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Study on Evaluation Index System of Optimal Allocation to Coal Resource

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Abstract. optimal allocation to coal resource is a major theme that cannot be ignored to healthy development of Chinese coal industry. In this paper, on the basis of an analysis to the main factors that affect optimal allocation to coal resource, an evaluation index system of optimal allocation to coal resource is put forward from the sustainable development, new-type industrialization, industrial safety, recycling economy, resource monitoring. The index system laid the foundation for quantitative evaluation of optimal allocation to coal resource.

Keywords: coal resource; optimal allocation; index system

1. Introduction

Statistic index system is an organic whole composed of a series of interrelated statistical indices, which reflects the interdependent and mutual restriction relationship in various aspects of the studied phenomenon. Social and economic statistical index system consists of two categories-constitutes, namely basic statistic index system and project statistic index system formed. Basic index system of social economic statistical index is also called total system, by the society index system, economic index system, the technical target system. Project index system is pointer on social economy special formulated special index system.

Energy is the foundation of economic development, yet currently the subject coal production and consumption of our country's energy sources wandered for a long time in the energy structure of 70% and along with the growth of Chinese economy, the rapid development of industrialization and urbanization, in the future for a very long time, this situation won't have big change. Coal resource is the cornerstone of Chinese energy security and on an important strategic position in Chinese national economy. So it is necessary to establish the coal resource index system. Through literature retrieval, we try to seek for articles about the coal resources or coal industry development index system research. Yet there are no articles to study this in 2002-2009 years "Statistical studies". This kind of articles mainly published in some energy magazines or newspapers of some institutions of higher learning. They studied and established the corresponding evaluation index system from industrial level or enterprise management angle. For example, from the enterprise level: the evaluation of mine development and construction [1-2]; from the industry level: the evaluation of the safety of coal industry [3], the coal industry, the evaluation of the economic growth mode [4-5], on the coal industry can be Evaluation of sustainable development [6], on the evaluation of cleaner production in the coal industry [7], on the coal industry, the evaluation of recycling economy [8], monitoring evaluation of coal resources [9] . The optimize the allocation of coal resources, not only to consider all aspects of the coal industry, but also to take into account the interconnectedness in all aspects. Establish coal resources optimization allocation of index system of coal industry development is not the

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simple addition of all aspects of evaluation index system. So with studying system elements of coal resource and the existing research results, and I try to construct the index system of optimal allocation to coal resources.

2. Analyze and Constract the Index System in Theorys

It is always a permanent task to build scientific and entire index system. Statistical indicators of scientific system is the content of the study, it should be neither repeated nor omission. The integrity of the system index should not reflect the consistency and connectivity in inner indicators, but also reflect the linkages and the upper levels in different systems. There is a close logical relationship in each level system. The scientific and entire system index should provide the scientific formulation of industrial development policy for all levels of government and relevant departments. Through timely and accurate index system to grasp, monitor and evaluate the coal industry, economic situation, development trend and problems. It contributes to coordinated economic development, optimize and upgrade industrial structure, change the mode of economic growth, improve regional competitiveness, and establish the resource-saving and environment-friendly society.

December 2007 State Council Information Office published "Chinese Energy Conditions and Policies" which shown Chinese energy development strategy and objectives. The basic content of Chinese energy strategy is "priority to conservation, relying on domestic supply, develop diverse, relying on science and technology, environmental protection, strengthening mutually beneficial cooperation in the earth ,and efforts to build a stable, economical, clean and safe energy supply system, to keep the sustainable development of energy support economic and social sustainable development. To achieve economic and social development goals, Chinese energy development "Eleventh Five-Year" (2006-2010) aims: "To the 'Eleventh Five-Year' dead line, the energy supply should basically meet the needs of national economic and social development." Energy savings achieve significant results, significantly improve energy efficiency, optimize the structure better, make substantial progress in technology, economic efficiency and market competitiveness improve significantly. With the socialist market economic system adapting the energy macro-control, market regulation, and laws and regulations and early warning systems gradually improving, the energy and economic, social, and environmental will have a great development. As non-renewable resources of coal resources, especially coal, as Chinese primary energy, coal-dominated energy structure is difficult to change for a long period of time in the future , coal-dominated energy consumption, increasing the pressure on the status of the environment, so it requires optimal allocation of coal resources index system to reflect this development strategy and core objectives. Therefore, we believe that the coal index system for optimal allocation of resources should reflect the following: evaluation of the sustainable development of coal industry, coal industry, the process of evaluation of new industrialization, safety assessment coal industry, coal industry cycle economic evaluation, monitoring evaluation of coal resources.

Sustainable development is the development that meets human needs without compromising the needs of future generations to meet their capacity development. It means: adhere to people-centered comprehensive, coordinated and sustainable development of the scientific concept of development, properly handle the population, resources and environment nexus to continuously enhance sustainable development, improving the ecological environment and the efficiency of resource use, promoting the coordination of man and nature, pushing the whole society on development of production and life of affluence, the harmonious development of ecological civilization. Sustainable development considers coal industry as a whole, it provides basic advice for the development of the coal industry from the traditional transition to sustainable development, through estimating the sustainable development of coal industry of systems engineering and output target.

The so-called new industrialization is to put information technology to stimulate industrialization, and put industrialization to promote information technology. That is a kind of industrialization which has high technology content, good economic returns, low resources consumption, little environmental pollution and a full play of human resource advantages. The content of the coal industry is a new type of industrialization: relying on science and technology, full use of the latest science and technology, enhancing economic efficiency and market competitiveness, sustainable development is to take the play of human resources, expand employment opportunities and improve the safety of industrialization.

Industrial safety is an important component of national economic security. National economic security means：There is not fundamental threat to country's economic development and economic strength. It includes two aspects, on the one hand it refers to the domestic economic security, it is that a country's economy keeps in a stable, balanced and sustainable development, on the other hand it is international economic security, it is that the foreign resources and markets which development of a country's economy depends on keep stable and sustainable, free supply disruptions or price volatility resulting from a sudden blow. The markets, investments and other commercial interests scattered all over the world are not threatened. The state should not only protect, regulate and control the domestic market, but also maintain the national interests of globalization, participate in international economic negotiations, to achieve international economic cooperation. The core of the coal industry safety is that a country or a region faces the threat of damage to the coal industry which does harm to its national interests, economic health, stability and sustainable development. Its security status should have the following basic points: firstly, a good development environment; secondly, a good industrial competitiveness; thirdly, a moderate foreign trade; fourthly, a good control at the coal industry. From the view of the optimal allocation to resources, enhancing industrial competitiveness point, it should be encouraged to import and export of coal, but to maintain an appropriate degree, especially for the energy industry like the coal.

Recycling economy is a kind of development which follows the ecological laws of the economic development. By controlling the material in the economic system and optimizing the internal circulation and energy flow, we reduce the resource inputs and pollution output to achieve the harmony circle between economic systems and natural ecosystems, the coal industry recycling economy, beside the general characteristics of economic cycles, we stress the following points: Firstly, taking the deficient and limited resources and energy, and the non-renewable resources like coal as the basic starting line. The source control is the priority; Secondly, taking the limited environmental carrying capacity and environmental problems as the basic starting line, the improving economic efficiency and cleaner production need be running through the production, processing and transformation of the entire process. Thirdly, the integration of industrial integration as an important foundation for the implementation of circular economy; Fourthly, to the comprehensive development and utilization of resources as an important means for the full use of resources, improve efficiency of economic borders and to improve the quality of the environment; fifthly, the market mechanism should be played full role in the implementation of circular economy, policies and regulations, technological innovation, organizational innovation and management innovation is the four support system of circular economy. Policies and regulations are very important the external drive to the implementation of circular economy, the three innovations is reliable internal assurance to the implementation of circular economy.

The monitoring of coal resources is to search a balance in a reasonable period of years from the supply side of resources, so that coal resource could keep the effective supply and acceptable output. With monitoring the ratio between the stock and yield, and the balance of service life of the coal resources, the government would issue red, yellow or green light to regulate the coal production capacity and then avoid the result of sharp fluctuations in coal production and the consequent of social or economic risk

3. Design the indicator system

3.1. The frame of the system index

Sustainable development factors to coal industry is that the coordination of coal economic development level, mining area society development level, environmental capacity level, resource management level and the coal production condition control level . At a time cross section if these aspects are not coordinated, it is not sustainable development at this cross section.

Economic indicators do not only reflect the current level of development of industry, but also reflect the potential for industrial development and trends, and reflect the evaluation object on the implementation of circle economy development model in its industry economic. Eco-environmental indicators used to measure the ecological management and environmental protection level. Characteristic index of recycling economy is in accordance with the basic principles of recycling economy, with reference to eco-efficiency indicators for

industrial screening, reflecting the coal industry and the level of material and energy use. The new coal industrialization is that change the old coal industry which based on raw materials into the modern new energy industry with high technology content, good economic returns, low resources consumption, little environmental pollution and human resource advantages into full play. Its evaluation involves the level of economic development, information technology, environmental protection, resource development, utilization of human resources and safety, and many other factors in the comprehensive evaluation.

Safety evaluation of coal industry should not only reflect the ability of the coal industry safety and effectiveness, but also reflect the basis of its development, as well as the sustainability of industrial development and development potential. So it must include industrial competitiveness, industrial capacity and other indicators of foreign trade, and need to consider the economic environment in the coal industry, high-tech and sustainability indicators.

The logic of the coal resource monitoring means that colleting the raw data of coal resources, the regional environmental indicators data, social indicators data and economic development data , through the resource evaluation system, assess the physical quantity of coal resources, the value and environmental impact, and get the results of warning of the final evaluation . By regulating coal output in the various coal resource regions, the government could make it match with the coal reserves, and then avoid risks, keep sustainable development.

Obviously there is a lot of repetition in each separate evaluation of each side. Therefore, evaluated by the analysis of relevant existing screening, we could get the main target of the evaluation of each side of the system index. And the choice indicators system should meet the scientific nature, purpose, links, uniformity and comparability principle, and then the system of the optimal allocation to coal resources is established. Their composition is 14 sustainable industry development indicators, 9 industrial recycling economic indicators, 9 industrial safety development indicators, 13 new industry degree indicators, 3 resources monitoring indicators.

Industry sustainable development indicators include the followings: market demand growth ratio, non-coal output ratio, reserve-production ratio of coal, coal recovery, land reclamation rate in mining subsidence, air quality, water quality, environmental protection into account the proportion of industrial, balance index of mine development, coordinated economic and social index, coordinated economic production index, coordinated economic environment index, contribution of coal industry to national economic development index.

Industrial recycling indicators: the comprehensive utilization of the gas, comprehensive utilization rate of the coal gangue, per ten thousand Yuan output value of wastewater discharge, per ten thousand Yuan output value of emissions, per million the value of solid waste emissions, utilization of mine water, closed circulation rate of washing water, clean production quality.

Industry safety indicators: industrial share of the domestic market, industry share of the international market, industry concentration ratio, the rate of foreign trade, the share of industrial exports in international market , the export rate industry of foreign dependence, the import rate industry of foreign dependence , control rate of foreign capital markets industry, industrial control rate of foreign capital.

The indicators of the degree of new industrialization: full in-kind labor productivity, corporate capital tax rate, fixed-asset investment growth rate, capital costs, labor costs, labor quality, R & D input intensity operations, integrated mechanization level of information, raw coal washed rate, per ten hundred Yuan output value of water consumption, per ten hundred Yuan output value of electricity consumption, per million tons mortality.

Resource monitoring indicators are: the effective supply of coal resources, production capacity endowment balance and equilibrium length of service.

3.2. The meaning of indicators

Coal demand growth = GDP growth rate × coal consumption elasticity. In addition to coal ratio = Non-coal output and coal preparation operations other than value / output value of the coal industry. Reserve-production ratio of coal = coal storage capacity / year of coal resources exploitation. Recovery = recovery

rate of coal mining. Mining subsidence land use rate = area of subsidence of land consolidation / collapse of the total land area. air quality (according to the national air quality standards to measure).

Gas Comprehensive Utilization = using gas volume / total gas production. Use of coal gangue comprehensive utilization of coal gangue = volume / total production of coal gangue. Million value of wastewater discharge = discharge of waste water / coal industry output value. Million value of emissions = emissions / output value of the coal industry. Million value of solid waste emissions = emissions from solid waste / coal industry output value. Mine the amount of water use efficiency = mine water / mine water emissions. Closed cycle coal washing waste water utilization rate = coal washing / washing water volume. Clean production quality (according to the national cleaner production standards).

Industry, domestic market share = (consumption of industrial products market - Industrial Products Imports) / industrial market consumption. International market share = coal industry product sales / World coal sales. Industrial concentration CR4 with industrial concentration, ie CR4 = Coal Industry sales in the first 4 companies / total industry sales. Industry foreign trade index = (EI) / (E + I), E is the total coal exports, I for the total imports of coal products. Industry share of the international export market = coal exports / total world trade. Industry dependence on foreign exports = total exports of coal / coal production. Industry dependence on foreign imports = total imports of coal / coal output. Industry, foreign industry, foreign market control ratio = sales / total industry sales revenue. Industry, foreign capital control rate = foreign assets industry / industry assets.

Full physical labor productivity = coal production / average number of all employees. Enterprise fund tax rate = total amount of corporate profits and taxes / (average net fixed assets + average working capital occupied by the amount of business).Fixed asset investment growth rate = (amount of investment in fixed assets in the report - based on the amount of investment in fixed assets) / base year fixed assets investment. Cost of capital reflects the coal industry and the use of capital within the enterprise to raise the price to the actual loan interest rate that banks generally one-year benchmark lending rate to measure. With the coal industry labor costs to reflect the average wage level. Labor quality = medium-sized enterprises of the coal industry the number of professional and technical personnel / number of employees in the industry. Business investment in R & D intensity = R & D of coal and medium-sized enterprises financing / sales revenue of the industry. Level = mechanized production of mechanized coal mining / coal output of the entire industry. The level of information with the level of hardware, software sophistication, the level of the main information activities, information sharing rate, rate of information of value, real-time information transmission capacity, investment in information technology, customer lead time changes, customer changes in completion rates, network coverage, average transmission delay, transmission error rate were consolidated judgments. Coal into clean coal washing rate = current yield / year of coal production. Million value of water consumption = current water consumption volume / value of the coal industry (million).Million in the year the output value of power consumption = amount of electricity consumption / production value of the coal industry (million).Million tons of coal industry in that year mortality = total number of deaths / year of coal production (million tons).

Effective supply of coal resources is the amount of the economic recovery in the total amount of coal resources. Endowment balance production capacity is defined by seam thickness, seam stability, structural complexity and hydrogeology conditions. All in a word, that is determined by the level of coal production capacity. The equilibrium length of service life is able to effectively supply coal to maintain a balanced production in the life.

4. Conclusion

"Optimization" is not a static allocation to coal resources, but it is a dynamic system with considering the economic, technological, social, political and other factors. The paper tries to construct an index system including 47 detailed indicators of 5 aspects of the optimal allocation to coal resources evaluation system with analyzing and summing up sustainable development of the coal industry, coal industry, the new industrialization process evaluation, safety evaluation of coal industry, coal industry cycle economic evaluation, monitoring evaluation of coal resources, So it could lay the foundation for quantitative evaluation of optimal allocation to coal resource

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