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RESEARCH ON THE OVERLAPPING RIGHTS OF COALBED METHANE IN CHINA

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ABSTRACT

Coalbed methane, a clean energy of high quality risen in the world two decades ago, has experienced a large-scale exploitation and utilization in a number of countries throughout the world. Since the quantity of coalbed methane resource in China ranks third in the world, the comprehensive development and utilization of coalbed methane plays a very important role in mitigating the tight supply of natural gas, reducing the emission of greenhouse gases, improving the atmospheric environment and decreasing the rate of accidents in coal production. However, compared to the United States and other countries, the development of coalbed methane in China is actually relatively slow and backwards due to the overlapping of the two rights in coalbed methane and coal industry. Therefore, the authors hope to offer suggestions to solve the problem and promote the sustainable development of coalbed methane industry in China through this research.

Keywords: Coalbed methane, Overlapping of the two rights, Sustainable development, China.

1. INTRODUCTION

Coalbed methane, commonly known as mash gas, consists of CH4 (methane). As a kind of unconventional natural gas stored in coal seams with coal, coalbed methane has gained its prestige as a clean and high-quality energy and chemical raw material in the world for nearly two decades. When the air concentration of coalbed methane reaches 5% to 16%, explosion will happen as soon as naked light is used, which is the source of gas explosion in coal mines. Today, due to its substantial reserve, coalbed methane has been widely used as a clean energy in the world. According to IEA (International Energy Agency), the coalbed methane buried at the depth less than 2000 meters in the world has reached 240 trillion cubic meters, more than twice of the proven reserve of the conventional natural gas. Currently, 12 major coal mining countries in the world are developing and utilizating coalbed methane, among which the United States, Canada and Australia focus on ground-based development and Germany, Britain and other European countries mainly concentrate on underground drainage.

IEA statistics show that the reserve of coalbed methane resource in China ranks third in the world after Russia and Canada. The coalbed methane buried at the depth less than 2000 meters has reached 30 to 35 trillion cubic meters, among which that buried at the depth between 300 and 1500 meters is about 25 trillion cubic meters (Table 1) [1], which provides a solid foundation for the development of coalbed methane. In recent years, Chinese government has been encouraging the development of coalbed methane industry and achieved certain results. As of December 2014, more than 13,000 coalbed methane wells have been developed. The production of ground and downhole CBM has increased separately from 750 million and 6.45 billion cubic meters in 2009 to 3.6 billion and 13.2 billion cubic meters in 2014 (see Figure 1) and initially realized large-scale development and utilization. However, China still lags behind the United States and other major coalbed methane developers and utilizers. For example, the CBM production in the United States has reached 50 billion cubic meters and accounted for 8% to 10% in its natural gas production [2]. In terms of the reasons, besides the inadequate investment in exploration, unmature technology and complex geological conditions, the overlapping of the two rights in coalbed methane and coal industry is one of the key issues [3]. This paper aims to carry out researches on the key issue and provide suggestions to solve this problem, so as to promote the sustainable development of coalbed methane industry.

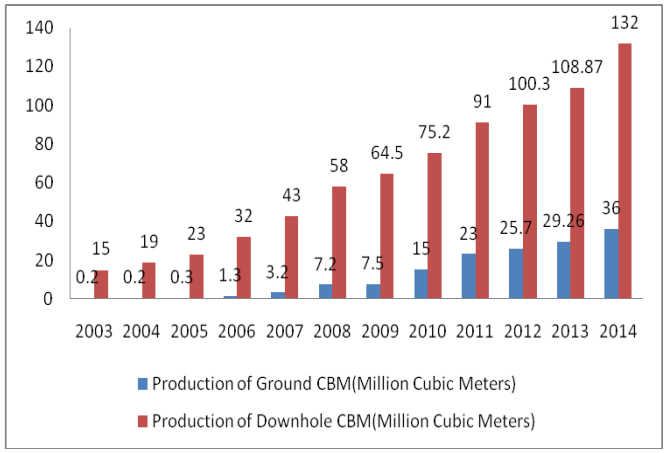

Figure 1. 2003-2014 Production of ground and downholeCBM

2. THE DEVELOPMENT OF CBM IN CHINA

The development and utilization of CBM in China can be divided into four stages, the first of which is from 1940s to the end of 1980s. This stage mainly focued on underground drainage to reduce gas disasters in coal mines. The gas drained has largely been treated as waste of little use and emitted into the atmosphere directly [4]. The second stage is from the late 1980s to the early 1990s, which marks the beginning of the exploration and development of ground coalbed methane and underground drainage. China has drilled more than 40 holes and conducted the hydraulic fracturing experiments and researches in the Longfeng Mine in Fushun, Zhongmacun Mine in Jiaozuo and Liwangmiao Mine in Hunan and other mining areas. Meanwhile, a large number of coalbed methane underground drainage and utilization projects gradually launched. In 1993, the annual drainage capacity of the underground drainage system has reached 4 × 108m3 and thus been used for industrial and domestic heating in certain areas [4]. The third stage is from 2000 to the end of 2003, during which, the development of CBM in China showed strong demand for science and technology, including geological exploration and reconnaissance as well as hesitation in development and trials. In general, this stage refers to the labor pains for the birth of the industrialization of CBM in China. The fourth stage, from 2003 to today, concentrates on the comprehensive exploration and development of ground coalbed methane and large-scale underground drainage and utilization. China has achieved substantial breakthroughs in CBM exploration and development and basically mastered the technology suitable for its own reservoir characteristics, laying the foundation for the commercial development of coalbed methane, which can be demonstrated by the more detailed investigation in the CBM geological research and exploration practice (see Table 1), the commercial production of CBM and the promotion and application of new technology. The fourth stage is an important stage and a major turning point in the history of the development of CBM exploration and development in China.

Table 1. The distribution area of CBM resources in China

Distribution area	Geological resources (100 million cubic meters)	Resource abundance (100 million cubic meters/square kilometer)	Recoverable resources(100 million cubic meters)	The proportion of geological resources (%)	The proportion of recoverable resources (%)
East area	113183.7	1.13	43176.69	30.75	39.72
Middle area	104676.36	0.81	19981.32	28.44	18.38
West area	103592.06	1.02	28583.2	28.14	26.29
South area	46621.85	1.06	16963.68	12.66	15.61
Qinghai-Xizang area	44.34	0.07	0	0.01	0
Total	368118.31	0.98	108704.89	100	100

3. THE SIGNIFICANCE OF CBM RESOURCES DEVELOPMENT

China is a big energy consumer with nearly 60% and 32.2% dependence on foreign oil and natural gas in 2014 and faces environmental pollution as economy enjoys rapid growth. Therefore, the development of coalbed methane resources in China has many important implications. Firstly, research shows that when the coalbed methane is directly emitted into the atmosphere, the greenhouse effect caused is about 21 times as much as that of carbon dioxide. Therefore, reducing the direct emission of coalbed methane into the

atmosphere can help to mitigate the greenhouse effect and improve the atmospheric environment [5]. Secondly, the exploration of coalbed methane before coal mining can make the gas explosion rate reduce by 70% to 85% and promote production safety in coal mines [5]. Thirdly, the large-scale development of coalbed methane can increase the supply of natural gas, ease the tight energy supply situation, increase the proportion of clean energy and improve the energy mix in China. Last but not least, the development of CBM in China can advance CBM related industries and speed up the transformation and upgrading of the coal industry to achieve common development. Since 2005, Qinshui, Hancheng, Fuxin and other areas have proven the geological reserves and more than 10 large-scale CBM fields have been found in Shanxi, Shanxi, Liaoning and other provinces. As CNPC (China National Petroleum Corporation), Sinopec Group (China Petrochemical Corporation), China CBM (China United Coalbed Methane Corporation), JAMG (Jincheng Anthracite Mining Group) and other enterprises realize large-scale development of the ground CBM in Fanzhuang, Zhengzhuang, Zaoyuan, Panzhuang, Liulin, Hancheng, Tiefa and other areas, the production of ground CBM has increased greatly from 20 million cubic meters in 2004 to 3.6 billion cubic meters in 2014 according to Ministry of Land and Resources and the cumulative production has reached 14.79 billion cubic meters, equivalent to saving 17.9 million tons of standard coal and reducing 2.2178 trillion tons of carbon dioxide emissions. With the increase of underground drainage and industrialization of CBM, the comprehensive benefits of CBM utilization in production safety, environmental protection, clean energy supply and other areas have become even more obvious.

4. THE OVERLAPPING OF THE TWO RIGHTS IN COALBED METHANE AND COAL INDUSTRY

With the increase of the production in coalbed methane, various sectors of the society have paid more attention to the development and utilization of coalbed methane in China. But compared to the United States and other major powers in coalbed methane development and utilization, China is quite backwards in the development of CBM. In terms of the reasons restricting the further development of coalbed methane in China, certain points are quite obvious, that is to say, the geological condition is very complex, the investment in exploration is inadequate and the technology is not mature, in addition, the overlapping of the two rights in coalbed methane and coal industry is one of the most critical issues. According to the data from the tenth meeting of China coal gas prevention and control inter-ministerial coordination and leading group, the quantity of drainage and actual use of coalbed methane have reached 14.1 billion and 5.8 billion cubic meters in 2012, a little far from the given objective of 15.5 billion and 8 billion cubic meters [6].

According to the verification data of mineral rights, as of June 2010, the total number of overlapping mineral rights reached 10,070 in China, among which the central region has the largest number, accounting for 55.44%; the western region accounts for 35.64% and the eastern region accounts for 8.92%. The overlapping mineral rights in Shanxi, Anhui, Yunnan and Guizhou are all over 1000, counted as 4 provinces having the most serious situation in China [7]. The overlapping of the two rights in coalbed methane and coal industry not only affects the spatial layout, timing and intensity of the exploration and development of the mineral resources in related areas, but also seriously hinders the conversion of mineral resources into assets and capital. What's more, tremendous waste and environmental pollution become increasingly severe. In the case of mineral resource shortage and serious environmental pollution, it is particularly important and urgent to handle the overlapping mining rights properly.

Taking JAMG (Jincheng Anthracite Mining Group) as an example, it suffered a Shylock-style puzzle in 2006, namely, the property of coal and coalbed methane is divided. Due to a variety of historical reasons and the national policy, the property of coal and coalbed methane of the X Block in the southeastern edge of Qinshui Basin is owned by different companies. Qinshui Coal in Jincheng, Shanxi is the only proven CBM field of more than 1 trillion cubic meters scale in China. JAMG has its coal property, while CNPC and China CBM owns the property of coalbed methane. CNPC and China CBM sued JAMG for violating their rights of developing CBM in its process of developing coal. The central government sent a special investigation team to carry out a thorough investigation to arbitrate this dispute and ultimately found it is illegal for JAMG to extract CBM in coal mining process and thus should be punished. However, JAMG believed that this judgment was not fair since it was inevitable to touch the CBM stored in coal seams during the coal mining process. On the other hand, there are laws to abide by when CNPC and China CBM sued JAMG for violating their rights since these two companies did have the rights to explore CBM in Qinshui Coal [8]. It is really difficult to judge who is right and who is wrong in this case since the property of coal and coalbed methane belongs to different companies. JAMG is just the first suffer of this kind of Shylock-style puzzle, while the same problem continues to occur in later years and has become one of the most important issues related to the sustainable development of CBM in China.

5. REASONS FOR THE OVERLAPPING RIGHTS IN COALBED METHANE AND COAL INDUSTRY

The root cause of the problem is that the system allows different stakeholders to own the property of coal and coalbed methane separately while these two resources coexist in coal seams and can hardly been separated, thus this system is not suitable and would cause a lot of problems especially when the two resources lie in the same area, which can be demonstrated by the dispute between CNPC, China CBM and JAMG. The specific reasons can be summarized as the following aspects:

5.1 The cut-throat competition between central enterprises and local enterprises

According to data from the Ministry of Land and Resources, currently 25 companies have the right to extract coalbed methane, among which central enterprises like China CBM, CNPC, Sinopec Group and a number of local state-owned enterprises are the main forces and the three central enterprises have possessed most of the resources [9]. However, local coal enterprises occupy the geographical advantage, therefore problems occur. On the one hand, China

CBM, CNPC, Sinopec Group and other non-coal companies undermined the coal mining conditions in the process of producing CBM to achieve the so-called profit maximization and resulted in the waste of coal resources and a series of security risks [7]. On the othe hand, the coal enterprises are eager to accelerate the speed of developing coal resources when the coal price remains at a high level, leading to a huge waste of the coalbed methane resources. In a word, central and local enterprises fight agianst each other for their own benefits and can hardly accept the solution of common development and win-win strategy.

5.2 The rights of developing coal and coalbed methane belong to different stakeholders

Getting the right of developing coalbed methane must be approved by the Ministry of Land and Resources while that of developing coal (annual output of 1.2 million tons or less) could easily be approved by the local governments, leading to the result that the enterprises having the right of developing coalbed methane may not get the the right of developing coal and vice versa. Since coal mining companies do not have right of developing coalbed methane, the implementation of coal mining and gas extraction integration is severely hampered. According to 2014-2020 China CBM industry in-depth research and development trend analysis report, CBM is managed by the central government while coal is managed by local governments. The fact that the rights of developing coal and coalbed methane belong to different stakeholders as well as the lack of effective coordination undoubtedly become the important reason for the disorder, conflict and waste in the exploitation of coalbed methane.

5.3 The internal contradiction between policies made by different national ministries

In terms of the national policy, State Administration of Coal Mine Safety asked local coal enterprises to extract ground coalbed methane first and excavate coal later while the Ministry of Land and Resources required that only the enterprises having the right to extract CBM could develop CBM. The conflict between different policies of two national ministries makes enterprises at a loss in the actual operation, therefore most companies choose the way in accordance with the principle of maximizing their own interests. During this kind of operation, it is bound to hurt the interests of other companies and further exacerbate the conflicts among different enterprises. And those enterprises felt violated are bound to complain to higher authorities and thus would create disputes between the national ministries and further intensify the conflicts.

5.4 The imprecision and contradiction in laws and regulations

Laws and regulations are quite essential for the development of coalbed methane industry, but the serious reality is that there exist imprecision and contradiction in laws and regulations. For example, article 30 of the Ore Resource Law stipulates that paragentic and associated minerals of industrial value should be incorporated into comprehensive utilization and waste needs to be eliminated in mining major minerals. This article clarifies the relationship between paragentic, associated minerals and major minerals and gives the individuals owning the property of the main mineral the right to exploit paragentic and associated minerals. However, the clear definition and scope of paragentic and associated minerals as well as the method of solving the problem that paragentic and associated minerals owned by different enterprises are not presented. Besides, the Ore Resource Law and its supporting regulations recognize CBM as an independent mineral and grant individuals indepedent rights to extract CBM while the Coal Act clearly treats CBM as the associated resource of coal. Therefore, the dispute between coalbed methane and coal mining rights is by no means a simple question, but a severe problem exposing the legal loophole [10].

6. DISCUSSION

Relevant ministries should make new policies to specify the right of developing CBM as soon as possible to solve the problem fundamentally, rationalize the relationship between CBM and coal mining rights, promote the integration of CBM extraction and coal production vigorously and support coal mining enterprises and coalbed methane extracting companies to seek for active cooperation and common development. The specific recommendations are as follows.

6.1 Separate legislation for coalbed methane to achieve win-win progress

The state should consider separate legislation for coalbed methane instead of simply attaching CBM to the existing laws of natural gas or coal resources. The reason is that CBM is associated with coal during its exploration and extraction in terms of its formation mechanism and location and similar to natural gas in terms of its transportation, processing and utilization after extraction, therefore, the act of simply attaching CBM to either side of law is not appropriate. At the same time , the government can perform its function of mobilizing social resources and promoting coordination to solve the problem of overlapping mineral rights through the executive and legislative means, so the exploration and development of coalbed methane can be in harmony with the production of coal and the goal of coal production after CBM extraction and the integration of coal and CBM development can be achieved, thus could advance the mutual benefit and common development of these two industries.

6.2 Financial support for the development of CMB industry

The existing subsidies from the central government could not even meet the demand of CBM development in Qinshui Basin which already enjoyed relatively good conditions (lose at least 0.35 Yuan per cubic meter of CBM production). The higher costs and investment risks elsewhere make the majority of companies lose enthusiasm in coalbed methane development. At the same time, the lack of investment and financial support creates difficulties in financing for some small and medium sized enterprises and thus inhibits the development of coalbed methane industry. Therefore, the central government should increase policy support and give differentiated financial subsidies to different regions and enterprises considering their different CBM extraction costs. Meanwhile, the central government should spare no efforts to

promote the state-owned banks and fund companies to invest more to advance the development of CBM industry.

6.3 The central government should set uniform standards

China should study and set uniform standards in coalbed methane exploration, drilling, fracturing, mining, gathering, utilization and other aspects as soon as possible. From the perspective of the top-level design, the state should clarify the overall plan, specific procedures, division of responsibilities and actual schedules of CBM standards and further improve the skills and levels of the standards development research team through introducing outstanding technical talents, improving the professional knowledge structure and creating a mechanism of comprehensive trainings and experience exchanges. Besides, the country should further broaden the channel of project funding, increase investment in CBM standard setting, establish an incentive mechanism to improve the enthusiasm of the standard-setting bodies and related enterprises. What's more, the government needs to have a group of national level to set CBM standards, management departments and relevant committees to strengthen the organic linkage in standard setting and ensure the unification of the contents.

6.4 Coal and CBM enterprises further strengthen cooperation

Since the recent international coal price remains at a low level and the domestic coal market experiences a downturn, the coal mining process slows down in China, which provides an important opportunity for the cooperation between coal and coalbed methane businesses. CBM enterprises should actively seek cooperation with coal companies, establish joint ventures to promote the exploration and development of CBM and reduce damage to the coal and coal mines in CBM extraction to ensure the maximization of the overall benefits. Coal enterprises should also strengthen the cooperation with the non-coal enterprises having the right to develop CBM like CNPC and open up new paths for their own transformation and development.

6.5 Improve the establishment of CBM network and other related matters

The state should accelerate the development of natural gas pipelines, establish the network for methane of high concentration (CBM with the concentration higher than 95%) without setting any additional conditions and further promote the downstream market open to CBM and other unconventional natural gas producers. Meanwhile, the government should advance the planning, investment and construction of the CBM network in major areas and encourage private capital investment to accelerate the development of CBM network and the rapid progress of the coalbed methane industry as a whole.

7. CONCLUSIONS

The CBM resource is rich in China and the development and utilization of coalbed methane have considerable security, social and environmental benefits. During the eleventh five-year plan period, the domestic ground CBM extraction has a smooth start with the support of a series of national policies. However, with the development of coalbed methane industry, mining rights disputes continue to occur and seriously affect the development of CBM industry in China. The overlapping of the two rights in coalbed methane and coal industry cannot simply be attributed to the lack of coordination among departments and enterprises, actually the imperfection in policies, regulations, systems and plannings is the key reason for this problem. Therefore, in order to address this issue, the government and enterprises should take their own responsibilities, that is to say, the government should focus on the top-level design and further improve policies, laws, systems and plannings and enterprises should concentrate on R&D, reduce cost, promote cooperation and spare no efforts to advance the sound and sustainable development of the CBM industry in China.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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