Regulating China’s shale gas development: challenges, principles and approaches

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Abstract. The shale gas development is an important aspect of China’s discourse of energy revolution. Compared with the practice of the United States, China’s shale gas development is faced with many different situations. Regulating the shale gas development would be a key concern of the Chinese government. There are four challenges that should be addressed by the Chinese policy makers for the regulation. The first is to ensure the public safety, which focuses on the possible adverse impact of the shale gas development especially from the application of the techniques of hydraulic fracturing and horizontal drilling. The second is to prevent the ecological damage and environmental pollution, which gives attention to the negative externalities of the shale gas development. The third is to protect the rights and interests of the local people, which centers on the claims of the local people. The fourth is to promote the efficiency of the shale gas development, which emphasizes the strategic value of the shale gas. For better regulating the shale gas development, four principles should be upheld. Building a rules system and reforming the pattern are two critical points of improving the regulation.

1. Introduction
Energy is an important factor of sustainable development, therefore, to find economic, safe, efficient, and environmentally sound energy resources becomes the mission of many countries and regions. There were lots of energy resources that cannot be developed due to the constraints of economic, technological and legal conditions. However, with the breakthroughs of the foregoing areas, the issues of developing some of the unconventional energy resources have been proposed. The development of the shale gas is one of the prominent cases. The “Shale Revolution”, which refers to the significantly increase of oil and natural gas production in the United States by using the techniques of hydraulic fracturing and horizontal drilling, has had a profound impact on the world energy market [1]. The practice on shale gas shows that it could contribute not only to ensuring energy security but also to the things of environmental protection, scientific and technological progress, regulation reform, improvement of the legal system, etc.

China has abundant reserves of shale gas resources. The issue of the shale gas exploitation has been proposed by the decision makers. The discourse of the energy revolution, which consists of five struggling directions, i.e., promoting the revolution in energy consumption, supply, technology, systems, and international cooperation, is an important guideline for future energy development of China [2]. The development of shale gas is an essential aspect of the energy revolution. It is explicitly included in the design of the future energy supply system, which aims at diversifying the sources of energy supply. According to the 2017 China Mineral Resources Report published by the Ministry of Land and
Resources of China, the geological resources of shale gas shallower than 4,500 meters were 122 trillion cubic meters, including 22 trillion cubic meters recoverable.

Examining from the process of shale gas development, we could find that the problems such as public safety, environmental protection, resource development efficiency, and the rights and interests protection of local community, cannot be ignored [3]. Therefore, it is necessary to discuss the issue of regulating the shale gas development. The success of the United States’ shale gas development benefits from many factors, e.g., the geological conditions conducive to exploitation and the unique operating model of many small businesses participated in. While the situations are different for China’s shale gas development. Compared with the long history of shale gas development of the United States, China just stands at the starting point, and the challenges and approaches are still unclear. This article focuses on the issue of regulating China’s shale gas development. The Challenges facing the Chinese policymakers, the regulatory principles that should be applied, and the approaches for establishing and improving the regulation are discussed.

2. Challenges

2.1. Ensuring the public safety
There would be many risks derived from the development of shale gas, forcing the policymakers to consider how to ensure the public safety. The techniques of hydraulic fracturing and horizontal drilling are the core of successful shale gas development. However, a series of side effects related to them should be concerned. The application of these techniques may induce geological disasters such as earthquake and land subsidence, and also may cause water tensions because of the huge water demand and possible water pollution. Even in the United States, the development of shale gas is still controversial, e.g., some states warmly welcome while others strongly oppose [4]. According to the investigation of the U.S. Energy Information Administration (EIA), China’s shale gas resources are mainly distributed in the areas of Sichuan basin, Yangtze platform, Jianghan basin, greater Subei, Tarim basin, Junggar basin, and Songliao basin. These places are faced with complicated situations, including geological vulnerability, high population density, water scarcity, underdeveloped infrastructure, safety of important public works, protection of the ecological environment functional area, etc. The shale gas development would bring security risks in these contexts. Meanwhile, many other potential factors like the acquisition of land, traffic congestion or accidents, and the disturbance to local residents, could also be risky for public security under the complicated circumstances. In short, it is important to keep cautious of the shale gas development for ensuring the public safety.

2.2. Preventing the ecological damage and environmental pollution
Examining from the experience of the countries early engaged in shale gas development, we could find that the ecological environmental problems have always been a focus of the regulation. The development of shale gas involves many critical elements, such as the entry of land, drilling, hydraulic fracturing, and storage and transportation of gas. They could have major impacts on the ecological environment. The main environmental problems include excessive water consumption, vegetation destruction and surface erosion, methane leakage, pollution of water, atmosphere, noise and solid waste, etc. If blindly developing the shale gas without the consideration of the environment capacity and the economic and social functions of a specific place, it would probably lead to disastrous consequences. Accelerating the improvement of ecological environment and building a modern energy system have become an important task of the Chinese government, according to the Outline of the 13th Five-Year Plan for Economic and Social Development (2016-2020). Balancing the relation between shale gas development and environmental protection requires not only the basis of techniques, but also the support of policy and legal systems, while many of them are great challenges facing the Chinese society.
2.3. Protecting the rights and interests of local people
How to protect the rights and interests of local people is one of the issues should be paid much attention to because of the possible major impacts upon the local communities and related parties from shale gas development. Although the economic benefits of shale gas development have gradually been recognized by local leaders and related citizens in many countries’ practice, the potential threats to public health and safety from the unreasonable operation of shale gas development, such as increased trucking, natural gas leaks and noise, are still the concerns of many local people and sometimes even the sources of many disputes [5]. In China, the operation of shale gas development would be carried out in many sensitive areas, where the economic and social relations are very complicated. The traditional approach of China’s energy resources development is dominated by the large state-owned enterprises, mainly serving the purpose of gain profits and executing the major decisions of the central government. Therefore, the interests of local people are often not an objective of consideration. This would be risky with the increasing rights awareness of local people.

2.4. Promoting the efficiency of resource development
The shale gas could be seen as a strategic resource, which requires reasonable and effective ways of development. The unique business model that allows diversified participation of different market players is believed to be effective for the development of the United States’ shale gas. This prompts us to think the issue that which way would be efficient and suitable for China’s shale gas development. The development of shale gas has a characteristic of high dependence on the comprehensive support of technology, economy, and policies and laws. Therefore, any insufficiency of these aspects might cause low efficiency, resulting in not only waste but also damage of the sustainable development abilities of a region. China is facing a situation of severe shortage of energy resources as the demands grow quickly. Ensuring the energy security has been identified as a national strategy. To increase the efficiency of energy development becomes an essential choice. The shale gas, if used properly, could sustain China’s development of a long time.

3. Principles
3.1. Precautionary principle
Regulation is an important approach to internalize the negative externalities resulting from the shale gas development. The concept of risk could be defined as the possibility or uncertainty of suffering some adverse consequences or burdens. Thus taking precautions to avoid possible losses is essential. The development of shale gas is accompanied by various risks. The precautionary principle, which has been prescribed by many environmental and energy laws, should be applied strictly. Actually, many of the discussions on regulating the development of shale gas focus on the issue of preventing risks, e.g., which risks should be specially regulated and which measures should be taken. Once the risks in the process of shale gas development occur, the costs and consequences would be unbearable. Regulation and appropriate liability systems are important drivers for operators to take measures to reduce risks. For policy makers, identifying the risks and formulating the plans should be the center of work.

3.2. Comprehensive control principle
It is necessary to adopt plural and comprehensive measures from multiple perspectives to regulate the shale gas development. From the practical experience of the United States, adopting a tool combination, which consists of tools and actions from the government, social organization, enterprises, etc. has achieved good results for the regulation of shale gas development. With the emergence of the concept of good governance, which emphasizes the collaboration of a complex set of institutions and actors that are drawn from but also beyond government in public affairs [6], integrating different actions and measures into the regulation of the shale gas development would be helpful. The traditional single-centered (government-based) and one-dimensional (lack of response) regulation
model seems to lack flexibility and effectiveness because of the disadvantage of neglecting the role and action logic of different players.

3.3. Public participation principle
There should be a well-ordered public participation for properly regulating the shale gas development as it involves not only the correct exercise of government power but also the interests of the public and many direct stakeholders. “Decision making that uses participatory, dialogue-based processes conducive to producing competent understandings and social legitimacy will require financial and political support and ongoing commitment from leaders in industry, government, and stakeholder organizations.”[7] The disadvantages of the approach that solely rely on government to regulate energy development are increasingly apparent in the context of civil society, democratic politics, and good governance. Public participation represents a number of arrangements that allow the stakeholders to seek their private and public interests, such as the information disclosure system, dispute settlement mechanism, and open of decision making procedure [8]. The public participation we advocated is an orderly participation, which requires preventing the tendency of populism and respecting the existing values and rule of law.

3.4. Block focused principle
The shale gas block is an important planned geographical space, in which a series of specific operating activities could be performed and many conflicts might be produced. Hence, the block should be given special attention by the regulation. The regulation of shale gas development needs to deal with many issues related to the blocks, such as the delineation of the blocks’ boundary, the design of the blocks’ development plan, the investigation of the geological and environmental conditions of the blocks, and the administrative license for development activities. Concentrating on the blocks could help the regulator find problems and respond quickly. Deconstructing the process of the shale gas development, we could find that most of the decisions from the operators and the regulators are more or less affected by the characteristics of the block. The regulatory policies should consider the particularity of the blocks, which would determine the application and actual effects of related countermeasures.

4. Approaches

4.1. Building a policy and law system for regulating the shale gas development
There is a big challenge that should be addressed by the regulation of China’s shale gas development, namely building a harmonious and effective system of rules. In terms of the laws, the comprehensive and integrated legislation about the development of shale gas is still absent. Most of the articles that could be applied are scattered in the complicated legal systems, creating many uncertainties and additional costs. On the policies, some for promoting the shale gas development and enhancing related regulation have been formulated, such as the Shale Gas Development Plan (2016-2020) and the Policy for the Shale Gas Industry published by the National Energy Administration (NEA), and the Notice on Introducing a Subsidy Policy for Shale Gas Development and Use jointly issued by the Finance Ministry and the NEA. All of these laws and policies are necessary for better shale gas development, but the inadequacy is also obvious.

The ideal rules system for regulating the shale gas development should fully take into account the facts that the shale gas has multiple values of economy, ecological environment and society, and the shale gas development might impose many major impacts not only on the energy sector but also on the social and economic structure. Therefore, addressing the following things could be helpful. First, the value orientation of the regulation should be clarified. For ensuring the energy security, we should encourage the development of shale gas. Meanwhile, we must pay enough attention to the possible problems in order to protect other priorities (e.g., environmental rights). Second, the existing policies and laws should be integrated. An important work is to promote the State Council to formulate a comprehensive administrative regulation to deal with the shale gas issue. Third, the establishment and
development of self-governance rules of shale gas development should be promoted. The rules from the shale gas industry organizations would be influential.

4.2. Reforming the pattern of regulating the shale gas development

According to the theory of path dependence, the regulatory pattern of the shale gas development in China would probably continue the traditional model that has been applied in almost all the conventional energy areas. The main feature of this model is that the role of the government and the function of the plans are highlighted. As foregoing discussed, the development of shale gas has its own complexity, which calls for more adaptive regulatory path. Therefore, reforming the unreasonable aspects of the old regulatory model is essential. There are two significant events that are profoundly affecting China should be noted for this reforming, i.e., further deepening the market-oriented reform and promoting the institutional system reform for ecological civilization. The market-oriented reform requires controlling the natural monopoly of energy sector and respecting the participation of private actors. The institutional system reform mainly focuses on the adjustment of government functions, and the design and improvement of a series of systems for protecting the natural resources and environment.

Meanwhile, the concept of good governance could inspire the reform of the regulation. According to the definition of the Commission on Global Governance, governance refers to “the sum of the many ways individuals and institutions, public and private, manage their common affairs; it is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken.”[9] There are eight principles of good governance proposed by the United Nations Development Program (UNDP), i.e., participation, consensus orientation, strategic vision, responsiveness, effectiveness and efficiency, accountability, transparency, equity, and rule of law [10]. All of these principles are good guidelines for reforming the pattern of regulating the shale gas development of China. In the field of energy, although some market-oriented reforms have been carried out, many practices implemented in the planned economy period have still been maintained. With the increase of the marketization level of China’s energy sector, the transformation of reducing unnecessary government intervention and fully utilizing the market mechanism is inevitable. In short, a new paradigm that focuses on regulating the shale gas should appropriately change the concept and practical actions for better adapting to the new realities.

5. Conclusions

The success of the United States’ shale gas development has a profound impact on the world energy market and the international relations. China also has rich shale gas resources. The development issue has been proposed. But the fact that China has its own special situations should be concerned for developing and regulating the shale gas. The development of shale gas could help China ease the tensions of the energy supply. However, many challenges should be properly dealt with. Although the application of the new techniques promoted the successful development of shale gas, many risks also emerged. The possible geological disasters and pollution might impose major threat on the security of local people and the environment. The interests of the local people might be severely affected. The shale gas could be seen as a strategic resource for the sustainable development of China. Therefore, the development should solve the problem of efficiency. For better regulating the shale gas development, four principles should be upheld. The precautionary principle holds that identifying the risks and building some mechanisms to prevent the bad consequences are one of the core works of the regulation. The comprehensive control principle believes that diversified tools and measures should be adopted for more effective regulation. The public participation principle requires the regulation must pay close attention to the opinions of the public, and build institutions like the information disclosure system to secure the participation of the public in shale gas development. The block focused principle emphasizes that the regulation should center on the particularity of the shale gas blocks. The dependence on the traditional model to regulate the shale gas development may cause many problems.
Hence, a transformation in terms of the rules system and the concept is needed. Building a suitable and effective rules system should concern the things of clarifying the value orientation of the regulation, integrating the existing policies and laws, and promoting the establishment and improvement of the self-governance rules. In short, reforming the unreasonable practice of the old regulatory model is important. Taking ideas from the concept of good governance especially the eight principles proposed by the UNDP could be an inspirational path.

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