

# The Conception for Policy System on Unconventional Natural Gas Development in China

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## **1. The status of unconventional natural gas exploration and development in China**

### 1.1 The status of exploration

Since 1980s, the unconventional natural gas has been achieved marked achievements in China. CBM (short for Coalbed Methane), tight gas and shale gas reserves of about 80 trillion, which is 1.2 times of conventional gas. CBM and tight gas have been already achieved of industrialisation, intensive and effective exploitation, but the development of shale gas is still in the stage of technical reserves.

#### 1.1.1 CBM

According to the new round of the evaluation results for the oil-gas resources by ministry of land and resources, CBM resource in China is evaluated as 36.8 trillion at shallower than 2 000 m, amount of recoverable resource is about 10.87 trillion. It mainly distributes in Shanxi, Shaanxi, Liaoning, et al. CBM development started in 1980's, but capital, technology and policy constraint on the development. Therefore, China put out a series policy encourage CBM's develop and utilize in 2006 and 2007. Under such policies, CBM has been built production capacity more than 3 billion m<sup>3</sup>/a at the end of 2010. Achieve annual output of 1.5 billion; 1.18 billion of commodity charge, construction completed a pipeline, compression and liquefaction capacity of 5.6 billion per year.

#### 1.1.2 Tight gas

At present, the tight gas' exploration and development is still in its early stages, proved is approximately 23.5%, technology recovery only 50%, According to China's tight gas standards (air infiltration rate of less than 1 mD, cover substrate permeation rate of less than 0.1mD), Domestic tight sandstone gas recoverable resources about 9~12 trillion, representing about tight gas resource in the global 5%, It mainly concentrated in Ordos, Sichuan, Songliao basin and other basins. Tight gas development in China started relatively late, but after nearly ten years of technological research, the development of tight gas have a breakthrough progress. Tight gas production reached 16 billion cubic meters in 2010, which yields more than 13.5 billion in Ordos's area.

#### 1.1.3 Shale gas

According to analogy and volume estimation, approximately 31 trillion cubic meters of shale gas resources in China, mainly Paleozoic shale, in the South of lower Paleozoic in North China and shale of Cambrian-Ordovician in Tarim basin shale. Shale gas development in

China has just started, still at the stage of technical reserves. Current shale gas has been in Sichuan construction pilot and from 2007 onwards in succession and the United States in San Tin to cooperation with foreign companies, shell companies, So far, it has conducted 16 shale gas well, 1 horizontal well, 6 wells in production for more than 10,000 m<sup>3</sup>/a.

### 1.2 The Analysis of development trend

Because of the unconventional natural gas exploration costs generally higher than conventional gas production costs, Chinese conventional natural gas has more space for development. Base from a technical and economical point, unconventional natural gas is viewed as additional resources of conventional natural gas.

China's CBM mining exploration and development study has been conducted for decades, CBM mining test has also carried out in Shanxi, Jincheng and other places, accumulating a lot of experience and technology, it can enter the commercial development, is the most realistic non-conventional gas resources. During the period of the "Eleventh Five Plan", the development of tight sandstone gas technology has made tremendous progress, But under the present condition of development costs and gas prices, tight gas development inputs and outputs of flat in the marginal stage, requiring further mining through policy incentives. Shale gas is still in its infancy stage, above all, it should make a technological reserve, Ensure develop valid and scale in the future.

Therefore, China's unconventional gas should be positioned to complement conventional natural gas resources; its development should be given priority for business of coal bed gas mining, using policy to support development of tight sandstone gas. It adopts independent research and development, international cooperation to reserves shale gas mining technical, and encourages efficient production of shale gas in terms of policy.

## 2 Analysis of unconventional gas existing policy in China

### 2.1 Policy status

Because of CMB started relatively early, China had already introduced some tax policy encouraging its development. The No.47 file released by State Department in 2006 and the No.96 file released by Ministry of land and resources are very important to develop CBM in China. (See table 1)

Contrasts tight sandstone and shale gas, there are not many policies on its development. But China has added shale gas development into the 12th Five-Year Plan, and managed as an independent mine, formulated a "shale gas development plan". On December 2011, National development and Reform Commission announced that opening CBM and shale gas producer price and regulated by the market.

Table 1 Policies of CMB in China

Financial project	Preferential policies
Value added tax	Refund after collection policy
Enterprise income tax	For such Chinese-foreign cooperative exploitation of CBM enterprise income tax carry out "Two-year Exemption and Three-year Half Reduction"

Financial project	Preferential policies
Resource tax	Exemption
Mineral area usage fee	Annual capacity is no more than 1 billion, exemption; 1 - 2.5 billion, 1%; 2.5 - 5 billion, 2%; more than 5 billion, 3%
Price	Civilian coal-bed gas price shall have to reach an agreement with supply and demand in consultation. If the price has been included in local government management, it needs to create conditions to open the price as soon as possible.
Subsidy	The standard of CBM from the central finance is 0.2 RMB yuan/m <sup>3</sup> Local finance may be provided with appropriate subsidies, where necessary, specific standard is announced to local finance.
Equipment depreciation	CBM drainage and utilization equipment use double declining balance depreciation and sum of years digits depreciation to accelerate depreciation
CMB power	CMB power carries out the price as power production from biomass.

## 2.2 Problems

### 2.2.1 Policies are not systemically

From CMB, it can see that, China support for the development of unconventional gas almost entirely focused on fiscal policy, there is a serious lack of input to the relevant industry or field. Such as, no boot technology reserves policy mechanisms or financial support for CMB industry related system. However, financial support is very important in development of unconventional gas, but if can put forward multidimensional policies, it can produce "1+1>2" policy effects.

### 2.2.2 Policies lack specific

There is no tax preferential policy in transmission and distribution of coal-bed gas exploration, network links. Present relevant tax policy systems do not mach well it led to CBM fields unbalanced develop, it's not conducive to balanced develop. Otherwise, current financial policies in China focuses on coal-bed gas development results, it pay no attention to its development (such as exploration, development, testing).

### 2.2.3 The incentive policies inadequate

In order to encourage the rational exploitation of CBM resources, China have grant a degree of financial and tax incentives to support. These policies give some extent inspired enthusiasm for CBM production. It effectively promotes the yield. But investigation in several CBM production companies, it found that under present tax preferential policy, develop projects are still difficult to profit or just a meager profit.

## 3 The construction of China's unconventional natural gas development policy system

### 3.1 Construction principles

3.1.1 Integrity principles. The strategic objective of China's unconventional gas is a complement to conventional natural gas resources; therefore it should take present CMB, tight sandstone and shale gas policy as a proper subset of the policy system of unconventional gas.

3.1.2 The principle of combination of strategy and tactics. The top design of Policy system should master the development of unconventional gas's strategic objectives and direction on the whole; Middle-level design should be in close connection with the present situation and development tendency of unconventional gas, which came to the connecting link between the role; the bottom design must be operable, which developed under specific circumstances of the various of unconventional gas resources.

3.1.3 The principle of combination of control and motivation. Policy system must encourage and promote the development of unconventional natural gas and make basic control policy for it, making it consistent with the national economic and social development

3.1.4 Principles for combining relative independence with organic connection.

Sub policy system must be independent, corresponding to the appropriate authorities or bodies. At the same time, policy system must be a whole of organic connection, the coordination of policies must be systemic, which has good operation mechanism.

3.1.5 Principles for combining Chinese characteristics with international practice. Due to the unconventional natural gas industry in China has a different background to other countries, we need consider the policies based on the reality of China, which reflecting the technical and economic conditions of unconventional natural gas field. At the same time, policy formulation in terms of specifications and support the development of unconventional gas to capture the experience of successful countries, make policy system with a global outlook.

### 3.2 System structure

System construction of Chinese unconventional gas development policies in this article is divided into three levels, strategies, systems, and implementation layers respectively.

#### 3.2.1 Strategy layer

Strategy level is based on the development strategy of Chinese unconventional gas target, constructed in accordance with the regulatory policy, incentive policies and supporting policies. Control policy is the basic systems of managing unconventional gas system, incentive policy is the sustainable development of unconventional gas in China policy, supporting policies is for ensuring that the regulatory policy and incentive policies successfully implemented in other relevant policy system.

#### 3.2.2 Regulation level

Systems level is set up in 6 sub systems, including unconventional natural gas regulatory policy, industrial policy, the legal system, fiscal policy, technology and personnel policy, financial policy. From the development experience of United States of unconventional gas, we know that regulatory policy, industrial policy and the legal system are regulate necessary conditions for the development of unconventional natural gas, and most of incentive policies embodied in the financial, monetary and investment in science and technology. The establishment of system is complied with principles for combining relative independence with organic connection, making basic operating mechanism of the development of unconventional natural gas industry.

### 3.2.3 Implementation level

Implementation level established 21 policy under the system level, covered the unconventional natural gas industry of China in the areas constitute a relatively complete system of policy. Taking the unconventional gas technology and personnel policies as an example Firstly, because of the lack of existing technology, it needs to cooperate with internal country, deriving from international cooperation policies; buying technology for failure to carry out directing cooperation, involving technology transfer policy; involving science and technology innovation policy for the way of relying on homegrown technology; in the cooperation or technology development, training of personnel policy is also essential. In addition, in mining rights management and defining standards have distinct Chinese characteristics on the policy development, the specific formulation of subsidies and preferential tax policy is according to a variety of unconventional gas technical and economic conditions

Table 2 The main content of China's policy system of unconventional gas development

Strategy	Regulation	Implementation	Main application object
Control policy	Unconventional natural gas regulatory policy	Mining right management	CBM、 Shale Gas
		Reference standard and norm	Tight gas
		License policy	CBM、 Shale Gas
		Monitoring policy	CBM、 Tight gas 、 Shale Gas
	Unconventional natural gas industrial policy	Industrial structure policy	CBM、 Tight gas 、 Shale Gas
		The upstream exploration and development policy	CBM、 Tight gas 、 Shale Gas
		The middle reaches of the pipeline policy	CBM、 Tight gas 、 Shale Gas
		Downstream use policy	CBM、 Tight gas 、 Shale Gas
	Legal system	Mineral resources law	CBM、 Shale Gas
		Environmental protection law	Shale Gas
Land law		CBM、 Tight gas 、 Shale Gas	
Encourage policy	Unconventional natural gas fiscal policy	Investment policy	Shale Gas
		Price Policy	CBM、 Tight gas 、 Shale Gas
		Subsidy policy	CBM、 Tight gas 、 Shale Gas
		Preferential taxation policy	CBM、 Tight gas 、 Shale Gas
	Unconventional natural gas science and technology policy	International cooperation policy	Shale Gas
		Importation of foreign technology policy	Tight gas 、 Shale Gas
		Scientific and technological innovations policy	CBM、 Tight gas 、 Shale Gas
		Personnel training policy	Tight gas 、 Shale Gas
	Unconventional natural gas financial policy	Financing policy	Shale Gas
		Credit policy	Shale Gas
Supporting policy	Green development policy		

	Energy policy
	Industry policy

#### 4. Conclusion

(1) In general, the present unconventional domestic natural gas is still in the initial stage of development, with the support of the policy, it will expect to form unconventional gas development with Chinese characteristics, and become to an important supplement of natural gas resources in China, it will play an important role in the energy structure.

(2) The present government encourages inadequate unconventional natural gas (special to tight sandstone gas and shale gas) exploration, development, test and production of preferential policies, lack of systematic and targeted and pay less attention to the development process. So it's not conducive to the development of unconventional natural gas. Government did not establish and improve a policy for supporting the development of unconventional gas system.

(3) This paper discuss a policy system which is made of strategic, institutional and implementation, it completely coverage of the unconventional natural gas industry in China and proposed the further research orientations of importance on regulatory policy, industrial policy, the legal system, fiscal policy, technology and personnel policy, financial policy.

(4) Unconventional gas developments to revitalize China's natural gas industry, it is beneficial to China's economy and society green development. Working out suitable policies for the development of unconventional natural gas system in China is the key to progress the cause, it also a important part of China's natural gas system of laws and regulations