

Recent Significant Gas Discoveries in China: Influence on National Energy Structure and Future Gas Exploration

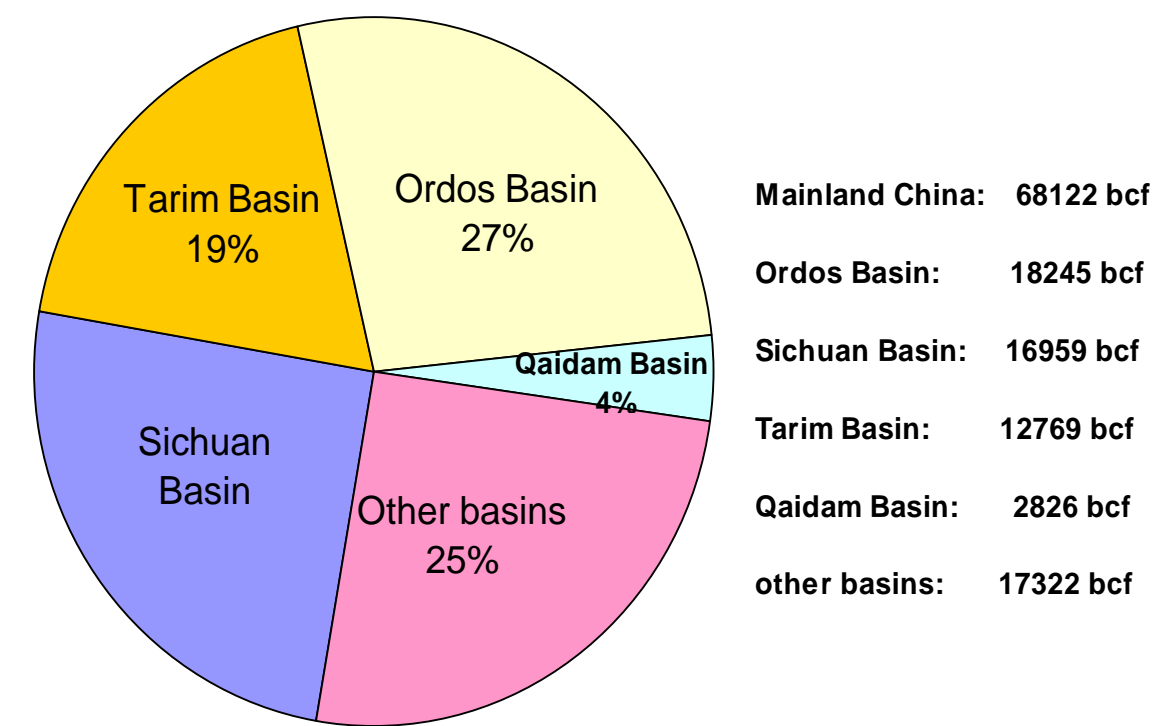
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Introduction

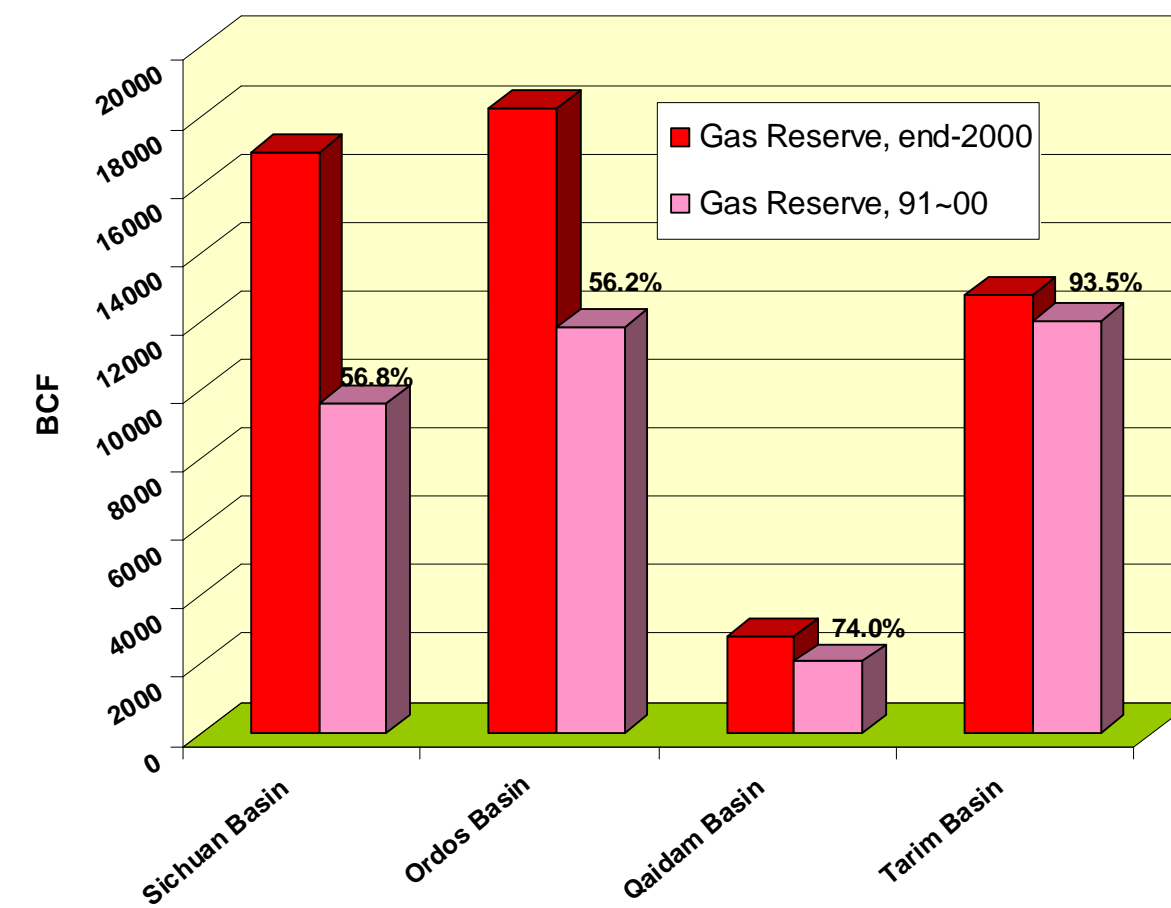
China has been growing more and more energy hungry. In 2003, China imported a record high 91 MMt crude oil, superseding Japan as the second oil importer after the United States. Energy growth in China is expected to increase rapidly. Currently coal continues its dominant role in primary energy usage in China, accounting for over 70%, oil being second, while natural gas accounts for only 2.5%, much lower than the world average level of 23%. In the most recent decade, numerous significant gas discoveries were found, and much effort has been made to build up the pipeline networks throughout the country. Gas supply districts are forming with dependence on gas-bearing basins, including Ordos, Tarim, Sichuan, and Qaidam onshore, and Yinggehai, Qiongdongnan, and East China Sea offshore. Gas reserves of the four onshore basins/districts (**Poster 1**) account for over 70% of China's total (not including Taiwan) (Zhao et al, 2002), and they are the subjects of discussion here.

The most recent decade is the most important stage for gas reserve growth in China. The gas reserves discovered since 1990 occupy at least 55% of the total in the four major onshore gas-producing basins, up to 93.5% in the Tarim Basin (Zhao et al., 2002).

Recoverable Gas Reserves Distribution (End-2000)



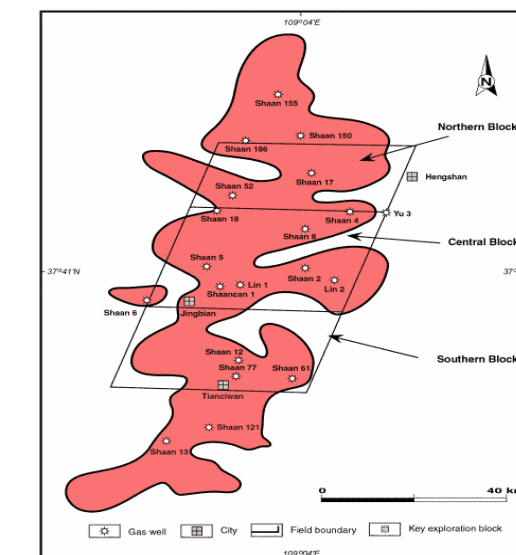
Recoverable Gas Distribution



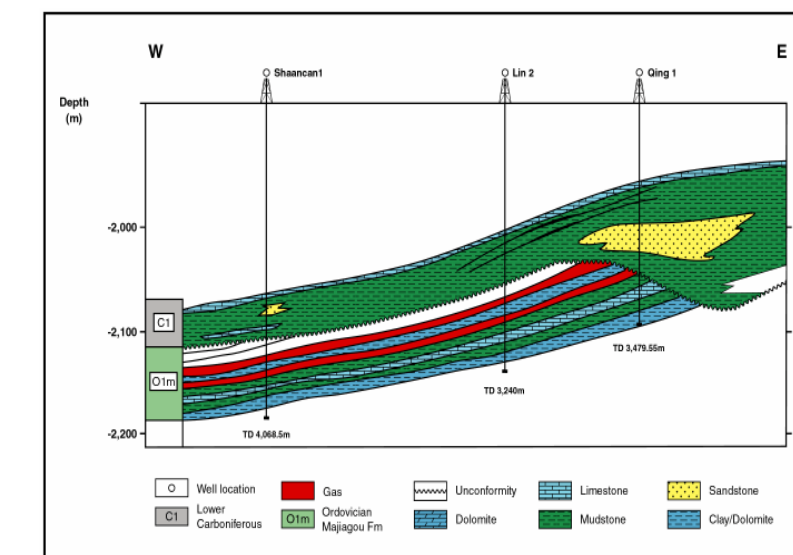
Ordos Basin

Large gas fields are distributed in the Eastern Slope in the Ordos Basin. There exist two groups of gas reservoirs – Upper Paleozoic and Lower Paleozoic, with source rocks of Carboniferous-Permian coal measures and Ordovician Majiagou carbonates. The Lower Paleozoic reservoirs are composed of the altered Ordovician Majiagou carbonates that have been altered through dissolution and/or weathering. Discovered in 1989, Jingbian, the first large gas field of the basin, has been producing gas from Majiagou reservoirs (Kang et al., 2000). Of the major fields, it is the only one that produces from Ordovician carbonates. Establishment of the Upper Paleozoic as targets occurred in the middle 1990's, resulting in the discoveries of the giant Sulige, Changdong, Changbei, Wushenqi, and Shenmu fields. The Upper Paleozoic reservoirs are composed of river-dominated deltaic sandstones. By end-2000, the proven recoverable gas reserves of the Ordos Basin reached 18,245 bcf, replacing Sichuan Basin to become the basin with the largest gas supply in China (Zhao et al., 2002; Kang et al., 2000; Qi et al., 2001; Liu et al., 2004; Xu and Shen, 1996).

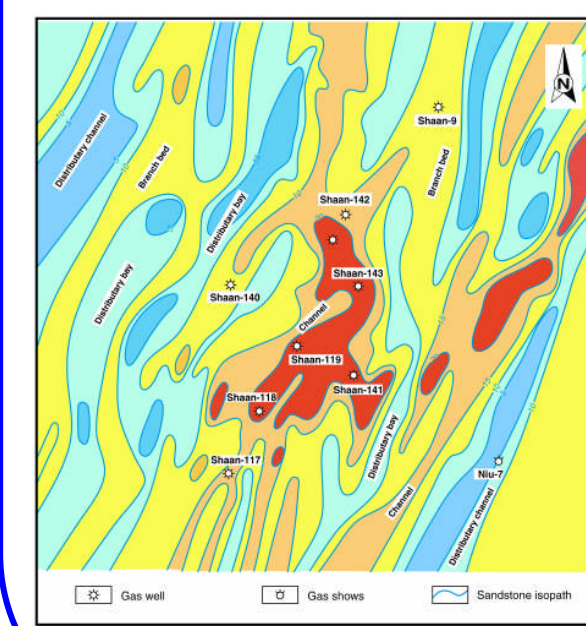
Jingbian Gas Field



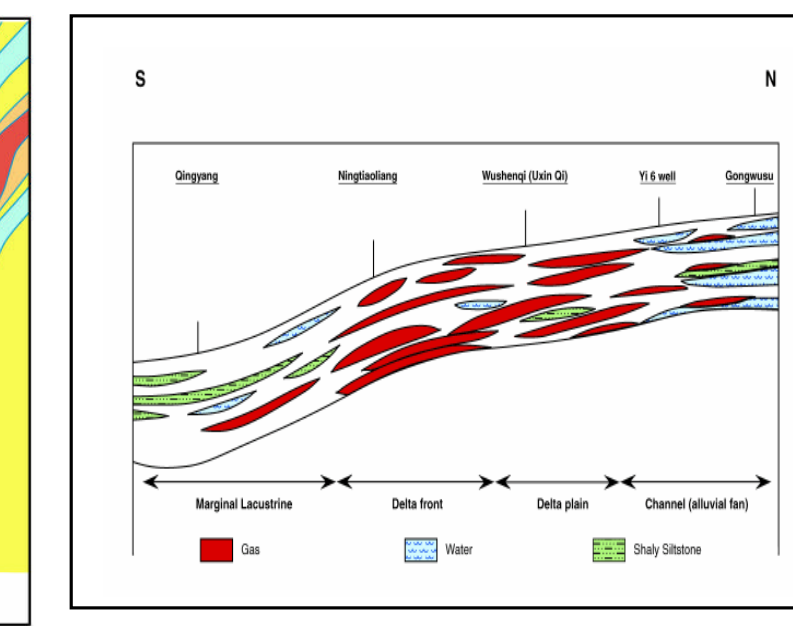
Cross Section of Jingbian Field



Permian Shanxi Channel Distribution



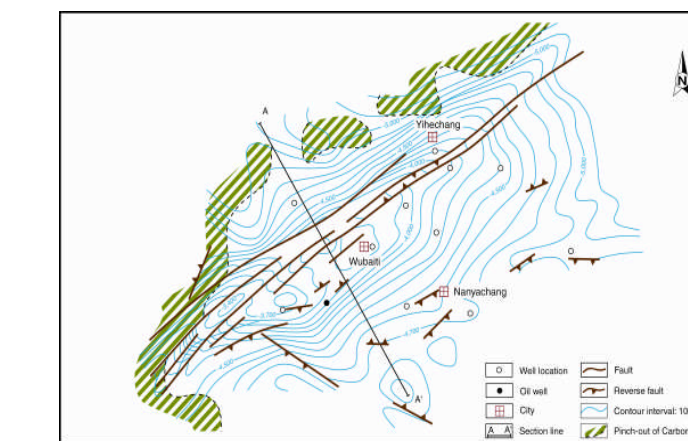
Cross Section of Shanxi sandstones



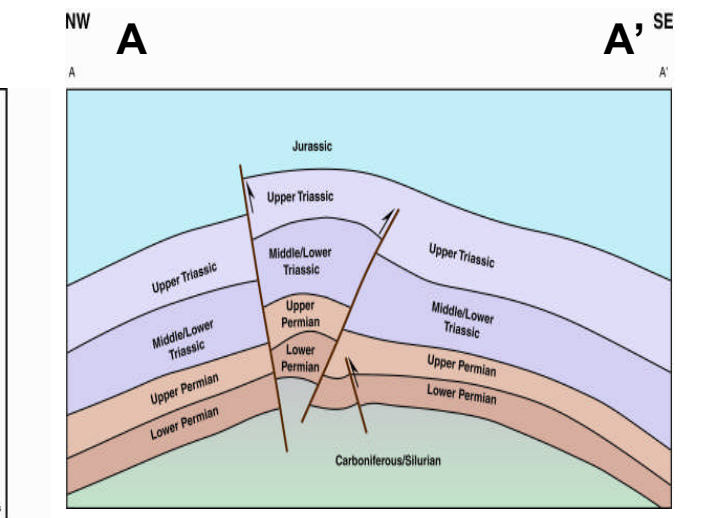
Sichuan Basin

Sichuan Basin is the area that natural gas was discovered and used earliest in China. Over 100 gas fields have been found, most of them located in the eastern and southern parts of the basin. By end-2000, the proven recoverable gas reserves reached 16,959 bcf, of which 9641 bcf was found from 1991 to 2000, accounting for 56.8% of the total. The newly found reserves are concentrated in the Carboniferous limestone formations in Chuandong (Sichuandong) High Fold Belt in eastern Sichuan Basin up to 7136 bcf, accounting for 74% of the reserves found from 1991 to 2000. The other two big contributors to the newly found reserves are Lower Triassic Feixianguan oolitic limestones, also in Chuandong High Fold Belt, and Jurassic sandstones in western Sichuan. The development and distribution of the oolitic limestones are the key trapping factors in the Feixianguan reservoirs (Zhao et al., 2002; Kang et al., 2000; Xu and Shen, 1996; Qiu and Gong, 1999; Zhou, 1996).

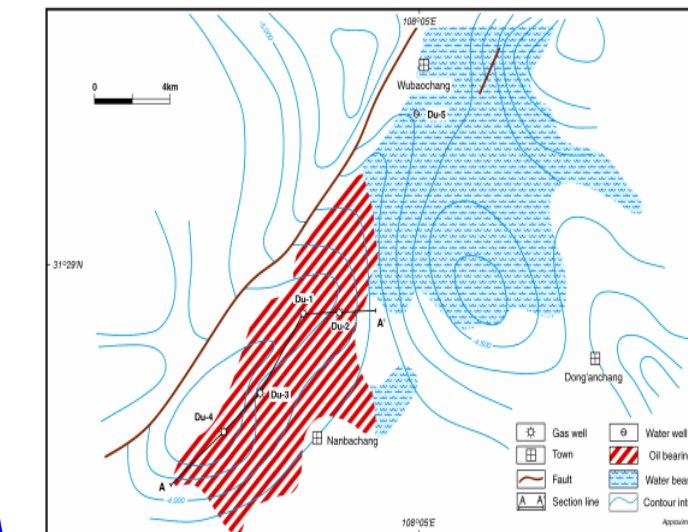
Structural Contour Map of Wubaiti Field



Cross Section of Wubaiti Field



Structural Contour map and area of Dukouhe Field



Cross Section of Dukouhe Field

