

Outlook for coalbed methane resources development in Russia

Promising coal basins and those under development contain a significant part of the global coal resources accompanied by methane. Coalbed methane (CBM) resources are commensurable with the world's conventional gas resources. Therefore, such basins shall be considered as the CBM basins that are subject to comprehensive phased development with preliminary large-scale methane production.

Methane is the basic component of natural gases contained in coal beds, which are not influenced by demethanization processes. Methane concentration in the mixture of coalbed natural gases reaches 80–98 per cent.

Scientifically proven assessment of the coal-bearing formations' role as the major sources of methane and locations for its accumulation in the Earth's crust opens up new and wide horizons in building up the resources of hydrocarbon gases. Methane, being a most hazardous by-product of coal, is becoming a valuable natural resource to be produced from coal mines, as an independent commercial product or as a by-product, in the process of comprehensive phased development of gas-bearing coal fields.

Peculiarities of CBM fields development

It should be noted that not every type of coal is suitable for methane production. Thus, long-flaming brown coal fields are featured with low methane content. Anthracite coal is characterized with high gas content; however, it can not be recovered due to high density and very low permeability of the deposit. The coals that fall somewhere in between the brown coals and the anthracite coals are attributable to the most favorable ones for methane production. This kind of coal is deposited in Kuzbass.

There are two essentially different ways of CBM recovery: from coal mines (existing mine take areas) and from CBM wells. When produced from coal mines, the amount of CBM is small and is mainly used for technological purposes of coal producers.

This technique is impeded by considerable fluctuations in the volume of the gas-air mixture received and methane concentration in it. Methane recovery from purposefully-drilled CBM wells ensures commercial gas production.

Russian CBM resources

Methane resources of the major coal basins in Russia are estimated to contain 49 trillion cubic meters making up approximately one-fifth of the country's forecast natural gas resources.

Kuzbass is distinguished from the rest of Russia's coal basins. Kuzbass may reasonably be considered as the world's biggest CBM basin providing real and promising opportunities for large-scale methane production. The basin's forecast recoverable methane resources are estimated at 13 trillion cubic meters. These estimates are given for the coal and methane resources deposited at a depth of 1800–2000 meters. Deeper coal deposits of the basin keep the immense amount of methane estimated at 20 trillion cubic meters that seems to be sufficient in the long run.

The resource base of Kuzbass ensures large-scale production of methane (beyond the mine fields) as a separate natural resource.

The Pechorsky basin is Russia's second largest after Kuzbass in terms of the amount of methane resources. CBM resources in the Pechorsky basin are estimated to make up 2 trillion cubic meters.

International experience in CBM production

Necessity, possibility and feasibility of large-scale commercial CBM production is confirmed with the practice of CBM fields development in the USA, the world's leader in terms of the 'new gas industry' advancement. Methane production in the USA has upraised from 5 billion cubic meters in 1990 to 27.6 billion cubic meters in 1995 reaching 50 billion cubic meters in 2005 which makes some 8 per cent of the conventional gas produced domestically.

CBM is commercially produced in Australia, Canada and Columbia.

Current status of CBM production in Russia

Currently, CBM is extracted in Russia as a by-product only from the mine fields under operation through the mine degassing systems incorporating the wells drilled from surface. In the recent years, these systems yielded some 0.5 billion cubic meters of methane per annum in the Pechorsky and Kuznetsky basins.

Unlike the San Juan CBM field (USA), where gas is extracted from three coal beds with a total thickness of 35 meters deposited in the interval of 100 meters, the aggregate thickness of coal beds in certain areas of Kuzbass reaches 70 meters. However, the deposits are distributed in the interval of 600 meters and feature multiple intercalations, of which only 7-10 may be developed at a commercial scale. These geological peculiarities do not allow applying the technologies that took nearly 15 years to be developed in the USA (from 1977 to 1992).

In 2003 Gazprom launched a project to estimate the possibility of commercial CBM production in Kuzbass. 4 pilot wells were drilled in the Yerunakovsky District, Kemerovo Oblast at the Taldinskaya area of Kuzbass. In 2004 the wells yielded the first gas influx. In addition, a CBM reserves estimation method was developed, methane production technologies were elaborated and approbated, and a regulatory basis was shaped providing for CBM methane resources development and for environmental safety of CBM fields.

The wells are currently at the stage of being prepared for pilot operation. Pilot operation is projected to start in late 2009 – early 2010.

Having acquired a controlling stake in Prospecting Company Kuznetsk (holding the license for CBM prospecting, exploration and production within the South Kuzbass group of coal fields containing 6.1 trillion cubic meters of gas) in June 2007, Gazprom became capable of creating a new CBM production sector of Russia's fuel and energy complex, as well as enhancing its own hydrocarbon feedstock base and

sales markets, arrange large-scale gasification of the Kemerovo Oblast and southern regions of Siberia.

Objective reasons for CBM production in Russia

Favorable geological features and CBM occurrence in Russia create reasonable preconditions for launching, primarily in Kuzbass, and subsequently in other coal basins, large-scale production of methane both as a by-product and a separate natural resource.

CBM production in Kuzbass is feasible due to the following factors:

- availability of large-scale CBM deposits in Russia;
- availability of state-of-the-art technologies for commercial CBM production that have been widely used internationally in the recent years;
- Russia's sci-tech potential and capability to coordinate and perform scientific research on the matter.

Among Russia's regions insufficiently supplied with gas fuel, a number of coal producing regions could fully satisfy their gas demand owing to large-scale CBM production. The Kemerovo Oblast, capable of producing up to 15-17 billion cubic meters of gas per annum, is among such regions.

In addition, gas production and utilization will improve the environmental situation in the coal-mining regions, reduce the gas explosion hazard associated with coal production from future mines and create new jobs in the gas production and processing.

The most promising areas in the Kuznetsky and Pechorsky basins for commercial production of methane are located in the vicinity of potential gas consumers, within 75–200 kilometers. The proximity of CBM fields to consumers saves gas compression and high-pressure gas trunkline construction costs making CBM the most promising non-conventional energy carrier for coal-mining regions.