

OIL AND GAS TRANSPORTATION AND STORAGE

About the conception of underground gas storage in Ukraine

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New conception of underground storage is proposed. It includes formation of gas hub on the base of West Ukrainian complex of underground gas storage facilities, situated in the centre of Europe.

The high-power underground gas storage (UGS) complex created in Ukraine mainly in 1965–1992 according to its active volume (31.95 bln m³) ranks the second one in Europe after the Russian one and one of the first ones according to the total daily capacity after full filling (250 mln m³). Although in the initial phases of development of underground gas storage facilities, formulation of conceptions of their creation as a normative or directive instrument was not practiced, the relevant conceptual approaches existed indeed. This is first of all an issue for creation of underground facilities for safe gas supply of Kyiv, gas delivery to main gas consumption centers of Ukraine, as well as for grand transit to the European countries [1].

Creation in the last century of underground gas storage facilities (UGSF) in the former USSR was performed on the basis of decrees of the government and orders of the Ministry of gas industry. Therewith, recently they took into account feasibility reports (FRs) on the gas industry development. At the turn of the century, planning of development of the underground gas storage system in Russia and Ukraine is performed on the basis of the approved conceptions.

The conception of creation of underground storage facilities is a primary instrument for creation or modernization of UGSFs and is based on the computer model of combined functioning of the integrated gas supply and underground gas storage system in the long run (for 10 and if necessary for more years) and is updated every five years. The task of the conception is evaluation of irregular gas consumption, prospects of change thereof and development of the strategy of regulation thereof at the expense of further development and optimization of UGSFs in the gas supply system. The conception of creation and improvement of underground gas storage facilities approved in accordance with the established procedure is the basis and, in fact, the first phase for designing of a new storage facility, expansion or modernization thereof.

Establishment of the procedure of systematic updating of the conception of underground gas storage in Russia on the basis of partial or radical change of export gas flows requires adequate improvement of the conception of functioning of the UGS system of Ukraine as the guarantee of reliability of transit gas supplies by the domestic gas transportation system. In 2007–2008, the subsidiary company “Naukanaftogaz” on request of National Joint Stock Company “Naftogaz of Ukraine” elaborated the Conception of functioning and development of the system of gas storage facilities of Ukraine. The structure of the natural gas consumption in Ukraine for the period of 2001–2005 was investigated in it, future prospects were evaluated, seasonal and daily gas demand changes were modeled, necessary gas storage volumes and the maximal capacity of storage facilities were determined, geological features for creation of new storage facilities were proposed, directions for the system development and improvement by 2030 were determined, issues of the technical progress and economic indicators of storage facilities in the market conditions were studied. It contemplates liquidation of shortage of the UGSF capacities in the central and eastern regions of the country by means of completion of expansion of the Proletarke

and Kehychivske UGSFs, expansion of the Solokhivske and Hlibovske UGSFs, modernization of the Chervonopartyzanske, Krasno-popivske and Verhunske UGSF, creation of an additional UGSF in water producing formations of geological structures located in the territory of the Kharkiv, Donetsk and Odesa regions.

The conception reflects the measures on increase of the gas withdrawal rate during the peak years and further study of the technology of substitution of a part of the buffer gas by alternative gases. But the proposed program was fulfilled incompletely. Only substitution of several engines on compressor stations for high-efficiency engines was performed, introduction of reliable sand filters on the sand-carry-over-prone wells was commenced, and preparatory works for introduction of the technology of partial substitution of the buffer natural gas for nitrogen in the Dashavske UGSF are performed.

For a long period of time, high potential of the domestic underground gas storage complex has been used not to full capacity. There is an urgent need for elaboration of an updated conception of underground gas storage with enhanced substitution of its appeal both for gas importers and gas exporters. It must become the basis for usage to the fullest extent of transit capacities of the Ukrainian gas transportation system, as well as regulated capacities for parallel routes of the Russian gas. The system of underground gas storage of Ukraine, especially its western complex (the active capacity of about 25 bln m³) is the most advantageous place for creation of the western European gas hub for regulation and assurance of reliability of gas supply of Europe.

Despite creation of a significant gas component for reliability of export in the total active volume of UGSFs of Russia, by no means the coldest winter of 2011–2012 revealed unreadiness of OJSC “Gazprom” for reliable gas supply to the European consumers in the relatively extreme conditions. Only usage of the Ukrainian gas saved in UGSFs facilitated improvement of the situation.

The underground gas storage system built in Ukraine showed its high reliability during full stoppage of delivery of the Russian gas in January 2009, having assured in the relevant winter period gas supply of the country in the non-routine regime at the expense of the previously generated far from being full and significantly spent at the end of 2008 stocks.

In order to exclude economic uncertainty (from the tendency to minimize underground storage to the tendency to increase its potential by 1.5 times), several variants of functioning of the underground gas storage system must be economically substantiated in the new conception. Special attention must be paid to the unique Bilche-Volytsko-Uherske UGSF, taking into account the fact that for a long period of time only a half of its capacity was used.

In order to increase the total gas storage volume, in particular the potential total capacity of underground gas storage facilities, expediency and phasing of expansion of the Proletarske, Solokhivske, Oparske and Kehychivske UGSFs, modernization of the Verhunske and Krasnopopivske UGSFs must also be substantiated. Study of the possibility of expansion of the Hlibovske UGSF must be connected with usage of its capacity during increase of production of gas from the Black Sea shelf fields – Odeske and Bezimenne, its further delivery to the local gas transportation system of the Crimea and the whole gas supply system of Ukraine.

Usage of the international practice is of great importance for development of optimal ways to increase the peak performance of gas storage facilities of Ukraine by means of creation of UGSFs in saline deposits. High performance to ensure peak gas consumption in Germany and France is achieved through usage of UGSFs constructed in saline deposits.

The Institute of Geological Sciences of NAS of Ukraine and Ukgazproekt [2] proposed the structures in the east and south of the country for creation of such UGSFs. Creation of UGSFs in combination with construction of a salt plant would be economically profitable [3].

Usage at an appropriate level of the proposed new variant of the conception would become for the Government of Ukraine and economic entities a reliable instrument in issues related to

planning of the prospects of functioning of domestic UGSFs for the purpose of usage of their unique possibilities in order to ensure reliability of gas supply to internal consumers and transit gas deliveries.

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