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Extraction of Gas from Underground Gas Storage and its Technical and Economic Indicators

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Abstract

Gas extraction during the operation of the underground gas storage is determined based on the gas consumption graph. According to the location and security requirements, the underground gas storage will be located at some distance from the gas consumption area. The gas taken from the warehouse can be delivered to consumers using its own pressure or compressors.

Keywords: underground reservoirs, well-compressors, gas storage collector, gas loss to the atmosphere, diaphragm flow meters, optimization.

Introduction

The basis of the fuel energy complex is the oil and gas production industry. The storage of gas underground has an important economic value in moderating the variability of seasonal demand for fuel in the national economy. Underground gas storages are very efficient and safe. One type of them can be built in spaces where oil or gas is exhausted, in water layers of the earth (gas is trapped in water). In such warehouses, natural gas is stored in a gaseous state.
Feasibility studies are used to determine:
- justification and optimization of gas supply reliability, when choosing a gas storage method used for certain conditions;
- in justifying the optimal variant of the technological scheme of the warehouse;
- in determining the costs of construction and operation of the warehouse.
Technical and economic indicators depend on the following factors:
- unevenness of gas consumption;
- speed of gas transmission;
- the distance of consumers from gas extraction sites;
- indicators of the gas transportation system, etc.
In many cases, it is advisable to solve the problem not only by one type of gas consumption unevenness compensation (YeOGO), but by using several types together.
The economy of underground gas storage in aquifers is affected by the main indicators of the storage (size and maximum daily production) and geological conditions, the depth of the formation-collector, as well as the porosity and permeability that determine the flow rate of the well. In addition, the economic indicators of the warehouse depend on the following technological parameters during its construction and operation: the gas driving and extraction schedule, the ratio of buffer and active gas volumes, the number and structure of wells, the maximum and minimum gas pressure, the capacity of the compressor station. , power of

cleaning devices, etc.

The big difference in the economic indicators of underground gas storages built in aquifers is explained by the distance of the storage from gas consumption. Factors influencing the economics of gas storage include:

- with an increase in the size of the warehouse, its relative indicators decrease, that is, from several warehouses of a small size under the same known conditions
- according to this, it is always desirable from the economic point of view to organize one large-scale warehouse.
- with an increase in the maximum daily amount of gas taken from the storage, the relative capital investment and production costs increase. It is important to note that capital inflows grow more slowly than production costs. This can be explained by the fact that most of the total costs go to capital investments that do not depend on the size of the warehouse.

It follows from this that the increase in gas consumption, which leads to the production of underground storage and an increase in the size of the storage, mainly leads to an increase in the costs of gas storage. At this time, relative capital inflows will increase by a small amount. This factor should be taken into account when assessing the economic expediency of the limits of gas extraction from the warehouse, and at the same time when comparing the methods of compensating the seasonal unevenness of gas consumption**.**

As the size of the warehouse increases, the effect of its distance from the consumption area on the economy of storage decreases significantly. In addition to the mine-geological conditions and parameters of the reservoir, the factors related to the choice of the technological scheme of gas storage operation also affect the level of economic indicators. This mainly applies to reservoirs in aquifers. Basically, it should be emphasized that the technological classification of gas storage can be determined in many ways for each given parameter storage; the number of production wells, the ratio of active and buffer gas volumes, the power of KS, the diameter of incoming and outgoing gas pipelines. Thus, the problem arises of determining the optimal parameters of the warehouse, the criterion of which is the minimum stated costs for maintaining quality.

During the operation of warehouses, there is an economic problem related to improving their economic indicators. In the management of unevenness of gas consumption, there is a correct distribution of gas intake and driving among a group of warehouses. In the design and operation of such warehouses, the main attention should be focused on reducing such a part of costs, which depends on the size of the warehouse and the maximum daily amount of gas taken from it.

To compensate for seasonality, underground gas reservoirs formed in used, aquifers and salt layers are the most effective. It is advisable to use liquefied hydrocarbon gases and liquefied natural gas storages to compensate for seasonal gas consumption in regions where there are no conditions for the creation of these storages. Increasing the throughput capacity of the main gas pipeline is a less economical method.

In conclusion, the increase in gas consumption unevenness, which leads to an increase in the production of underground storage and the size of the storage, mainly leads to an increase in the costs of gas storage. At this time, relative capital inflows will increase by a small amount. This factor should be taken into account when assessing the economic expediency of the limits

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