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Ukrainian Gas Transmission System Renovation Project: Reliability and Efficiency of Gas Transit to Europe

УДК 622.691:69.059.7

Стаття присвячена питанню реконструкції газотранспортної системи України. Показано основні напрямки та об'єкти реконструкції, а також її економічну ефективність.

Статья посвящена вопросу реконструкции газотранспортной системы Украины. Показаны основные направления и объекты реконструкции и ее экономическая эффективность.

The article devoted to the problem of renovation of Ukrainian gas transmission system. The main sectors and objects of renovation as well as increasing its reliability and efficiency are listed.

1. Background

Russian gas export to the countries of Western and Central Europe and Turkey is carried out by three basic routes: through the gas-transmission system (GTS) of Ukraine, by the Yamal-Europe gas pipeline over the territory of Belarus and by the Blue Stream gas pipeline across the Black Sea. During the period of 2001-2010, the average amount of Russian gas transit through Ukraine was 110 bcma, given the gas transit system capacity is 146 bcma. In 2010 transit lowered to 95.4 bcm, this was almost 80 % of all Russian gas deliveries to the mentioned countries. Due to putting in 2011 the North Stream into operation, the Ukrainian transit volume can decrease, but expected growth of gas consumption in Europe can be a substantial argument that Ukraine with its strategic pipeline infrastructure will remain a major route for Russian gas deliveries to Europe for decades.

It should be noted that Ukrainian GTS operates reliably today, providing deliveries of Russian gas to Europe under the contracted conditions. This is achieved due to flexibility and wide branching of the pipeline system and the cross-border pipelines, interaction between adjacent pipelines, considerable capacity of the underground gas storage (UGS) facilities located mainly in close vicinity to the EU borders, and by realization of technical inspection and rehabilitation programs, introduction of European operating standards and regulations. High qualification and experience of the personnel is although an important value.

2. Aims

In order to guarantee reliability and security of both gas supplies to internal users and transit gas deliveries to the European gas market for the future prospect, it is needed to provide accident-free, reliable, economically efficient and environmentally friendly functioning of all the GTS links. The tasks of the project are to conduct detail inspection of the GTS transit lines with subsequent replacement or renovation of the determined parts.

3. Methods

The aims can be achieved by systematic update and renovation of the GTS.

As far as some parts of the 12 thousand kilometers long transit gas pipelines have already been operated for 25-35 years, and many compressor units are outdated with low efficiency and high level of emissions, NaftoGaz of Ukraine together with EU experts, selected first priority lines and objects to be replaced or rehabilitated and upgraded.

Table

Basic characteristics of the selected gas pipelines

Gas pipeline	Put into operation (year)	Length (km)	Working pressure (MPa)	Unit power (MW) and number of compressors	Mean operating life (hours × 10^3)	Average efficiency (%)
Soyuz	1978	1567	7.4	10/84	140	24
Urengoy-Pomary-Uzhhorod	1983	1160	7.4	25/21 25/6	120 40	26 36
Prohres	1988	1122	7.4	10/15 12.5/7 16/8 25/12	70 25 45 50	27 30 29 33
Yelets - Kremenchuk - Ananiiv – Izmail	1986	930	7.4	6/15 10/45 16/4	33 70 60	23 25 24

The GTS Renovation project (Fig.) envisages:

for the main gas pipelines:

- conducting technical inspections;
- replacement of defective parts of the gas pipelines;
- replacement and/or repair of pipeline isolation;
- replacement of fittings and valves;
- modernization of remote control and telecommunication systems;

for the compressor stations:

- modernization or replacement of gas compressor units (drivers, superchargers);
- modernization or replacement of the systems of compressor units automated control and electrical equipment;
- modernization or replacement of auxiliary equipment;
- replacement of fittings and valves.

The first priority objects for renovation are:

- the Urengoy - Pomary - Uzhhorod, Soyuz and Prohres gas pipelines on the western transit corridor, and the Yelets - Kremenchuk - Ananiiv – Izmail gas pipelines on the southern transit corridor;

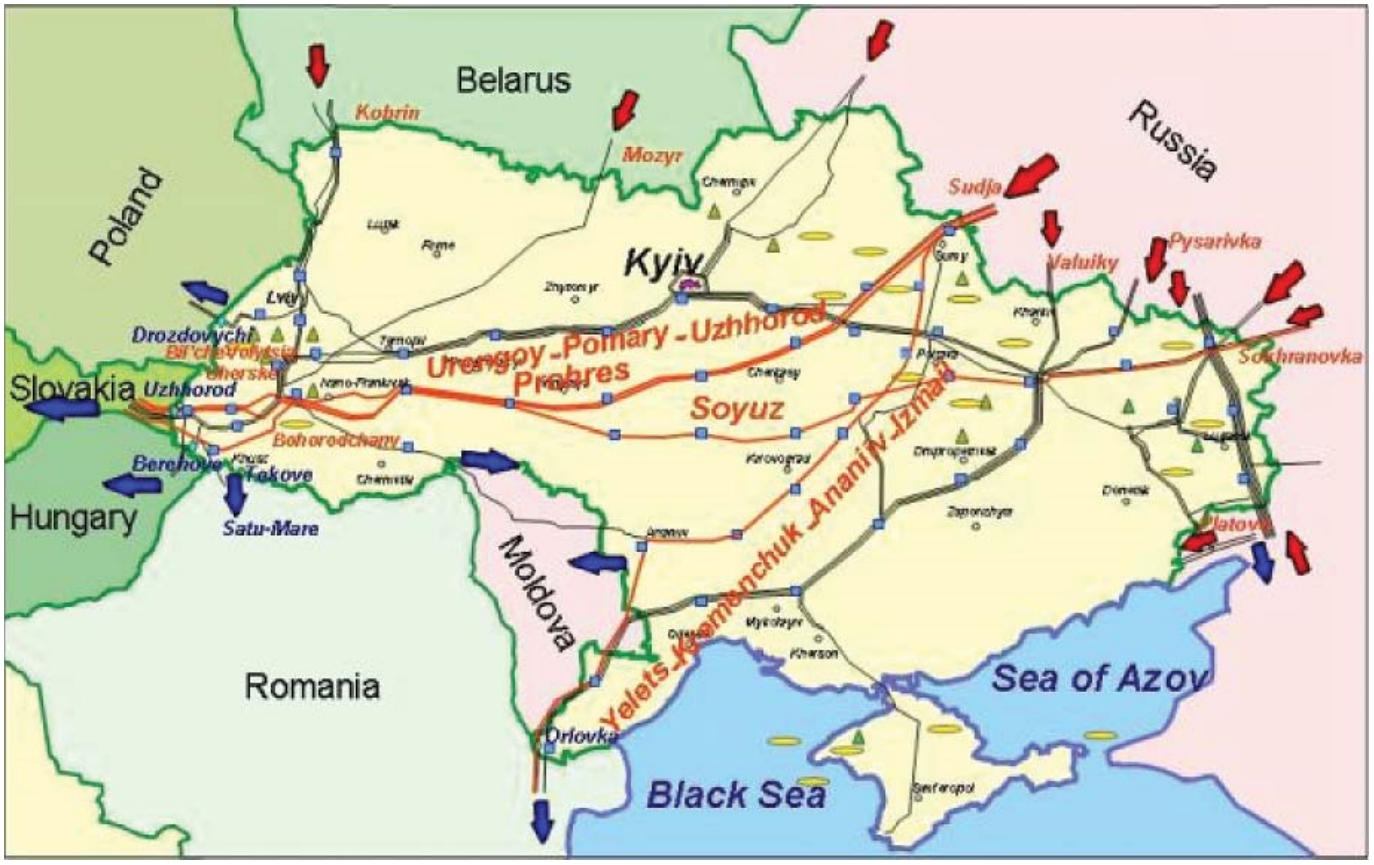

Fig. The GTS Renovation project priority objects

- the Bil'che-Volytsia-Uherske and Bohorodchany UGS facilities;
- the Uzhhorod, Berehove, Drozdovychi, Tekove and Orlovka gas metering stations.

Basic characteristics of the selected gas pipelines and compressor stations are presented in the Table. The characteristics of the Bil'che-Volytsia-Uherske and Bohorodchany UGS facilities are respectively as follows: working gas volume - 17050 and 2300 MMcm, maximal volume of gas withdrawal at the beginning of season - 142 and 50 MMcm/d.

The project envisages that the renovation works will be carried out without stopping or decreasing of transit gas shipping through Ukraine.

In accordance with the EU-Ukraine Declaration upon results of the International Investment Conference on Modernization of Ukrainian GTS held in March 23, 2009, it is expected that the EBRD and European Investment Bank will provide financing of the works. In July 2011 the first phase of the Renovation project on reconstruction of the Ukrainian part of the Urengoy–Pomary–Uzhhorod commenced.

4. Results

Realization of the Renovation project will provide:

- long term correspondence of the main gas pipelines characteristics to the design parameters;
- higher efficiency of the compressor units;
- increase of the compressor units operation life to 100 000-150 000 hours;
- fuel gas saving at the level of 600 MMcm per year;
- decrease of influence of stres-corrosion of the main gas pipelines;
- considerable decline of negative impact upon environment.

5. Summery/Conclusions

Realization of the Renovation project will enable to provide until 2030 and for further prospect:

- reliable and uninterruptable transit gas deliveries at the level of 110-140 bcma;
- high commercial attractiveness of the system;
- competitiveness comparatively with alternative gas pipelines, which require considerable capital investments and building of new infrastructure.

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Головний інженер ДК «Укртрансгаз». Закінчив Івано-Франківський державний технічний університет нафти і газу. Виробничі інтереси пов'язані з розробленням концепції розвитку автоматизованих систем електрохімзахисту об'єктів ГТС України, стратегії продовження ресурсу та впровадження комплексу технології реновації трубопровідного транспорту України.