

## **SETTING CAPACITY AND COMMODITY BASED PRICES FOR TRANSMISSION OF NATURAL GAS THROUGH BULGARTRANGAZ EAD GAS TRANSMISSION NETWORKS**

With reference to setting the capacity and commodity based prices through the company's gas transmission networks, the Energy and Water Regulatory Commission (EWRC) with its decision approves, at the proposal of the Transmission system operator (TSO), allowed annual revenue and base allowed revenue for the natural gas transmission activity over the first tariff period, as well as a series of parameters regarding the price-setting prior to the start of every regulatory period. The TSO includes in his proposal costs and assets related to the activities of natural gas transmission in line with the Methodology setting the price of access and transmission of natural gas through Bulgartransgaz EAD gas transmission networks (the Methodology).

The TSO receives a return on the invested capital on the book value of the assets with which it carries out the activity. Return is not accrued on assets acquired at the expense of gratuitous financing (including at the expense of accrued connection fee). The forecasted assets are in accordance with the approved business plan of the TSO.

EWRC approves the rate of return on capital for the regulatory period taking into account the current financial and economic conditions in the country, the alternative capital price, the company's specific risk, the company's financial policy and capital structure, etc.

The TSO submits an estimate of the costs for the regulatory period and EWRC assesses the economic justification thereof.

The regulatory authority approves also duration of the regulatory period, efficiency improving factor and factor smoothing the allowed revenue for the regulatory period.

Every year after conducting public consultations in accordance with art. 28 of EU Regulation 2017/460, The National Regulatory Authority determines multiplier values, seasonal factors, as well as discounts for characteristic points and interruptible products.

Every year TSO proposes entry and exit points/zones of the gas transmission system for which capacity and commodity based tariffs must be set.

Bulgartransgaz EAD, on the basis of the approved allowed annual revenues for each tariff period representing the respective gas year 2021/2022, 2022/2023, 2023/2024, 2024/2025, the multipliers, seasonal factors and discounts determined for the respective year, as well as the approved pricing parameters in accordance with the applicable principles of the Methodology, calculated the capacity and commodity based tariffs of natural gas at entry and exit points/zones.

In line with the Methodology the applicable prices are set as follows:

Revenues, covering the technological component of the commodity based tariff and allowed revenue, arising out from obligations to the public are set aside from the general allowed annual revenue approved/calculated for the respective tariff period. The values of the two components of the commodity based price are set on basis of the estimated quantities to be transported over the respective tariff period.

The remaining allowed annual revenues covered by tariffs under the introduced Entry-Exit system are split in the ratio 85:15, approved by decision no. НГП-1/02.10.2020 of EWRC of revenues, covered by capacity based prices and revenues, covered by the general component of the commodity based tariff.

The value of the general component is set on the basis of the estimated quantities to be transported over the respective tariff period and the resulting share of allowed revenue, covered by the general component of the commodity based tariff.

Concerning the allowed revenues covered by the capacity based tariffs in line with the Methodology, the Matrix method is applied for distribution of the allowed revenues, related to the capacity based tariffs at entry and exit points. The result of the application of the method is the determination of reference prices for a firm annual capacity product at entry and exit points / zones.

The Matrix Model calculates reference prices for the entry and exit points of the gas transmission system, setting them in such a way that the sum of the prices at entry and exit for each pair of entry and exit point to reflect as exactly as possible natural gas transmission costs between these points.

The starting point for the calculation are the allowed revenues related to the capacity based tariff. Their allocation to entry and exit points of the gas transmission system is determined by the estimate of booked capacity at the entry and exit points, as well as the values of the peak flow through the individual segments of the system. Information on the assets through which the natural gas transmission activity is performed is also used to allocate the costs to the individual segments of the gas transmission system.

The gas transmission system is divided into segments to create a model for the presentation of the network. The segments are defined as connections between two network vertexes having approximately uniform technical characteristics. The matrix model applies to the selected network topology. The Methodology uses the assets replacement costs to allocate the allowed revenue related to repayment through the capacity based tariff to the sections of the gas transmission system, by using data on the diameters and lengths of pipes and the capacity of the compressor stations. For each of the defined segments of the gas transmission system, the peak flow passing through it is calculated.

Unit costs are calculated based on the determined peak flow and the allocated revenues by segments of the gas transmission system. The unit costs of the respective segment reflect the transmission costs per unit volume of natural gas through the respective segment.

The matrix of the unit costs is determined based on the allocated unit costs by segments of the gas transmission system. The matrix of the unit costs has as many rows as are the exit points and as many columns as are the entry points. The values of this matrix are the sum of the separate unit costs of the different segments of the system through which a unit volume of natural gas is transported from the respective entry to the respective exit point. In this regard, for each of these combinations, the total amount of unit costs is calculated along the respective transmission route from the entry point to the exit point.

The entry and exit tariffs must reflect as much as possible the values of the unit costs matrix, i.e. the sum of the price at a given entry point and the price at a given exit point must be as close as possible to the respective value in the unit costs matrix. This is achieved through optimization algorithm that minimizes the sum of the differences of the smallest squares between the values of the unit costs matrix and the sum of the respective entry and exit tariffs. Calculations are made as follows:

$$\text{minimization } \sum_{i,j} (C_{ij} - (T_{Ni} + T_{Xj}))^2$$

if  $T_{Ni}, T_{Xj} > 0 \quad \forall i,j$

where:

*C<sub>ij</sub>* = the sum of unit costs for transmission from the entry *i* to exit *j*

*T<sub>Ni</sub>* = entry tariff *i* (must be calculated)

*T<sub>Xj</sub>* = exit tariff *j* (must be calculated)

The total revenues from the capacity based tariffs, generated by the use of these initial results (their multiplication with the charged quantities, for instance capacity booked at each entry and exit point) can differ from the approved allowed revenues. To reach the approved allowed revenues the capacity based tariffs are multiplied by a coefficient determined by the above condition.

The model requires additional adjustments to the resulting tariffs. Corrections are made with the introduction of limitations in the mathematical model.

The used limitations are as follows:

- (1) avoidance of zero pricing levels;
- (2) grouping and determining of weighted average price for certain entry and/or exit points/zones;
- (3) keeping the determined ratio of the received revenue from capacity based tariffs from entry and from exit points (50/50%).

The tariff model includes as well the approved discounts for special products as follows:

From and entry and exit points from/to gas storage facilities 80% of the tariff calculated without discount.