

METHODOLOGY AND PRACTICE OF FORECASTING SITUATION IN THE REGIONAL GAS MARKETS OF THE RUSSIAN FEDERATION

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International method of designing gas market models on the basis of econometric dependency of natural gas demand on alternative fuels price ratio and on consumer income is not applicable so far in the Russian market. Such dependencies rely upon processing of long time sequences reflecting market gas demand dynamics. In Russia, which economy is in transit stage and where state regulates gas prices, direct or “pure” consumer reaction to increased gas prices does not take place, and market signals do not consequently suffice for building statistic relation between gas demand and gas price.

Nevertheless, gas market development forecasts should account for the fact that in the context of shaping competitive gas markets domestic gas prices will be converging with export ones in terms of efficiency, and the factor of consumer reaction to fuel and energy resources (FER) cost variation will be gaining in influence.

It means that predictive research of gas market conditions should consider gas prices, gas demand and demand for other FER in their relationship. At that other factors demanding proper consideration include economy development growth rate and nature, increase of industrial production and energy consumption, rise in household incomes, interoperation of external and internal gas markets, consumer reaction to price variance. Another factor to consider is increasing with market extension corrective influence of energy cost over economy growth rate.

The paper presents methodology approach to predictive research of regional gas markets in the Russian Federation as accounting for new influencing factors and relations in energy markets and providing for mutually coordinated dynamics of gas demand and gas prices.

Basing on regional fuel and energy balance optimization the authors seek to determine possible dynamics of gas prices and gas demand subject to expected external energy markets conditions, regional economy development parameters, competing fu-

els' prices expected variance, technical and economic aspects of other FER production and transportation.

This objective is implemented in the following major stages:

1. Determination of expected prices for gas and other energy resources.

It is taken into account that prices in the regional energy markets will be influenced by competition between prospective gas suppliers (minimal supply prices are those of the self-sustained budget), competition between fuels (inter-fuel competition) and by fuel export efficiency (prices providing for international level margin).

Prices providing for international level margin are taken as cap prices in the Russian markets. In some regions price cap can be set at the level allowing gas to compete with domestic or imported coals.

Lower price range limit is determined by minimum supply prices offered by energy companies (self-sustained budget prices). Such prices should cover annual expenses, taxes, and minimum profit indispensable for normal operation. For new enterprises and developing companies self-sustained budget price should also include investment element providing for repayment of borrowed funds and accrued interest, and for acceptable average annual return on invested funds during the considered period.

Diverse investment means (depreciation, profit, credits, stock issuance), as well as variable in terms of time and nature investments, borrowed funds, annual expenses and income are taken into account in self-sustained budget prices.

2. Optimization of regional fuel and energy balance:

- Elaboration of the region economic development scenario (macroeconomic factors and specific FER consumption dynamics within the considered future time period, economically feasible energy saving opportunities);
- Expected heat, electricity and direct fuel consumption per industries within the considered future time period; Working-out of heat and electricity balances as based on the analysis of prospective development of energy supply sector and energy markets in the region; Fuel and energy balance optimization and development of fuel and energy complex of the region.

3. Identification of potential competitors in the regional energy markets (as based on fuel and energy complex optimization, provided self-sustained budget prices of the previous stage).

4. Comparative analysis of gas use efficiency per different consumer categories.

Gas is compared to competing energy in terms of consumer-effect values to identify different consumer categories' reaction to gas price increase. Thus cost-effectiveness of using gas, alternative fuels or electric power by existing and new consumers is determined for established price ratio.

5. Assessment of potential social and economic consequences of gas price change (gas price variation influence on macroeconomic indices, production and social sectors of the region, incomes and expenditure of consolidated regional budget).

The developed scheme of problem solving staged coordination allows to identify potential gas demand in the region as aligned with scenarios of economy, energy consumption and fuel and energy complex development under different dynamics of gas and competing fuels' prices.

Calculations for each scenario are implemented in two stages. At the 1st stage minimum and maximum gas prices range and relating indices of gas demand in the regional energy market are identified for the given economy development scenario. At the 2nd stage the most probabilistic values of gas prices and gas demand are determined as accounting for producers' and consumers' interests and possible compromise between state and gas companies.

Calculations under the presented method are made with application of computer complexes developed by Gazprom promgaz and Energy Systems Institute, Siberian branch of Russian Academy of Sciences.

The full paper will include examples of the described method application in predictive research of East Siberian and Far East markets. Some results of stage 4 relating to consumer effect assessment are provided in the table below.

Table – Approximate acceptable overrunning of gas price over coal price for steam turbine stations, USD/t.c.e.

	Environmental effect
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	not taken into account	accounted for
Switching operating thermal power stations to gas		
from high quality coal	9-13	13-17 *
from low quality coal	13-17	18-23 *
For newly commissioned stations	18-24	30-45 *

* For environmental requirements current in Western Europe and USA

Gas price for combined cycle stations can exceed those for steam turbine ones by 50-65 USD/t.c.e. If we combined cycle unit and environment-friendly coal-fired thermal power station with equal cost of produced electricity, gas prices for the former can exceed coal price for the latter by 75-90 USD/t.c.e. In case of restricted CO₂ emission requirements permissible prevalence can exceed 140 USD/t.c.e.