

STRATEGY OF REDUCING GREENHOUSE GASES EMISSION IN THE GAS INDUSTRY OF RUSSIA

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ABSTRACT

The paper describes the role of the gas industry in the fuel and power sector of Russia. The volumes of greenhouse gases are discussed. The strategy of reducing greenhouse gases emission in the context of realization of the terms and rules of the Framework Convention on Climate Change and Kyoto Protocol is discussed.

A base scenario of the dynamics of greenhouse gas emission volumes for the periods of 2001-2008 and 2008-2012 taking into account the prospects for the gas industry development and the fulfillment of measures on reducing greenhouse gas emissions is given. Design options on reducing greenhouse gas emissions and ecological projects on applying environment-friendly pure technologies realized with large foreign companies are discussed.

EVALUATION OF GREENHOUSE GAS EMISSIONS AND THE WAYS OF THEIR REDUCTION

The gas industry of Russia is one of the main sectors governing the national economy, public life and a general technical progress in the country.

Gazprom involves into many applied problems of the national policy in the field of realization of the terms and rules of the Framework Convention on Climate Change and Kyoto Protocol and focuses its efforts on solving the problems of nature and environment protection. One of the priority and perspective ecological and economic problems is a reduction of greenhouse gases emission at the expense of nature and resource-saving technologies.

Natural gas is one of the key energy carriers having the advantages over the other hydrocarbon feed by ecological indicators.

Being the largest company in the fuel and power sector of Russia, Gazprom has a certain influence upon the environment, Table 1 and Fig. 1 /1/.

The emission in the gas industry contains a wide spectrum of climatically active components (CH₄, CO₂, VOC, etc). The main greenhouse gases are CO₂ and CH₄ (Fig. 2).

Greenhouse gases emission in the gas industry are considered from a well to end-user including wells, gas processing facilities, thousand kilometers of gas pipelines, over 300 compressor stations and gas distribution systems.

According to open publications issued by Gazprom, a total methane emission in the gas industry accounts for 1.5 % of the ultimate gas production. This figure was obtained by the results of full-scale experimental measurements being carried out since 1995. The gas transmission system is a main source of methane emission (92-95%).

The calculations show that CO₂ emission is proportional to fuel gas consumption, Table 2 and Fig. 2. The gas transmission system is also a main source of CO₂ emission (80%).

Thus, a basis for developing and realizing the policy and measures to stabilize and reduce greenhouse gases emission is a total volume of greenhouse gases emission from all the emission points of Gazprom.

The problems related to the reduction of antropogenic emissions of the main greenhouse gases includes: long-term evaluation of methane emission and measures on remaining an emission level of the year of 1990 and further reducing greenhouse gases emission.

A notable result had been reached by 2000. Methane emission was reduced by over 1 bcm. However it should be noted that this reduction could be mainly explained by the setback in gas production, Table 2.

The systems of monitoring and periodic accounting on greenhouse gases emission (state, international and branch) are being under development.

Ratification of the UN Framework Convention and acceptance of Kyoto Protocol by the Russian Federation will open a new stage in the Gazprom activity in the problem of greenhouse gases emission where ecological and economic aspects will play a key role.

Decisions of the Kyoto Protocol create the conditions for applying economic instruments of “climatic” activity enhancing including:

- Negotiation of emission reduction units obtained as a result of joint execution of projects – since 2000
- Transfer of certified emission reduction and mutually beneficial trade of emission quotas (“prescribed emission volumes”)
- Pure development (technological and financial support to developing countries)

Realization of each of the above instruments opens a new world market (commodity, financial and technological). For example, this will enable Gazprom to attract foreign investments and new energy efficient technologies and then to reinvest these financial resources into modernization of the gas

industry. Besides, realization of projects on the territory of developing countries including both CIS and other countries will replenish Russian quotas on greenhouse gas emissions. Later, based on economic expediency these quotas can be used either for receiving extra profits or compensating possible deficit of reduction of greenhouse gas emissions in the gas industry.

A base scenario of the dynamics of greenhouse gas emission volumes for the period of 2001-2008 and 2008-2012 was developed taking into account the prospects for the development of gas industry and realization of target measures on CH₄ and CO₂ emission reduction, Table 3.

The calculations show that by 2012 the potential of CH₄ and CO₂ emission reduction will be 4.9 bcm and 35MMcm respectively.

Under proper substantiation a part of these reserves can be a subject of purchase and sale in the market.

A long-term evaluation is to be constantly corrected depending on changes taking place in the gas industry.

Gazprom widely employs the mechanism of international cooperation and during a number of years maintains contracts with many business partners on ecological projects. They are aimed at the reduction of greenhouse gases emission, including methane, enhancing of energy efficiency and cutting of fuel gas consumption.

The main ways of greenhouse gas emission reduction are as follows:

- Reduction of energy consumption of gas
- Reduction of gas consumption on process operations
- Enhance of stop valves tightness
- Increase in the efficiency of process equipment operation
- Decrease of losses during repair operations
- Equipment inspection
- Utilization of low-pressure gases with the help of piston pumping units
- Gas losses control and record system

The gas industry participates in realizing joint scientific and technical projects on the introduction of environment-friendly technologies together with large companies and organization of the United States, Great Britain, Germany, France and other countries. Under the Strategic alliance agreement between Gazprom and Royal Dutch/Shell Concern the investments on the development of Low Cretaceous deposits of the Zapolyarnoye oil and gas condensate field were grounded.

An experimental project of Ruhrgaz and Gazprom companies on optimization of operating conditions of Volgotransgaz gas transmission system on the basis of Cimone software has been successfully executed. The realization of the project

will save fuel gas in a volume of 230 MMcm/y and reduce CO₂ emission by 440 Mt/y. The distribution of advantages of these project over the entire gas transmission system of Gazprom will allow to increase these indicators by 10 times.

Joint projects on reducing greenhouse gasses emission between Gazprom, Ruzgaz and Sumitomo companies are also worth to be noted.

A final target of all ecological projects is a reduction of contaminant emissions including greenhouse gases. A common feature of these projects is the possibility of their accomplishment in the presence of international payment system for greenhouse gas emission reduction.

According to the estimates made by many experts, the Russia's gas industry has reserves for selling quotas on greenhouse gases emission.

Quota market will allow to save money and take actions on reducing greenhouse gases emission. Under the conditions of limited investments into Russian economy the above measures will enable to attract additional investments for solving many ecological problems, as the environment protection is a crucial and noble target of Gazprom due to rash development of scientific and technical progress and introduction of up-to-date technologies.

CONCLUSION

Gazprom widely employs the mechanism of international cooperation and during a number of years maintains contracts with many business partners. It is ecological projects carried out jointly with renowned foreign companies. They are aimed at the reduction of greenhouse gases emission, methane included, enhancing of energy efficiency and reduction of fuel gas consumption.

In accordance with the United Nations Framework Convention on Climate Change at the time being the terms and rules of trading by greenhouse gas emission quotas are being established, in order to create a basis at an international level for the reduction of emissions at minimal costs.

The gas industry of Russia has an extremely high potential for reducing greenhouse gas emissions and can be a large seller of quotas on the emissions both in home and international market.

The further progress in the solution of the global problem of climate change can be reached on the basis of the interdisciplinary approach using a powerful arsenal of modern means for carrying out large-scale theoretic and experimental investigations, and on the assumption of integration of the international community efforts.

REFERENCE

1. Journal "Okhrana okruzhayushey sredy 2002", Gazprom, 2003

Table 1 Structure and volume of atmospheric harmful substances emission

Structure of atmospheric emissions	Emissions volume, 10 ³ tons						
	1996?	1997?	1998?	1999 ?	2000 ?	2001?	2002?
Total GASPROM	2563,1	2345,2	2455,2	2469,4	2259,5	2199,2	2243,4
Including							
Methane	1767,0	1616,0	1697,8	1687,8	1514,1	1483,3	1457,2
Carbon oxide, ??	549,2	526,0	548,7	554,8	528,7	503,5	565,3
Nitric oxides, NOx	181,0	141,8	150,1	139,3	131,4	128,1	145,8
Sulfur dioxide, SO ₂	43,7	45,8	48,5	58,6	63,9	62,9	71,8
Volatile organic compounds (VOC)	4,0	3,2	1,4	3,9	6,9	7,0	6,8
Solids	5,8	5,4	8,4	7,4	8,3	7,8	7,0
Others	2,4	7,0	0,3	7,6	6,2	6,5	2,2

Table 2 Dynamics of Greenhouse Gases Emission (by Gazprom)

Greenhouse gases emission	Years			
	1990	2000	2008	2012
Methane, CH ₄ , 10 ⁹ m ³ /y	11,0	10,0	7,8	5,1
Methane as CO ₂ equivalent, 10 ⁶ t/y	160,7	148,0	114,6	75,0
CO ₂ from burned natural gas, 10 ⁶ t/y	105,4	84,0	74,0	70,0
<i>CH₄ emission reduction for the period, 10⁹ m³</i>				
-	-	1990-2000	2000-2008	2008-2012
-	-	1,0	2,2	2,7
<i>CO₂ emission reduction, 10⁶ tons</i>				
-	-	21,4	10,0	4,25

Table 3 Industry-wide potential for greenhouse gases emission reduction
(for the period of 2001-2012)

Segments of industry	Greenhouse gases emission reduction			
	<i>Natural gas</i>	<i>Natural gas as CO₂ equivalent</i>	<i>CO₂ (from burned fuel gas)</i>	<i>CH₄</i>
	<i>10⁶ m³</i>	<i>10⁶ tons</i>	<i>10⁶ tons</i>	<i>10⁶ tons</i>
1. Gas transport	2600	38,2	13,2	51,4
2. Gas distribution	1000	14,7	-	14,7
3. Gas, condensate and oil production	1000	14,7	0,78	15,48
4. Gas, condensate and oil processing	50	0,7	0,27	0,97
5. Underground gas storage	250	3,7	-	3,7
Total by GASPROM	4900	72,0	14,25	86,25

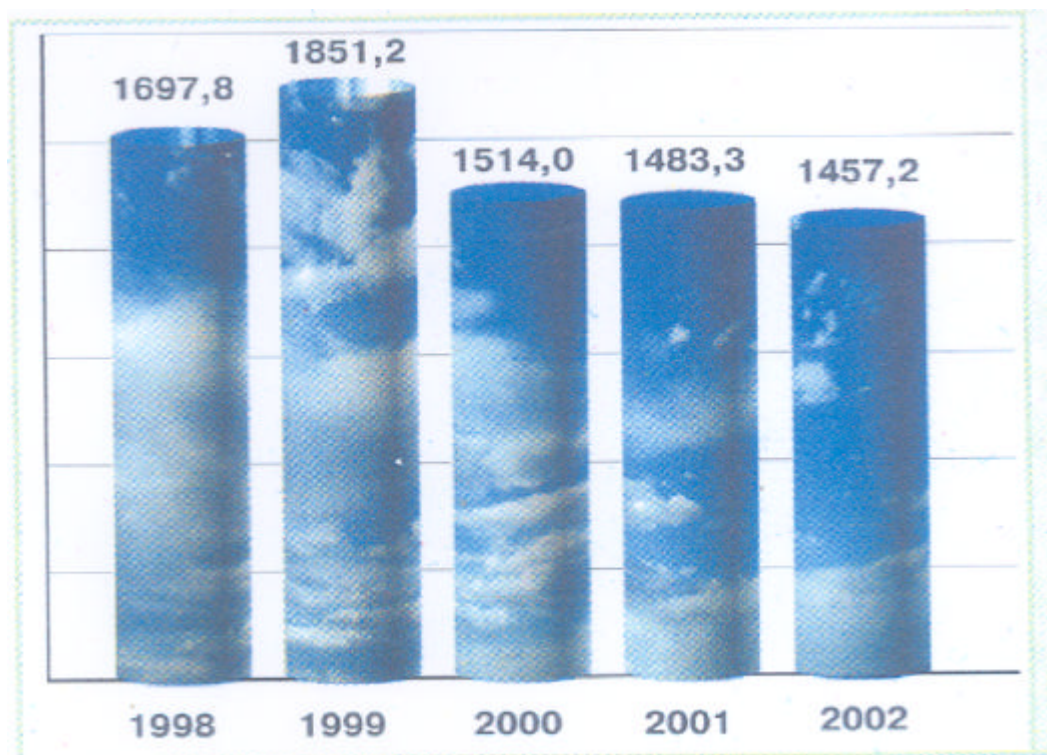


Fig.1. Emission methane CH₄, 10³ tons

Greenhouse gas emissions

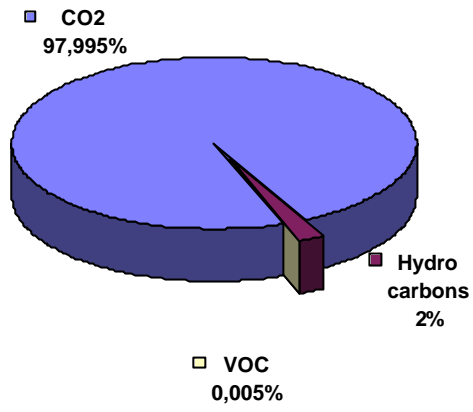


Fig.2