

Resource conservation program in terms of Vostokgazprom environmental policy

M R Tsibulnikova^{1,2} S V Nadyumov (Надымов)¹ A M Adam² T V Korotchenko¹

1 Tomsk Polytechnic University, 30 Lenina street, Tomsk, 634050, Russia;

e-mail: tsibulnikova2011@yandex.ru

2 Tomsk State University, 30 Lenina street, Tomsk, 634050, Russia;

e-mail: adam@green.tsu.ru

Abstract. The article examines a number of key areas of environmental policy of Vostokgazprom. The Associated Petroleum Gas program is an important step within the resource conservation and environmental protection framework. In addition, the company undertakes the extensive work on emergency response programs, and carries out continuous protection of the subsurface and control over environmental safety in all production sites. Vostokgazprom continuously modernizes the basic industrial facilities and invests money in new projects. The study analyzes the steps being taken by the company within the energy saving policy that leads to significant costs cut.

Key words: environmental policy, oil and gas production, resource efficiency, energy conservation.

1. Introduction

Worldwide, energy and resource conservation is considered the first priority in sustainable development as it is intended to balance the economy and the sustainability of environment [1]. In many countries, the development and implementation of resource efficiency programs [2] which are primary based on introducing new technologies aimed at reducing consumption of fuel and energy resources [3] are an integral part of environmental policy. Resource consumption optimization is regarded as a tool for enhancing competitive capacity [4], while reduction of fuel and energy is supposed to avert global climate changes [5].

Today, natural resources play a significant role in the Russian economy. Production of natural resources contributes 50% of GDP (gross domestic product) of Russia. About 70% of foreign exchange earnings of federal and constituent entity's budgets of the Russian Federation directly or indirectly come from the natural resource sector. Due to these facts, the issue of energy and resource conservation occupies a central place in petroleum companies' policies [6].

The petroleum industry recognizes that energy efficiency and resource conservation programs, including well-balanced environmental policies, can make a major contribution to optimal use of natural resources and reduction of environmental impact [7, 8].

2. Materials and Methods

The present study is focused on the analysis of a number of programs implemented within the environmental policy of "Vostokgazprom". Precisely, the performance indicators of resource conservation programs and environmental policy itself are thoroughly examined.

3. Results and Discussion

Environmental protection implemented in accordance with the Environmental Policy of Gazprom and unified HSE program is among Vostokgazprom's prioritized activities. The resource conservation program of Vostokgazprom is focused on ensuring the ecological balance, developing new technologies that would save resources and provide consumers with consistent source of energy.

The environmental protection policy of the company encompasses the following targets:



- development and improvement of the environmental management system of the company in accordance with the current environmental legislation;
- implementation of a number of environmental protection measures both at the stage of field infrastructure design and construction, and stage of field operation;
- facilitation of efficient control over implementation of technological and administrative decisions.

Design and engineering solutions which are thoroughly examined by the company departments and government agencies allow reducing environmental impact. Reclamation of disturbed land and forests makes it possible to restore fertility and quality of soils and territories that are not planned to be used during facilities operation and maintenance.

At the first stage of Vostokgazprom production facilities construction, environmental safety was secured due to carefully considered and balanced engineering decisions provided by the field infrastructure development projects. Precisely, efficient natural gas processing technologies, as well as, up-to-date methods of industrial solid and liquid waste disposal, were implemented. In addition, emergency prevention decisions and activities were elaborated.

Assuring permanent control over the quality of production facilities construction, used materials and component parts, test procedures and maintenance activities is considered essential constitute of technological, and as a result, environmental safety.

When developing hydrocarbon fields, the company takes steps on reducing negative environmental impacts associated with hydrocarbon extraction, processing and transportation. To be more precise, production facilities are renovated, corrosion protection practice is revised, gas-field production facilities and pipeline systems are inspected on the schedule basis. In addition, technologies of natural gas gathering and processing are constantly being improved.

In order to enhance production and transportation facilities safety, the following steps were taken: implementation of up-to-date well development and associated gas utilization technologies, as well as, regular non-destructive testing, control over production facilities and piping system tightness testing, automation of the most essential technological processes, and increase in competence and consciousness of the company's employees in addressing the environment-related issues [9].

The industrial wastes are disposed in accordance with the nature conservation laws. The wastewater is treated and purified in the fields via biological treatment facilities. The peculiar design of wastewater facilities (the soil absorption system in Severo-Vasyuganskoye gas condensate field and the root zone waste water treatment system in Severo-Ostaninskoye oil field) secures efficient treatment of wastewater at minimum cost. To dispose and neutralize industrial solid waste, Vostokgazprom introduced onsite waste landfills appropriate for burial disposal techniques [10].

As the current study reveals, drilling cuttings removed from the exploration and production boreholes are classified as low-hazard and hazardous industrial waste (4 and 5 classes of hazard) in accordance with the waste management policy of Vostokgazprom. At the same time, these drilling cuttings are also composed of mineral substances found in the ground and required for plant nutrition. It is these characteristics of drilling cuttings that allowed engineers of Vostokgazprom to prove the possibility of using drilling cuttings as a by-product, i.e. fertilizer, in reclamation of the forest lands disturbed during the construction activities.

Recently, development of a new framework for financing and implementing the Associated Petroleum Gas program has become an essential step towards resource conservation and environmental safety within the environmental policy of Vostokgazprom.

Besides, implementation of emergency response programs developed for all hazardous production sites of the company is also an important constituent of the industrial and environmental safety.

The company timely carries out the inventory of the sources that create negative environmental impacts. Due to this, draft standards for allowable emissions of pollutants, discharge of pollutants into surface water sources, and waste generation and limits on waste disposal have been developed and are regularly revised.

Field activities that occur during exploration and production stages also include protection of the subsurface and control over environmental safety. In general, based on monitoring and control results, it can be stated that industrial environmental impact is within the allowable limits set by the design documentation and specifications.

Energy conservation is the prioritized activity of Vostokgazprom. The company is one of the largest consumers of energy resources among the enterprises of Tomsk oblast.

In 2013, the company spent 31940 thous. rubles on energy resources, 26404 thous. rubles on electricity, 5536 thous. rubles on thermal energy. Due to the certain activity of the company, the extracted gas is not only transported but also used for on-site needs. Therefore, the company does not bear any expenses related to gas consumption.

In 2013, in order to reduce energy cost, the furnace smoke exhaust motor was equipped with adjustable speed drive (Myldzhinskoye field). From 2007 to 2011, only two of four smoke exhausts were in service, each consuming 45 kW. The operating time of the smoke exhaust was 24 hours, with the average duration of the heating season being 201 days.

In addition, to secure continuous energy supply, outdated panels of electric equipment control centers were replaced by modern ones manufactured by «Siemens». This program, initiated in 2005, was planned to continue until 2016. According to this program, 250 panels of electric equipment control centers, 27 transforming substations and distributing points were either replaced or renovated.

In 2012, within the joint program on energy supply reliability enhancement and reduction of risks of power cuts in Myldzhinskoye, Severo-Ostaninskoye, Kazanskoye, and Severo-Vasyuganskoye oil and gas condensate fields (OGCF), outdated isolating switches, short-circuit throwing switches, and oil switches were replaced by modern vacuum switches and SF breakers. In the course of Ostaninsk fields development, power stations PS-35/6kW “Severo-Ostaninskaya” and PS-35/10kW “Ostaninskaya” were commissioned in 2015. Besides, transforming substation is planned to be constructed in Ostaninsk field itself. It would supply power to Mirnoye, Pidzhinskoye, and Ostaninskoye fields. Today, energy supply to these fields is secured by diesel-engine power plant located in Mironoye field. Assuring continuous energy supply will definitely increase reliability of the field facilities operation [11].

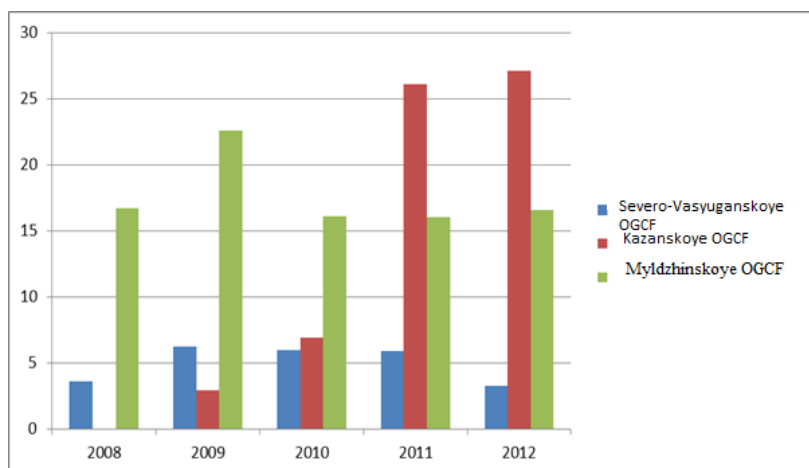


Figure 1 – Dynamics of energy consumption, mln kW/h.

Figure 1 illustrates the energy consumption analysis carried out for each of the above-mentioned fields. It shows that the annual increase in energy consumption is primarily stipulated by industrial and technological needs, while energy use for on-site needs, including supply of power to the contractors and compensation of industrial losses, remains constant. The volume of energy consumption in Kazanskoye oil and gas condensate field (OGCF) stands out against the general background.

Since the moment of the field commissioning in 2009, energy consumption increased 8.8. times and amounted to 23.074 mln kWh in 2012. In general, this fact identifies the steady level of energy consumption.

In August 2011, “Vostokgazprom” was issued “Power Certificate of Industrial Consumer of Fuel-Energy Resources” valid until 2016.

For further implementation of energy saving activity to reduce energy consumption and based on the Federal Law 261-FZ “On Energy Saving and Energy Efficiency Increase and Amending Certain Legislative Acts of the Russian Federation” adopted on 23 November 2009, Vostokgazprom developed the third program on energy saving for 2011-2015 with a vision to 2020. It is planned to save about 360 mln. kWh of electric power and 870 thous. Gcal of thermal energy.

The following results were achieved with the support of this program:

- 52009 kWh of electric power in kind and 144.8 thous. rubles in cash were saved. Active harmonic filters and adjustable speed drive were installed in furnace smoke exhaust motor in Mirnoye gas condensate field;

- 16.175 Gcal/year of thermal energy in kind and 114.7 thous, rubles in cash were saved. Thermal energy supply of the field facilities operated by Vostokgazprom is secured due to on-site energy generation: wasteheat exchangers have been placed behind gas turbines of power stations and gas-compressor units, which makes it possible to save money on heating buildings. To ensure more efficient saving, the defects in enclosing structures were laminated, and thermostatic valves were installed;

- 0.208 mln. m³/year of gas in kind and 2. 17 mln. rubles in cash were saved for on-site needs. In order to reduce gas consumption in the furnace rooms due to full use of generating unit thermal capacity, the efficiency of exhaust heat boilers was increased;

- 187.12 Hcal of thermal heat was saved for hot-water supply, as well as 2265 m³ of cold water. The savings per year from installation of touchless faucets were 1.44 mln. rubles.

Totally, the company consumed energy resources of 43.05 mln. rubles. The total savings with the support of the energy saving program were 39.58 mln. rubles.

In general, the company spent 31.940 mln. rubles on developing and implementing energy saving program, with 29.582 mln. rubles being saved.

In addition to resource conservation policy, Vostokgazprom continuously modernizes the basic industrial facilities and invests money in new projects.

4. Conclusion

As it was mentioned, resource conservation is an integral part of successful development of an enterprise. And, it is of particular importance for petroleum engineering since petroleum sector is the most resource consuming one. The activities of petroleum companies are directly dependent on resources consumption.

The current study analyzes the activities of the petroleum company in the sphere of resource conservation. The resource conservation program resulted in saving resources with full cost of 43.05 mln. rubles, which, in its turn, positively affected the profit of the company. Program implementation costs amounted to 31.94 mln. rubles, i.e. 39%, 61% being of the company’s profit. The continuous improvement of industrial process rests on developing resource conservation technologies.

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