# Oil and gas company policy regarding the concept of sustainable development (water resources)

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**Abstract.** The paper considers oil and gas companies implementing the strategy of sustainable development. Being vital to the national economy, oil and gas companies have a significant impact on the environment. Having analyzed the statistical data, the authors state that the leading Russian oil and gas companies contribute to the industry dynamics and conduct eco-friendly production practices. The environmental component is reported to be integrated in production, HR, information and other company policies, which results in "greening" both economic cooperation and place of production. The authors report the inverse relation between production dynamics and significance of the impact on water resources.

## 1. Introduction

Intensive development of the productive forces, limited resources, and carrying capacity insufficient to mitigate the human impact have boosted the choice and implementation of measures for sustainable development. Though the concept of sustainable development is assumed to support all national industries, this approach is particularly important for oil and gas producing regions due to the tradition of using fossil fuels in goods production.

## 2. Materials and Methods

Under sustainable development we mean a way of life which ensures expanded production, however, particular attention should be paid to the interaction between production and environment. Intensive development of Russian oil and gas companies shown in table 1 [1] makes them key factors for dynamic development of national economy, i.e. its sustainability in satisfying society needs.

**Table 1.** State and perspectives of leading national companies.

| Company | Production (compared to the same period in 2013) | Development perspectives |
|---|---|---|
| Rosneft | Over the past 9 months of 2014: oil recovery – 159.9 million tons (+12.5%), gas recovery – 40.9 billion m³ (+56.6%) | Production increase by 30% by 2020; twice as much by 2034. |

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|---|---|---|
| Lukoil | Over the past 9 months of 2014: oil recovery – 72 million tons (+6.6%), gas recovery – 14.7 billion m³ | The company is going to expand its business. through cooperation with Gazprom (2014–2024 General Agreement on Strategic Partnership). |
| Gazprom | oil recovery – 26.3 million tons; gas recovery – 320.3 billion m³ | To increase the global market share, Gazprom is implementing Vladivostok LNG project (up to 15%) and constructing LNG production complex in Tomsk oblast with the capacity of 20–23 tons per year. |
| NOVATEK | Over the past 9 months of 2014: gas recovery – 45.86 billion m³ (+1.76%), oil recovery (including gas condensate) – 4275 million tons (+21.8%) | Government support (Yamal LNG). |
| Bashneft | Over 2014: oil recovery – 17.8 million tons (+10.8%) | Four GCF development licenses. |

However, oil and gas complex has a negative environmental impact on water and land resources, as well as flora and fauna, at all production stages – geological and seismic survey, exploratory drilling, field facilities construction, field development and oil transportation, site restitution. Water resources contamination takes place throughout field development, production, and well abandonment stages. For instance, according to the research data on the fields of Tumen' oblast, there are 30 thousand exploratory wells (most of them drilled more than 15 years ago) collapsing due to long downtime and lack of maintenance, which, in its turn, results in seal failures and oil, gas and water showings. The total square area of oil-contaminated and saline lands and water surfaces is from 20 to 30 thousand ha [2].

Following the sustainable development strategy, oil and gas companies need to develop an environmental policy and then integrate it into the production one. However, environmental regulations of exploration and production are created earlier and become the requirements, which a company should meet to start a business. This indicates the prevalence of the environmental component over the production one. In compliance with the Federal Mineral Resources Act [3], the major requirements to sustainable use and conservation of mineral resources are "prevention of subsurface pollution during subsurface works, especially those connected with underground storage of oil, gas, and other substances and materials; hazardous and processing waste burial; waste water discharge, etc.". For example, NOVATEK conducted the environment research while constructing and commissioning the Ust-Luga Fractionation and Transshipment Complex processing stable gas condensate, with particular attention being paid to Luzhskaya Guba, the Gulf of Finland, and its water conservation zone [4].

The company environmental policy is not developed in isolation of production, quite the opposite, the environmental component is integrated into all activities performed. For example, in 2014, Gazprom conducted eco-friendly HR policy: 9012 employers of Gazprom Group attended environmental training courses (with 4669 persons trained for environmental management system (EMS)), including 7290 employers of OAO Gazprom (with 4580 persons trained for EMS) and 1306 employers of Gazprom Neft (with 54 persons trained for EMS) [8].

In order to meet environmental regulations, the companies not only improve current production, but also identify the strategic priorities (Table 2).

**Table 2**. Implementation of the sustainable development policy by national leading oil and gas companies [4–8].

| Company | Activities |
|---|---|
| NOVATEK | In 2013, Bureau Veritas Certification audited EMS, industrial safety, occupational safety and health management system to determine whether they conform to the international standards ISO 14001:2004, OHSAS 18001:2007.<br>In 2013, the costs for water resources utilization and conservation were 26436 |

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|---|---|
| | thousand rubles (145,3% increase in comparison with 2012). |
| Gazprom | The Company declared 2014 to be the Year of Environmental Culture and Industrial Safety. According to certification audit of 2013, the integrated EMS complies with the international standard ISO 14001:2004.<br>Waste water collecting and treatment account for 26.1%; the company conducted campaigns on water reclamation to remove residential waste and submerged trees. |
| Bashneft | Circulation water supply system and water recycling are operational in the oi fields; at the petrochemical plants, after two-stage filtration, about 65% of water is returned into the technological process.<br>The water-body management system includes 1391 water monitoring centers, with 70% monitoring the surface water quality and 30% – underground fresh water.<br>There is also a large-scale project aimed to modernize the biological treatment plants of the Bashneft-Ufaneftekhim branch. |
| Lukoil | The program for 2014–2018 presumes additional treatment of 6.8 billion m³ of sewage water and a decrease in water consumption by 7.6 billion m³.<br>To ensure a sustainable use of water resources and prevent water contamination, the company takes actions as follows: pipeline failures prevention and repair, constructing the system for produced water disposal; pipeline water crossing inspection and maintenance; slop water treatment system, etc. |

Eco-friendly policy conducted by oil and gas companies stipulates establishment of special departments and services responsible for environmental monitoring, control, and implementation of the required production systems (table 3) [8,9,10].

**Table 3.** Changes in company structure.

| Company | Activities |
|---|---|
| Gazprom | Establishment of environmental inspectorate responsible for meeting environmental regulations, adoption of environmental content for corporate code of conduct; EMS internal audit; meeting corporate requirements to sustainable use of mineral resources; cooperation with the government environmental protection agencies to improve company environmental activities.<br>In 2014, there were 597 inspections in 54 company subsidiaries: 411 – scheduled inspections examining for the compliance with environmental regulations, including 135 EMS audits, and 186 themes inspections examining for the compliance with environmental regulations regarding capital construction . |
| Lukoil | EMS has been implemented for offshore field construction.<br>In relation to the offshore field located in the Baltic sea, hydrodynamic data have been studied, bottom flows have been measured, etc.; special types of ships are involved in environmental monitoring; two double-bottomed observatories, a hydrophysical survey station, two hydrometeostations and three weather stations are operational on the offshore platform, at Kurshskaya Kosa, in Klaipeda, Baltiysk and Pionersky. It is for the first time when the company established an autonomous seismic station in this region. |
| Rosneft | The department of environmental safety and technologies is responsible for environmental risks assessment, internal environmental audit and project expertise. The department is in charge of supporting the program on Environmental Protection and Biodiversity Preservation in Exploration and Production of Mineral Resources in the Arctic Continental Shelf of the Russian Federation. |
| Bashneft | PJSOK Bashneft has in place HSE policy and is currently implementing the group's HSE strategy. The Group has implemented a Standard on Cooperation with Contractors in the Sphere of Health, Safety and Environment. Compliance of potential contractors with environmental requirements set out in the Standard is a necessary prerequisite for entering into |

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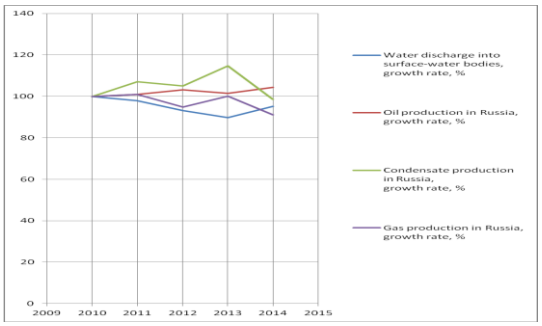
|---|---|
| | contracts with them (organization of waste collection, storage and accumulation sites and the transfer of waste for recycling; making payments for negative environmental impact; compliance of water consumption and discharge processes with environmental legislation). |
| NOVATEK | The company has implemented HSE policy and operates an Integrated Health, Safety and Environment Management System (IMS). Before carrying out activities involving environmental impact, the company, through media, informs the society about the data on environmental risks assessment, hold public consultations, establishes community liaison offices, present the information on the company's website.<br>The company representatives are among the members of the consulting group contributing to research and conservation of the Atlantic walrus in the Barents sea south-east and contiguous zones; they also make a part of the study team considering environmental impact of Sabetta dockyard construction, Obskaya guba. |

It is noteworthy that the above mentioned companies improving their production regarding environmental safety and sustainable development set environmental requirements for their partner (for example, contractors), inform the society about an environmental impact (actual or anticipated), and consider public opinion. Firstly, this indicates "greening" not only economic cooperation, but also the place of production, since all participants are involved in this process. Secondly, this defines the external environmental policy (including the information one). Moreover, making project solutions with due regard to environmental risk assessment signifies "greening" investment policy.

The companies currently promote environment-conscious policies, which leads to the fact that production growth and environmental impact are associated with opposite dynamics (for example, Gazprom and Lukoil data [7, 8, 11], Figure 1).

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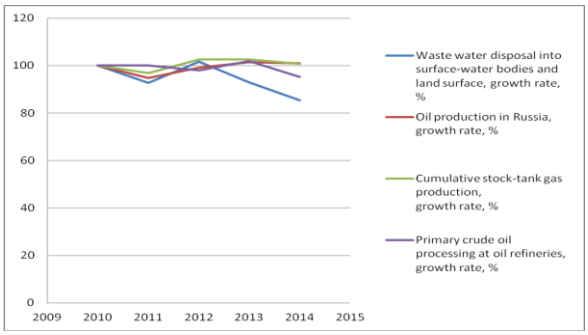


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**Figure1.** Comparison of business capacity and water resources use track records (1 – Gazprom data, 2 – Lukoil data).

As for OAO Gazprom, water discharge into surface-water bodies decreased (by 22 % over the study period) due to shrinkage of water required for process needs in the companies of Gazprom Energy Holding. Moreover, Gazprom Group took actions on sustainable use of water resources and preventing water contamination. If we turn to Lukoil, the drop in waste water disposal into surface-water bodies (25 % over the study period) results from high-tech and resource-efficient equipment implementation at the sites. Table 4 gives more information on water resources use.

**Table 4.** Comparison of business capacity and water resources use track records.

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| | | **Lukoil** | | | |
| Waste water disposal into surface-water bodies and land surface, million $m^3$ | 354.9 | 329.3 | 334.6 | 311.1 | 265.5 |
| including meeting quality standard, million $m^3$/ | 326.1/ 91.9 | 296.7/ 90.1 | 302.2/ 90.3 | 281.9/ 90.6 | 243.0/ 91.5 |

| | | | | | |
|---|---|---|---|---|---|
| percentage of total amount, % | | | | | |
| Oil production, thousand tons | 89 767 | 84 966 | 84 234 | 85 481 | 86 328 |
| Cumulative stock-tank gas production, million $m^3$ | 13 599 | 13 174 | 13 553 | 13 916 | 14 031 |
| Primary crude oil processing at oil refineries, million tons | 45.21 | 45.28 | 44.43 | 45.25 | 45.28 |
| **Gazprom** | | | | | |
| Water obtained, million $m^3$/ growth rate, % | 6 259.00/ 100 | 5 793.00 / 92.6 | 5 462.45/ 94.3 | 5 130.18/ 93.9 | 4 895.38/ 95.4 |
| including water from natural sources, million $m^3$/ / percentage of total amount, % | 6 015.73/ 96.1 | 5 572.42 96.2 | 5 212.95/ 95.4 | 4 890.63/ 95.33 | 4 410.68/ 90.1 |
| Water used for production, million $m^3$/ percentage of total amount, % | 5 982.12/ 95.6 | 5 550.79/ 95.8 | 5 209.31/ 95.4 | 4 919.51/ 95.9 | 4 506.18/ 92.0 |
| Water discharge into surface-water bodies, million $m^3$ | 5 364.05 | 5 257.71 | 4 892.96 | 4 389.91 | 4 179.09 |
| including meeting and treated to quality standard, million $m^3$/ percentage of total amount, % | 5 321.36/ 99.2 | 5 096.23/ 96.9 | 4 691.55/ 95.9 | 4 227.86/ 96.3 | 3 991.59/ 95.5 |
| Gaz production in Russia, billion $m^3$ | 508.6 | 513.2 | 487.0 | 487.4 | 443.9 |
| Condensate production in Russia, million tons | 11.3 | 12.1 | 12.8 | 14.7 | 14.5 |
| Oil production in Russia, million tons | 32.0 | 32.3 | 33.3 | 33.8 | 35.3 |

According to the data presented, the companies are reducing their water use with the production growth; also, the percentage of water meeting the quality standards and water treated is almost 100 %.

## 3. Conclusion

In conclusion, the oil and gas companies lay foundation for sustainable development of national economy, however, this does not result from their particular status of energy suppliers but is due to the consistent measures taken to mitigate the negative environmental impact. The environmental policy being integrated in company management system underlies all company activities (HR, investment, information, etc.), stipulates “greening” economic cooperation, involving contractors, public, and local authorities**.**

## References

[1] *Development of oil and gas complex in Russia over 2014 (as of 02.02.2015)* 2015 (Moscow, National Rating Agency) p 37 URL:http://www.ra-national.ru/sites /default/files/other/neftegaz_2014.pdf.

[2] Soromotin A V 2005 Environmental issues of oil and gas production in West Siberia *UT Research Journal* **3** 137–145

[3] *The Federal law "On subsoil" dated 21.02.1992, № 2395-1*. ConsultantPlus. URL:https://www.consultant.ru/popular/nedr/66_1.html
[4] *OAO NOVATEK Sustainability report 2010–2013* [official website] URL: http://www.novatek.ru/
[5] *OAO Gazprom Sustainability report 2012–2013* [official website] URL: http://www.gazprom.ru/
[6] *PJSOC Bashneft Sustainability report 2010–2014* [official website] URL: http://www.bashneft.ru/
[7] *OAO Lukoil Sustainability report 2014* [official website] URL: http://www.lukoil.ru/
[8] *OAO Gazprom Environmental report 2014* [official website] URL: http://www.gazprom.ru/
[9] Tsibulnikova M R, Kupriyanova O S and Strelnikova A B 2015 Economic assessment of environmental impact in the course of oil field development and production *IOP Conf. Ser.: Earth Environ. Sci.* **27** 012076
[10] Matugina E G, Glyzina T S, Kolbysheva Yu V, Klyuchnikov A S, Vusovich O V. Compensation for oil pollution damage *IOP Conf. Ser.: Earth Environ. Sci.* **27** 012070
[11] Khattu A A, Solodovnikov A Yu 2015 Hydrochemical survey of new zone surface waters as an environmental indicator *J. Oil industry* **4** 104–108