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## Economic and Environmental Activities of an Economic Entity in the Regional Economy

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**Abstract:**

*The article is devoted to the analysis of negative effects of the oil and gas industry on the environment in the northern region. It is noted that the prevalence of extractive industries in the structure of the regional economy ensures high living standards but affects the environment.*

*The authors provide socioeconomic characteristics of regions depending on the industry prevailing in the structure of the gross regional product. The paper provides an analysis of the current state and structure of the regional economy of the Khanty-Mansi Autonomous Region – Ugra. It analyses flow data of some enterprises that have a negative effect on the regional environment and provides characteristics of changes in the volume and structure of pollutant emissions resulting from economic activities of enterprises in key economic sectors of the region.*

*The paper demonstrates the changes in regional investments in fixed assets allocated to protecting the environment and rational use of natural resources.*

*The conclusions are drawn about the need for environmental monitoring and implementation of a targeted policy of regional authorities to preserve the rich natural and resource potential of Ugra.*

**Keywords:** Ecology, Ugra environment, damage, industry, emissions, pollution, environmental protection measures, environmental investments.

**JEL Classification:** O10, O44.

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## 1. Introduction

The oil and gas complex play a huge role in the Russian economy stipulated by its contribution to both regional and federal budgets. The volume of proceeds from the oil and gas industry increased more than threefold in the period from 2005 to 2013 – from 2.1 to 6.5 trln rub. (Federal State Statistics Service, n. d.). Undoubtedly, such growth had been caused by a significant increase in oil prices from \$44 per barrel in January 2005 to \$110 in December 2013. The subsequent fall in oil prices led to a decrease in the share of oil and gas proceeds in the budget, which was 43% in 2015 and 36.1% in 2016 (Ministry of Finance of the Russian Federation, n. d.).

The share of proceeds from the oil and gas industry in regional budgets varies from 20% (Republic of Tatarstan) to 65% (Khanty-Mansi Autonomous Region) (Makhmudova, *et al.*, 2016). As some studies show, the highest socioeconomic development indicators are observed in regions with predominance of extractive industries in the reproduction structure (Matyugina *et al.*, 2015). For example, the average wage is 2 to 3 times higher in the extracting regions than in Russia (Table 1).

**Table 1.** *Socioeconomic characteristics of regions by industry groups*

Type of the region	GRP, thous. rub./pers.	Average wage, thous. rub./pers.
Regions where extractive industries dominate	600-2,700	59-93
Regions where extractive industries are predominantly developed	240-380	27-47
Regions where agricultural production dominates	131-369	23-29
Regions where processing industries dominate	217-311	24-33
Regions where enterprises from transport and communication industries dominate	180-430	32-46

There are twelve regions where extractive industries dominate; their key characteristics are presented in Table 2.

**Table 2.** *Some socioeconomic indicators of regions where extractive industries dominate*

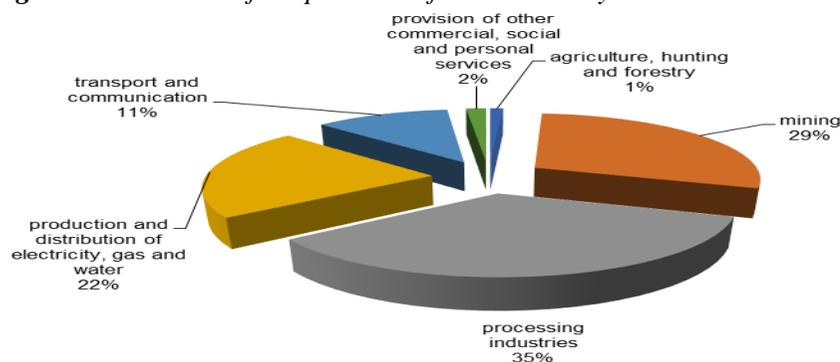
Region	Average wage, rub.	GRP per capita, thous. rub.	Share of the industry in GVA, %
Republic of Komi	40,222	567,658.8	32.4
Astrakhan region	24,576	261,932.3	21.3
Republic of Tatarstan	28,294	401,336.1	20.5
Republic of Udmurtia	23,421	266,776.2	25.2
Orenburg region	23,469	354,584.5	41.0
Khanty-Mansi Autonomous Region	57,956	1,730,554.5	65.6
Yamalo-Nenets Autonomous Region	74,489	2,543,509.1	52.6
Kemerovo region	26,809	245,252.1	22.3
Tomsk region	32,042	374,670.5	29.1

Republic of Sakha	51,111	594,766.0	43.0
Sakhalin region	54,896	1,379,556.5	61.0
Chukotsky Autonomous Region	76,285	930,489.1	31.3

However, aside from receiving high incomes, the development of extractive industries also has negative features associated with the negative effect on the environment. According to the official statistics data, a significant proportion of soil, water and air pollution is associated with operation of the following industries: oil extraction, electricity, coal, gas and oil refining (Figure 1) (Korolev 2016; Stroeva *et al.*, 2015; Grima and Caruana, 2017). For example, one third of air pollutant emissions in 2016 originated from the processing industry. The volume of emissions from extraction of minerals was 29%, of which 90% originated from the extraction of fuel and energy minerals. More than 90% of production and consumption waste is generated in extractive industries (Ministry of Agriculture of the Russian Federation, n. d.).

Oil pollution occurs both during the oil fields' operation and during the transportation of oil and petroleum products. Oil hydrocarbons' pollution leads to unfavorable and hardly reversible consequences in the ecosystem of soil and earth. Sources of soil contamination with oil and oil products include storage tanks, tank car loading and receiving racks, interplant and process piping, pumping equipment, etc.

**Figure 1.** Emissions of air pollutants from stationary sources



Chemical pollution caused by oil spills, pipeline breaks and release of mineralized produced water, spreading of drill muds with ground and surface waters is the greatest among all kinds of negative effect on the environment (Gnat, 2013). The man-made impact on the environment in oil extraction areas is extremely high. It is associated with the fact that the oil and gas producing industry is currently developing extensively, involving the formerly undeveloped territories and subsoil in the production process. The development of new deposits aggravates the negative effect on the environment. There are currently two main ways to reduce

harmful effects of mining on the environment (Zhakisheva, 2011; Sibirskaya *et al.*, 2016):

- 1) reduction, suppression and neutralization of harmful effects using modern technologies;
- 2) creation of cycle technological processes that do not affect the environment.

Oil and gas extracting companies strive to minimize the harmful effect on the environment, remediate contaminated land, reduce air emissions, and use associated gas in the production process.

Since 2014, environmental organizations have been compiling the ranking of the environmental responsibility of Russian oil and gas companies, which included 21 companies. They are assessed based on such indicators as environmental management, environmental impact and transparency of information (Ranking of environmental responsibility of Russian oil and gas companies, n. d.). The ranking was led by Sakhalin Energy in 2016 and by Surgutneftegas in 2014-2015 (Table 3).

**Table 3.** *Ranking of environmental responsibility of Russian oil and gas companies in 2016*

Line	Company	Final score	Line in 2015
1	Sakhalin Energy (Sakhalin-2)	1.853	3
2	Gazprom	1.720	2
3	Surgutneftegas	1.683	1
4	LUKOIL	1.653	5
5	Salym Petroleum	1.637	7
6	Exxon NL (Sakhalin-1)	1.630	9
7	NOVATEK	1.406	12
8	Gazprom Neft	1.379	10
9	Rosneft	1.355	6
10	Zarubezhneft	1.239	4
11	Irkutsk Oil Company	1.222	14
12	Total PPP	1.183	11
13	Tatneft	1.053	8
14	Bashneft	0.807	13
15	Transneft	0.638	15
16	Tomskneft Oil Company	0.473	16
17	Slavneft	0.462	17
18	Alliance-NNK	0.293	18
19	RussNeft	0.232	19
20	Neftisa-Belkamneft	0.148	19
21	Arctic Gas	0.148	21

In general, mining is an important tool for efficient regional development due to high proceeds to corresponding budgets, which allows to conduct efficient social policy and improve the living standards of the population of the regional society. However, the negative effect on the environment affects living standards of the population.

## 2. Methods

The authors used general scientific methods in the course of research: a retrospective analysis of main indicators of the changes in economic activity of regional economic entities was carried out based on scientific abstraction; the Delphi method and the method of data comparison were used; the dynamics and structure of the main indicators describing the current trends in the operation of organizations that released air pollutant emissions and had negative effect on the environment were described through the graphical interpretation of the data and the method of their grouping.

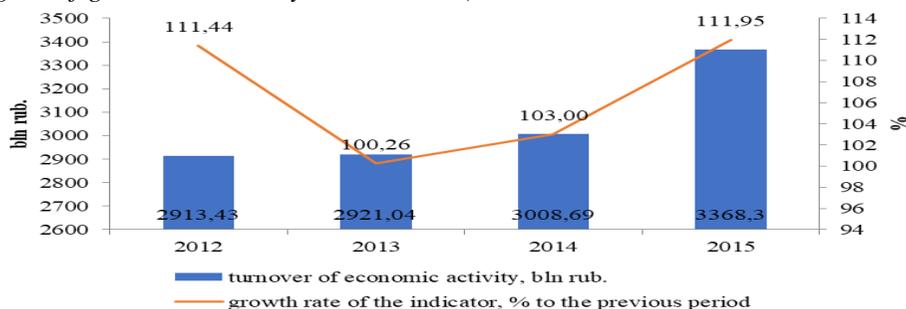
### 3. Experimental part

The Khanty-Mansi Autonomous Region – Ugra is one of the leaders among Russian regions by some important socioeconomic indicators: oil extraction, electricity generation, level of incomes of the population, and volume of industrial production (Economy of the Khanty-Mansi Autonomous Region – Ugra, n. d.). Competitive advantages of this region were formed as a result of intensive development and exploitation of the natural resource base. The specifics of the region also include large territories, severe climatic conditions, land swampiness, abundance of rivers, intensive development of the oil and gas extraction complex, and expansion of the city infrastructure.

The key sector of the regional economy of Ugra is the oil and gas industry, with more than 80 enterprises being involved in exploration and production of hydrocarbons (Makhmudova, et. al. 2016). Operation of the fuel and energy complex in the region defines the environmental situation in the Khanty-Mansi Autonomous Region. The main forms of negative effect on the environment in the field of oil and gas extraction include the following: disturbance of vegetation and soil cover, changes in water flow, harmful emissions in the air, snow pack, soil, surface and ground water, bottom sediments, and ingress of oil production wastes into all natural components (Report on the state of the environment of the Khanty-Mansi Autonomous Region – Ugra, n.d.). There are many types of enterprises in the fuel industry: oil and oil products, waste and produced water, drilling fluids and various chemical reagents. Besides, man-made accidents and spills accompanying the production and processing of hydrocarbon raw materials also harm the environment.

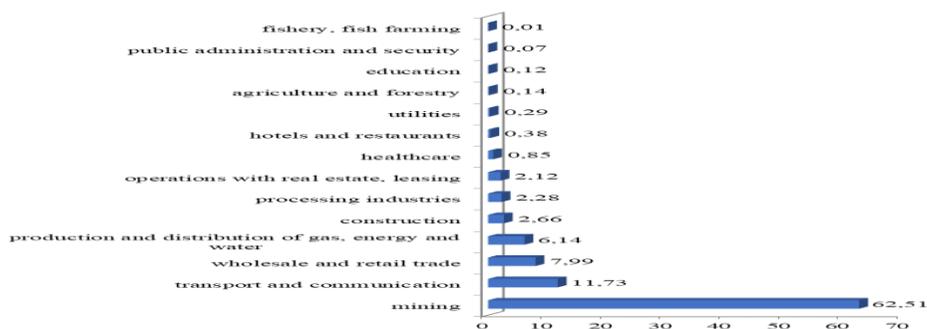
Various environmental programs aimed at preventing the negative effect of industrial production on the environmental situation of the region are widely spread in Ugra today (Makhmudova *et al.*, 2016). The current stage of economic development of the Khanty-Mansi Autonomous Region is described by an intensification of the economic activity. For example, the growth rates of production in the region have been increasing every year since 2014: the turnover of economic activity increased by 3% in 2014 relative to the previous period; the growth rate in 2015 was already 12% relative to the previous year (Figure 2).

**Figure 2.** Changes in the total economic turnover of the regional economy entities of the Khanty-Mansi Autonomous Region (Khanty-Mansi Autonomous Region – Ugra in figures: statistical yearbook, n. d.)



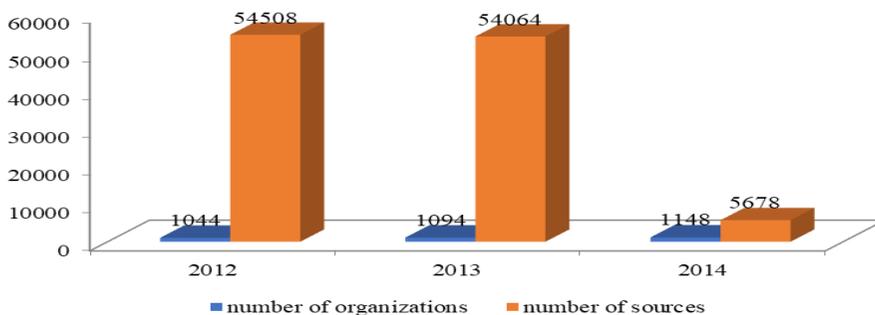
The sectoral specialization of the region is confirmed by the share of extractive industries in the structure of the gross turnover of the economy, which accounted for more than 65% of the total turnover (Figure 3). The proportions of production volumes, transport companies in the region, trade enterprises and entities of energy industries are significant. The intensive development of the transport sector, in part related to the development of new deposits and development of infrastructure, leads to large environmental problems related to the increase in air pollutant emissions (Ecological monitoring of the Khanty-Mansi Autonomous Region, n. d.). Operation of enterprises in the production and distribution of gas, water and energy sector is also associated with an unfavorable transformation of the environmental situation: deterioration in air quality, pollution of water bodies, noise from operating facilities, and death of fish entering water intake facilities (Report on the state of the environment of the Khanty-Mansi Autonomous Region – Ugra, n. d.). The level and speed of negative changes in the environment of the region are directly dependent on the intensity of development of key industries in the region. For example, the more intensively and dynamically the fuel industry develops at the present stage, the more significant and large-scale harm is made to the ecosystem of the territories.

**Figure 3.** Sectoral structure of the turnover of the Ugra economy, % (Khanty-Mansi Autonomous Region – Ugra in figures: statistical yearbook, n. d.)



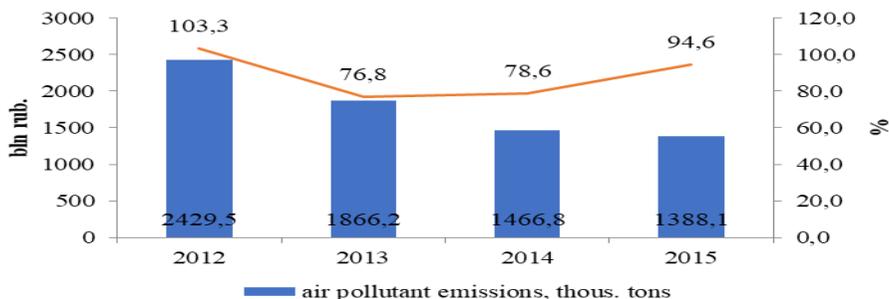
Now, there are 1,025 organizations in the structure of the regional economy of the Khanty-Mansi Autonomous Region that release air pollutant emissions (Figure 4). Despite their number having decreased due to the implementation of programs in the region aimed at reducing the volume of combustion of oil-associated gas, this problem is still relevant for Ugra.

**Figure 4.** Changes in the number of organizations that release air pollutant emissions and the number of sources of air pollutant emissions, pcs. (Khanty-Mansi Autonomous Region – Ugra in figures: statistical yearbook, n. d.)



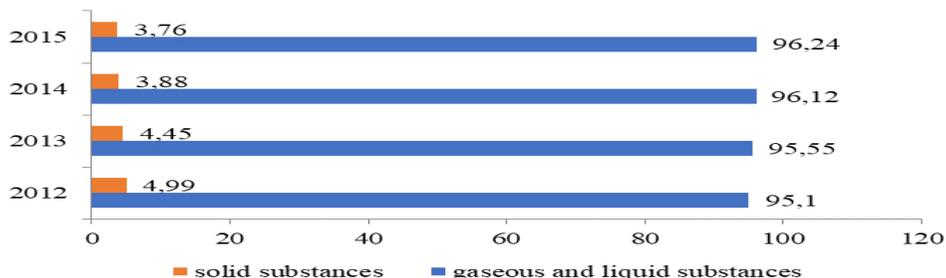
The efficient implementation of environmental measures and rational nature management in the Khanty-Mansi Autonomous Region are also revealed in the reducing volume of sources of pollutant emissions. However, there was an increase in the number of emission sources per each enterprise with such emissions in 2015. For example, this indicator had been 49 in 2013-2014, but in 2015 the number of sources at one enterprise increased to 53. This trend confirms the importance of the problem of air pollution by regional enterprises for the Khanty-Mansi Autonomous Region. The overall changes in air pollutant emissions from stationary sources of regional economy are described as declining. For example, enterprises of Ugra released 1,388.1 thousand tons of pollutants in the air in 2015, which was 43% less than in 2012 (Figure 5).

**Figure 5.** Changes in air pollutant emissions from stationary sources (Khanty-Mansi Autonomous Region – Ugra in figures: statistical yearbook, n. d.)



The structure of air pollutant emissions from stationary sources by enterprises in the Khanty-Mansi Autonomous Region is described as stable. For example, gaseous and liquid substances make up more than 96% of gross air emissions (Figure 6). However, despite the constant structure of harmful substances polluting the air, there is a significant reduction in the volumes of gas and liquids contained in them. For example, the total structure of emissions contained 2,301 thousand tons of gas in 2012, but in 2015 the volume of gas amounted to 1,336 thousand tons.

**Figure 6.** Structure of air pollutant emissions from stationary sources, % (Khanty-Mansi Autonomous Region – Ugra in figures: statistical yearbook, n. d.)



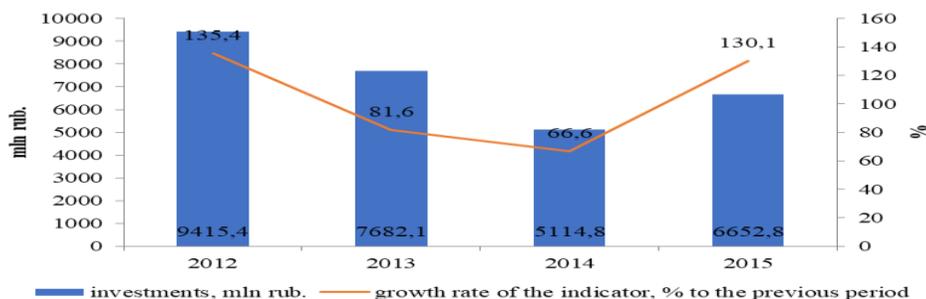
This confirms the efficiency of the targeted and adequate policy of the environmental services of Ugra, aimed at ensuring environmental safety of the economic activities in the region. The intensive use of economic methods to regulate the environmental activities of the entities of the regional economy in the process of their operation (Makhmudova *et al.*, 2016) in the practice of the Ugorsky Department of Ecology brings positive results at the present stage, which are seen in the dynamics of indicators of the negative effect on the environment. The most popular methods currently include benefits for the rational use of resources, introduction of advanced technologies that conserve the ecosystem of the territories, participation in the regional targeted programs, etc.

The intensification of operation of regional enterprises, the activities of which have negative effect on the environment, in the implementation of environmental measures is reflected in the growth of investments in the environmental protection

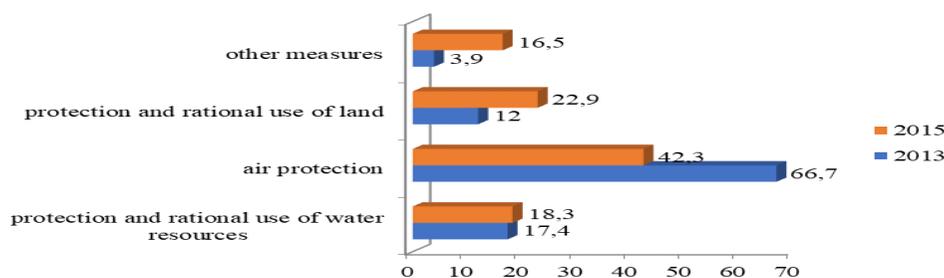
and rational use of natural resources. For example, economic entities of the Khanty-Mansi Autonomous Region invested 6,652.8 mln rubles in environmental protection in 2015, which was 30% more than in 2014 (Figure 7).

In the Khanty-Mansi Autonomous Region, the entities of the regional economy mostly invest in the air protection, purchasing expensive advanced technologies based on partial or complete cycles. For example, the total amount of capital investments in these facilities amounted to 2,812.5 mln rubles in 2015, or more than 42% of the total amount of environmental investments of the region (Figure 8).

**Figure 7.** Changes in the investments in fixed assets aimed at environmental protection and rational use of natural resources by enterprises in the Khanty-Mansi Autonomous Region (Khanty-Mansi Autonomous Region – Ugra in figures: statistical yearbook, n. d.)



**Figure 8.** Structure of environmental investments of enterprises that use natural resources of Ugra, %



A distinctive feature of the current environmental investment processes in Ugra (Pyatkovskaya and Skorokhodova 2012; Sysoeva, et. al. 2017) is an increase in the regional enterprises' funding of the waterworks' construction, introduction of soil and water saving techniques aimed at the rational use of land, use of landfills for waste disposal, prevention of accidents, etc. For example, the share of such investments in the total structure of environmental investments increased to 23% in 2015.

#### **4. Conclusions**

1. The prevalence of extractive industries in the reproductive structure of the regional economy ensures the highest socioeconomic development indicators and living standards but affects the environment. For example, a significant share of soil, water and air pollution is associated with the operation of such industries as oil extraction, electricity, coal, gas and oil refining.
2. The Khanty-Mansi Autonomous Region has a huge natural and resource potential, which creates the basis for sustainable economic growth and well-being of the population, at the same time holding leading positions in terms of production volumes in the key resource sectors of the regional and national economy. The sectoral specialization of the region, coupled with specific climatic conditions, leads to some environmental problems by causing negative effect on the environment. The main forms of this negative effect are large volumes of air pollutant emissions, large areas of uncultivated land contaminated with oil and oil products as a result of man-made accidents, weak development of the processing industry, etc.
3. The efficient and targeted policy of regional authorities implemented through a wide range of measures and programs contributes to the establishment of a favorable trend of preventing harm to the environment. There is a territorial environmental monitoring system aimed at describing the environmental situation and defining the size of the man-made load on the region, and environmental certification of the territory of the region is carried out.

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