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CLIMATIC ASPECTS OF GLOBAL ECONOMY TRANSFORMATION: INCREASE OF REGIONS AND MUNICIPALITIES' IMPACT

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Abstract

This paper analyzes prospects for economic development of the Republic of Bashkortostan in the the Paris climate agreement in 2015. On the basis of data on the non-renewable resources potential, economic growth rates, as well as the characteristics of the equipment and technology is evaluated the ability to move the region towards a low carbon economy and green growth. Activation of investment inflow can be conducted through fragmentation of its goals and creating pool of investment project on the level of regions and municipalities. Example of Russia and other countries confirms that existing structure of regional industrial complexes not only stipulates type and tempo of economic development, but also predetermines high environmental footprint and emerging of a set of environmental problems not only in regions but in national economy as well. The paper shows that pollutant emission from stationary and movable sources, increasing level of anthropogenic threat through aging of main means of production, buildup and accumulation of waste product and consumption residual, lack of efficient management system for quality of the environment – are significant factors that limit rate of socio-economic development of regional economic complex. The authors have substantiated a number of proposals to help improving the resistibility of socio-economic and ecological systems of the Republic of Bashkortostan, including economic diversification and sustainable governance of natural resources in the region. Transition from narrow ecological reading to a broad understanding of environmental policy.

Keywords: Non-renewable resources' potential, emission, equipment deterioration.

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1. Introduction

Implementation of climate policy faces a number of various challenges. These include mismatching approaches to using non-renewable resources in developing and developed states (Van der Ploeg, 2010). It is also important to take into account changes in consumers' welfare as a result of climate policy influence on socio-economical system as well as understand correlation between spending and benefits under the condition of significant external factors (Sunstein & Reisch, 2013). Studies of climate change economy, including theoretical conclusions and empirical results can and should be presented to government. But it is difficult to predict regulation consequences because due to ambiguity of terms and severity of policy actions taken to liquidate possible climate change (Goulder & Pizer, 2005). Institutional investors unwillingly take parts in climatic projects because they are expensive and implementation time sums up to 30-50 years. According to some authors solution to this problem can be investment project that are implemented on regional and municipal level. Project becomes less expensive and investors obtain opportunity to control it (Rodionov & Smirnov, 2016).

Thus, evaluation of resource base of certain regions in order to implement climate policy becomes more important. Due to this fact aims of the study are potential evaluation of non-renewable sources of Republic of Bashkortostan as well as possibility of region's transition to low-carbon economy and "green growth" (Hepburn, Pfeiffer, & Teytelboym, 2018). Republic of Bashkortostan was chosen as a subject of the study because it is a well-resourced region that is in a list of ten largest sub-federal units of Russian Federation.

2. Problem Statement

Fuel and power raw materials in Republic of Bashkortostan consist of hydrocarbons and brown coal. According to data of geology and licensing bureau of Republic of Bashkortostan of Department on Subsurface resources management Volga federal district (Bashnedra), on the territory of the republic as at 1 January 2015 there are 204 deposits of oil and gas. Bashkortostan possesses significant stock of iron and manganic ore, as well as copper-sulphide, gold-copper-zink and gold-sulphide ores. The republic has almost all types of general mineral resources – 13 types: sand and gravel mix, construction sand, brick-tile earth and construction stones, gypsum, anhydrite, agrochemical sources and turf etc.

In the region there are around 13 thousand rivers with total mileage of over 50 thousand kilometers. Average cubature of renewable surface waters total stock that forms on the territory of the republic is 25.5 cubical km. Taking into account waters that comes from neighboring territories and Republic of Tatarstan, cubature increases up to 35 cubical km. On the overall Republic of Bashkortostan has less water resources than Russian Federation: per 1 person in Bashkortostan there is 8750 cubical meters of water a year, or 24 cubical meters a day comparing to 29380 cubical meters a year or 80 cubical meters a day on Russia average; in Perm region that is also a part of Volga basin, this index is twice times bigger.

Existing pollution of water features is due to, first of all, to ineffectiveness of absence of water treatment facilities. Just as in previous years main reason of ineffectiveness of those are use of outdated technologies and exhaustion of main production facilities.

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Objects of environmental damage accumulated on the territory of the republic due to former industrial development of the region lead to endangering population's health. Currently the most important goals are detoxification and consecutive integration of these objects into economic development of the region.

Table 01. GRP Volga Federal District, bln. roubles.

№	Volga Federal District subject	2012	2013	2014	2015
1	Republic of Tatarstan	1437,0	1547,1	1671,4	1833,2
2	Republic of Bashkortostan	1149,4	1266,9	1248,8	1317,4
3	Samara region	937,4	1040,7	1152,0	1240,3
4	Nizhny Novgorod region	842,2	925,8	1018,4	1069,3
5	Perm region	860,3	893,4	967,9	1048,0
6	Orenburg region	628,6	709,5	731,3	774,8
7	Saratov region	478,3	528,6	562,3	617,5
8	Udmurt Republic	372,8	404,8	442,0	497,6
9	Penza region	239,9	270,8	297,7	336,5
10	Uluanovsk region	240,5	260,3	279,0	301,4
11	Kirov region	208,5	224,7	250,3	276,5
12	Chuvash Republic	217,8	224,4	235,1	250,4
13	Republic of Mordovia	119,9	149,3	170,9	187,4
14	Mari El Republic	117,2	124,4	144,1	165,5

Note: Source: compiled by the authors according to Rosstat

Dynamics of Republic of Bashkortostan development is unstable (see table 01). Existing resources are used in a non-optimal way. We can see that GRP of the region is 25% lower than GRP of Republic of Tatarstan, although population base is bigger by approximately 350 thousand people. This fact is also confirmed by data on GRP energy-output ratio and grade of fixed assets' exhaustion (see tables 02, 03). In criteria of energy-output ratio Republic of Bashkortostan falls behind Republic of Tatarstan on energy-output ratio by 48,6% and by grade of fixed assets exhaustion – by 21%. These data also tell us on significant emission of greenhouse gas due to use of outdated equipment and ineffective technologies.

Table 02. GRP energy-output ratio (kg of standard fuel for 10 thousand roubles) in Volga Federal District subjects

№	Volga Federal District subject	2012	2013	2014	2015
1	Republic of Tatarstan	184,12	153,25	143,77	121,79
2	Penza region	177,02	153,32	153,03	135,61
3	Mari El Republic	211,15	196,86	158,85	125,84
4	Udmurt Republic	168,39	187,39	165,72	135,38
5	Chuvash Republic	194,08	180,25	173,22	156,43
6	Uluanovsk region	209,58	190,82	175,51	159,48
7	Saratov region	243,92	214,92	193,95	165,79
8	Nizhny Novgorod region	246,97	234,01	203,37	173,59
9	Kirov region	246,22	224,43	205,16	180,55
10	Republic of Bashkortostan	232,18	227,35	213,69	199,27
11	Perm region	327,72	307,93	217,50	187,81
12	Samara region	278,36	248,64	225,28	199,19
13	Republic of Mordovia	264,18	233,76	227,96	181,08
14	Orenburg region	367,54	263,44	260,21	242,72

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Table 03. Grade of fixed assets exhaustion in Volge Federal District, %

№	Volga Federal District subject	2012	2013	2014	2015
1	Republic of Tatarstan	43,7	43,4	44,2	45,2
2	Uluanovsk region	46,6	46,9	48,0	48,3
3	Nizhny Novgorod region	50,2	49,7	48,7	52,1
4	Penza region	53,2	51,3	49,7	51,5
5	Kirov region	51,3	51,9	51,0	52,2
6	Republic of Bashkortostan	52,1	52,2	53,3	53,5
7	Samara region	53,7	53,5	53,4	55,1
8	Saratov region	54,0	53,5	53,8	56,2
9	Chuvash Republic	54,6	53,5	56,0	59,2
10	Republic of Mordovia	57,3	56,4	56,9	59,8
11	Orenburg region	56,9	55,9	58,1	61,1
12	Mari El Republic	60,6	58,7	60,2	63,3
13	Perm region	59,6	60,2	60,3	63,5
14	Udmurt Republic	61,0	62,3	62,0	64,6

Note: Source: compiled by the authors according to Rosstat

There is certainly interdependency between high GRP energy-output ratio (10^{th} position in the region) and low GRP per person (6^{th} position in the region).

From the point of view of climate policy social effects in Republic of Bashkortostan can be characterized the following way. 37,61% of population is concentrated in the five largest cities of the region, most of the stationary and movable sources of emission are located there as well. By gross index of urban environment welfare all five – except for the capital, Ufa, - are only in 200^{th} of Russia's cities rating. Index of environmental situation estimated only in 0,7 that is far worse than in other cities of the state. Index of population dynamics fluctuates between 168,39 (Neftekamsk) and 211,15 (Sterlitamak), in the capital (Ufa) it estimates in 184,12. Low quality of environment and medical-demographical problems define slow dynamics of population numbers reflexing unsatisfying attractiveness of living in the region.

3. Research Questions

Taking into account a gap in existing literature research questions for the study are the following:

To what extent does structure of industrial complex of a certain region influence climate policy of the state?

Which factors influence on low-carbon economy formation and "green growth"?

4. Purpose of the Study

The study has the following purposes:

- to analyze potential of non-renewable resources in Republic of Bashkortostan as one of the largest regions of Russia;
- to study possibilities of transition to low-carbon economy and "green growth" while taking into account impact of socio-economic and environmental factors.

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5. Research Methods

5.1.Hypotheses development

Paradigm of interdependency of state of the environment and regional economic growth is a theoretical basis for data analysis in the study (Kahn, 1998). Climate policy influences production growth in the country (Clarke, 2014), while allowing not to reduce productivity under conditions of requirement and standard strengthening. Studies of energy-output ratio in different aspects are important to understand the problem. For example, Cian, Schymura, Verdolini, & Voigt (2013) study special aspects in different countries emphasizing structural and technological aspects; Zhigalov and Pakhomova (2016) analyze influence of governing factor over energy-output ratio. As the same time green growth of economy, including regional economy, demands increase of investment tempo and innovation speed (Fux, 2016).

For this study paradigm of interdependency between environmental state and regional economic development is used at its broader meaning while considering such factors as pollutant emission from stationary and movable sources, increasing level of anthropogenic threat as a result of fixed asset exhaustion, formation and accumulation of production waste and consumption residual, lack of efficient environmental quality management systems. It is also important to make the connection between sustainable growth of region's economy and results of climate policy of a country.

5.2.Regions and sample

Republic of Bashkortostan is characterized by significant population number. All spheres of economy are present in the region: agricultural sector, extracting and processing, manufacturing of consumer goods, trade. Such a large region reflects structure of state's economy. Large region has an opportunity to improve its state in order to increase its credibility among citizens and decrease spending on economic structure upgrade.

With larger amount of qualified and unqualified personnel bigger regions are also able to support larger level of investment into basic funds in comparison to smaller ones. In similar way larger regions can attract more resources in order to improve effectiveness and lover energy-output ratio of the economy. This study expects similar results by region's size that is measured by GRP value and energy-output ratio, grade of fixed assets' exhaustion, and also confirms link between level of welfare and GRP energy-output ratio.

5.3. Data collection procedures

Data gathering is an integral aspect of any study. Data for this paper were gathered through prime sources through studying official statistics, secondary sources through studying reports and official documents, state programs of Republic of Bashkortostan ministries.

In order to perform content-analysis data on GRP value and energy-output ratio, grade of fixed assets exhaustion for subjects of Volga federal district that were shown in tables 1-3 were used. Authors' method is used by a number of researchers because it is one of instruments to estimate region's economic development.

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6. Findings

Problems that were listed above only confirm the necessity to pay more attention to climate policy issues defining a wide sphere of activities for state and business.

But regional government defines climate policy in a narrow meaning, in fact, substituting it with nature protection. In 2015 as part of state program "Ecology and natural resources of Republic of Bashkortostan" 2,5 bln. roubles were spent. Subject of the program were region's water industry (381,4 mln. roubles), sustainable natural resources management (54,7 mln. roubles), system of waste product and consumption residual management (783,45 mln. roubles), environmental safety (1088,1 mln. roubles). Implementation of the program required 161,45 mln. roubles (2014). State program's goals are not very ambitious and do not include a goal on reducing greenhouse gases.

Existing structure of industrial complex in the republic determines not only nature and tempo of economic growth but also predefined high anthropogenic pressure on environment and a number of ecological problems. Pollutant emission from stationary and movable sources, increasing level of anthropogenic threat through aging of main means of production, buildup and accumulation of waste product and consumption residual, lack of efficient management system for quality of the environment are significant factors that limit tempo of socio-economic development of republic's industry complex.

Thus, we see that there are problems and there are opportunities to create climate policy:

- existence of nature-protection infrastructure and scientific and technical potential that would allow to solve modern issues of climate policy;
- wide forested area of 6,3 mln. (44,1% territory of the region) helps to lower emissions;
- experience of decreasing accumulated ecological damage;
- experience of using renewable energy sources.

Renewable sources can be found everywhere and are clean. But unlike traditional sources of energy renewable are mostly periodical (Knox-Hayes, 2018; McElroy, 2018). It is necessary to develop technologies and also use existing ones to accumulate energy. Republic of Bashkortostan has enough of sunny and windy days to start implementing such projects. Manufacturing ecologically clean production on a regional level has a small-scale nature and by far cannot enter even markets of neighboring regions. Lack of evaluation criteria of ecologically clean production, certification body as well as business units that could fill this niche is also a constraining factor. During inventorying emissions and greenhouse gases in the region one should consider existing spreading of emission values in Russia – energy sector is responsible for 81-83% emission values; 6-7% - industrial sector; 5-6% - agriculture and 2-3% - waste treatment (НСРФ 3, 5, 6). For Republic of Bashkortostan this estimate (in accordance with authors' calculations): 71-74% for energy sector, 11-14% - industrial sector, 13% - agricultural and waste treatment. Main share of emissions from statutory sources comes from fuel and energy complex (oil processing, petrochemical, oil mining and electrical power spheres) – around 70%. During last six years emissions into atmosphere from factory units in Republic of Bashkortostan has not significantly decreased. Thus, in 2008 pollutant emissions into atmosphere comprised of 417,4 thousand ton, in 2013 it reached 448,9 thousand ton (НСРФ 4).

This shows that existing manufacturing capacities in Republic of Bashkortostan should be upgraded. Regional government should create a system of impetus in order to change over to using better

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and available technologies in the spheres of chemistry, petrochemistry, biochemistry, technologies that are based on energy-saving and resource-saving processes (Wright & Zhu, 2018).

7. Conclusion

Thus, Republic of Bashkortostan has opportunities for economic development in the context of Paris agreement in climate 2015 implementation. Based on data on non-renewable sources potential, economic growth values and features of used equipment and technologies we see that in order to switch region's economy to a low-carbon economy and "green growth" first of all institutional changes are necessary. Suggestions that would assist increase resilience of Republic of Bashkortostan economy are based on economy diversification and sustainable system of state management of region's natural resources. Transition from narrow ecological reading to a broad understanding of environmental policy is necessary as well. Therefore top-priority goals are the following:

1. Updating nature conservation laws of the region while taking into account requirements of new climate policy

2. Solutions in the sphere of economic policy should be taken while taking into account changing functioning approaches of global goods and finance markets. Adjustment of investment policy while considering values of energy conservation and emission decrease. Another vector should be work with business-community in order to clarify new handling of expenditures and profits as well as implementing contracts on efficiency improvement.

3. Developing forests absorptivity to increase value of accumulated CO^2.

4. Creating green plans of city development that would allow solving two issues – make region's cities more comfortable for population and assist decrease in greenhouse gas emission. Detailed economic model of a city with prognosis on growth tempo considering wide variety of economic and social variables with an overall goal to decrease greenhouse gas emission to a certain percent from a current level. Re-equipment of domestic and industrial buildings, urban environment zonation, detailed specification of general development plan, contribution from private and municipal sectors. Investment from municipal sector for twenty years should be 5% in order to change structure of GRP spending on economy support. Support old infrastructure costs more than investing into new one.

5. Developing system if ecological education that includes theoretical basis of "green economy" and practice-oriented programs.

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