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RUSSIA AND GERMANY: NEW OPPORTUNITIES FOR COOPERATION IN THE PRIMARY SECTOR

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The paper examines modern status and prospects of the Russian-German economic cooperation in the mineral resources sector. It has been revealed that in the recent years the bilateral trade between the two countries is influenced by the foreign affairs and witnesses a downwards trend. Development of economic cooperation in the traditional sphere, i.e. the fuel and energy sector, is hindered by several circumstances. Among these is a significant change in the energy policy of Germany and in the European energy market regulatory framework. A need appears to find alternative areas and forms of cooperation between the two countries. For this reason the major focus is on the problem of providing critical materials the German industry through creation of primary partnerships. Cooperation in this format secures access to the required feedstock for the German companies in exchange for creation of a complete value chain on the basis of the Russian companies. The role of Russia as a potential supplier of certain critical materials has been defined. The need in closer integration between the universities and the businesses for more efficient facilitation of bilateral scientific and technical cooperation has been justified.

***Key words*:** international cooperation, mineral resources sector, international trade, fuel and energy resources, critical mineral feedstock, cluster, resource universities.

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Introduction. Russia and Germany have a long history of cooperation in trade, industry, science and education. An important place in bilateral economic relations is taken by the primary sector of economy. Russia remains a reliable supplier of energy and other primary resources to the German market over many years. Germany in its turn supplies to our country the products with high degree of processing both for industrial and the consumer sector. Scientific and technical ties in commercial and industrial sectors also remain stable.

Presently cooperation is impacted by unstable geopolitical context, as well as contradictions between the goals pursued by Germany as a member of the European Union (EU) and by Russia. Some shifts are seen in the structure of demand for mineral resources, in production and services segments, clusters and international financial and industrial groups are being established. All this creates new challenges for international cooperation. Their discussion was the major focus of the regular international conference within the frames of the Russian-German Raw Materials Forum (St. Petersburg, October 2015). Experts from both countries emphasized the commonality of interests of Russia and European countries, both striving for the development of commercial and economic relations, implementation of joint investment projects in mineral resources sector and maintaining a favorable environmental and stable social situation within the common European space [11].

The objective of this paper is to justify the high-potential directions and frameworks of economic, scientific and technical cooperation between the two countries in response to new challenges faced at the present stage of industrial, economic and political development based on the principles of partnership and a fair balance between the interests of both countries.

The urgency of this study stems from its strategic importance for Russian-German relations for the development of both countries. Today Russia and Germany still remain important trade partners, despite negative dynamics in foreign trade turnover in the recent years.

Germany is Russia's third largest foreign trade partner by trade turnover, accounting for approximately 11.5 % of Russian imports (USD32.96 bln. in 2014) and 7.5 % of Russian exports (USD37.12 bln.) [12]. Russia is ranked 16th among all Germany's foreign trade partners by the volume of the goods supplied, 13th – by the foreign trade turnover and 12th – by the volume of imported German goods [13]. But Russian-German trade and industrial ties shall be examined in a system of Russia – EU relations.

Issues of Russian-European relations are extensively discussed in the scientific circles and by the politicians. While a considerable portion of publications is devoted to the issues of cooperation between EU countries and Russian in the energy sector [16, 24-26, 32] and foreign trade policy [22, 30, 37]; historic aspects of cooperation between the two countries in trade and production spheres [28]. In a number of publications of the last three years there has been much debate on the reasonableness of further economic sanctions in international relations.

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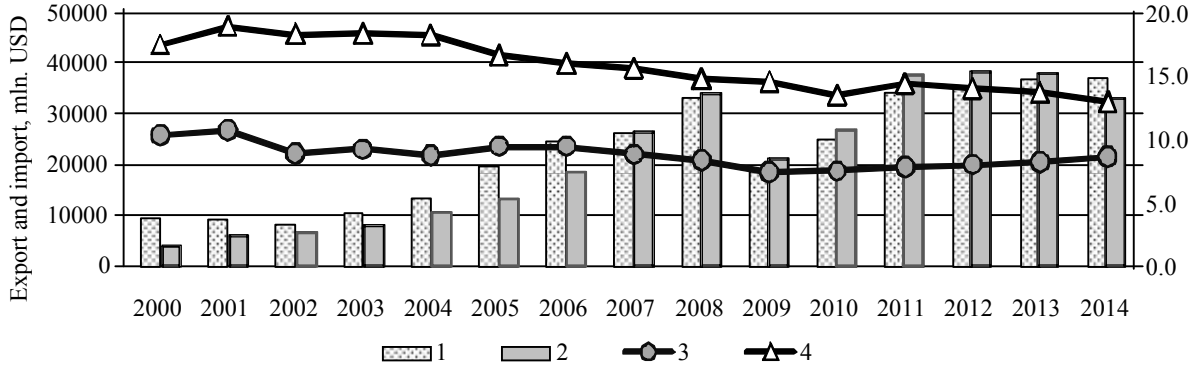

Fig.1. Dynamics of foreign trade between Russia and Germany
(based on the data from Federal Service for State Statistics [7, 11])
1 – export of goods and services to Germany, mln. USD; 2 – import of goods and services from Germany, mln. USD;
3 и 4 – the share of Germany in Russia's export and import, % from total value (right bar)

Germany and Russia are strategic partners in the Eurasian economic space and it's fair to view their relations as pivotal for the relations between the East and the West. In order to identify matters of concern in the relations between Germany and Russia and assess possible ways how those can be addressed the current trends in this area shall be analyzed and answers shall be given to the questions about quantitative and structural shifts in the trade turnover between the two economies; about projected changes in the demand for mineral resources; and about new higher-level forms of international scientific and technical cooperation.

Fuel and energy resources in the foreign trade between Russia and Germany. Cooperation between Russian and Germany in the fuel and energy sector of economy, which started in 1970^{s} from a large-scale deal between USSR and the German company Mannesmann AG for the supply of pipes for construction of gas pipeline with a view of future supplies of the Russian natural gas to Germany, still remains tight [28]. Germany is objectively dependent on the external supplies of oil and petrochemical products, natural gas and coal. Import covers more than 95 % of the country's internal demand for oil and petrochemical products, almost 86 % of the country's demand for natural gas and over 35 % for solid fuels.

For eleven months of 2015 the foreign trade turnover between Russia and Germany has shrunk significantly (by almost 35 % versus the same period in 2014), comprising USD 41.9 bln. in value terms [10]. The shrinking continued the trend of the previous year (Fig.1). Despite the decline in export in value terms, by physical indicators it is growing, mainly due to the increase in oil (5.3 % versus 2014) and natural gas (17.8 % versus 2014) supplies in volume terms [12, 21].

Russian companies cover approximately a quarter of the total Germany's demand for fuel and energy resources (FER). About 39 % of natural gas annually consumed by Germany comes from Russia [19]. Slightly less – 35 % – falls on the Russian oil supplies, 25 % of coal consumed in Germany is also purchased from Russia [17].

Intensive reduction of domestic production of oil, natural gas and coal in Germany has not led to a drop in Russian FER imports, despite overall lower consumption of energy resources in the recent years (see Table).

Dynamics of consumption and domestic production of energy resources in Germany

FER type	Energy consumption in coal equivalent (HCU) [14]		Relative changes in FER consumption, %	Share of FER produced in Germany, % of total		Structure of FER consumption, %	
	2003	2013	2013 vs. 2003	2003	2013	2003	2013
Oil	180	158	–12,2	3	2	36	33
Natural gas	109	106	–2,8	21	12	22	22
Bituminous coal	69	61	–11,6	39	13	14	13
Brown coal	56	56	0,0	100	100	11	12
Nuclear energy	61	36	–41,0	100	100	12	8
Renewable sources	19	55	189,5	100	100	4	12

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It shall be noted, that in the recent ten years structure of energy resources consumption in the domestic market of Germany has changed dramatically. Particularly, the focus has shifted to renewable energy sources (RES), which consumption over ten years amounted to almost 190 %, and which share in the structure of consumption has tripled. Intensive development of renewable energy sector within the framework of the new energy policy (*the Energiewende*) implemented by the state has displaced the nuclear energy and led to some reduction in oil and bituminous coal consumption (see Table). These changes are the result of the EU energy policy aimed at improving energy efficiency, reducing CO_2 emissions and ensuring security of energy supply.

Share of natural gas in the structure of FER consumption in Germany remains stable due to favorable environmental and economic parameters of its use. The idea of creating competitive gas market is actively promoted in the country. The number of companies engaged in natural gas supplies to the domestic market of Germany is intensively growing. In a period from 2005 to 2012 their number has increased from 20 to 38 (in the European Union Germany is outstripped in this regard only by Italy where as of 2012 gas supplies were provided by 85 companies) [20].

Much higher is the number of companies selling gas to the end German consumers – 851 organizations (2012), while the share of the largest of them is not exceeding 15 %. According to the forecasts of the Ministry of Economics and Technology, the total primary energy consumption in the country over the period from 2011 to 2050 can be reduced by an average of 1.2-1.7 % per year (depending on the scenario), resulting in 39-49 % decrease in the total energy consumption [18]. Significant changes will be seen both in the structure of primary energy consumption and in the structure of electric energy production in Germany (Fig.2).

According to experts of Institute of Energy of NRU HSE and RAS Energy Research Institute, in future Russia will remain one of the main suppliers of natural gas to the EU, but anticipated growth in gas exports is not high and estimated at 30 bln. m^3 as compared to 2014 [3]. Given that that the majority of long-term gas supply contracts expire in 2025, it is expected that competition among suppliers of gas to the European markets will increase.

As regards the possibilities of Germany switching to FER supplies from other countries, most experts believe that in the near future there is no adequate alternative to Russian gas: for increasing the liquefied natural gas supplies (to maximum possible volume of about 60 bln. m^3) Germany has not yet a proper infrastructure [23], and government has refused from developing shale deposits in the densely populated North Rhine-Westphalia due to environmental concerns [17, 34].

Growing urgency of 'critical materials' issue. The development of 'clean' energy technologies and determination to diversify the supply of FER can give impetus to the development of new areas and forms of scientific, technical and economic cooperation between Germany and Russia. First of all it could be joint implementation of projects for mining and processing of critical mineral raw materials.

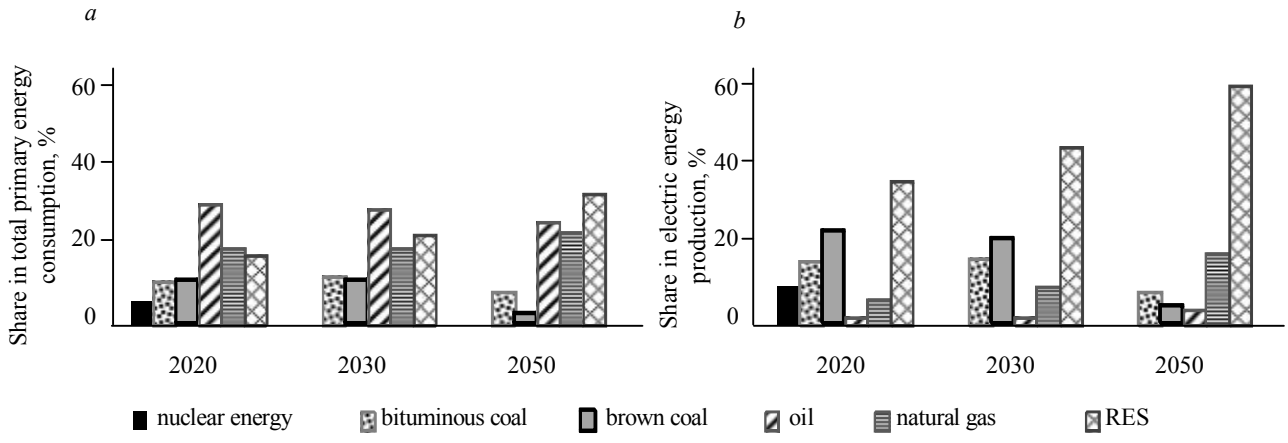

Fig.2. Projected structure of primary energy consumption (*a*) and electric energy (*b*) production by FER type (under basic scenario)

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The critical raw materials are the materials supply of which is not secured as its production is concentrated only in several countries. Criteria for including raw materials in the list of critical raw materials are their significance for the state economy and the level of risk associated with the supply of these raw materials to the industry. In connection therewith the EU has developed a strategy for securing supply of critical raw materials to the consumers (the EU Raw Materials Initiative (RMI), 2008), and the European program for cooperation in the field of critical raw materials (the European Innovation Partnership on Raw Materials (EIP), 2012). The materials included in the European list of critical raw materials in 2013 include antimony, beryllium, cobalt, fluorspar, gallium, germanium, indium, magnesium, natural graphite, niobium, platinum group metals, light and heavy rare earth elements (REE), tungsten [29].

The major global producer of the critical raw materials being in short supply is China. This country produces around 99 % of global output of heavy REE highly demanded for industrial applications, 87 % of light REE and antimony, over 85 % of magnesium and tungsten, about 70 % of graphite, magnesite and gallium, more than half of the global output of germanium, indium and metal silicon [29]. According to expert estimates by 2030 the European manufacturers will need 6,800 tons of neodymium per year for the production of electric cars and about 3.500 tons – for the production of wind turbines. 97 % of EU demand for neodymium and dysprosium, and 65 % of demand for graphite and 53 % of demand for indium is also covered by supplies from China [35].

In the short term there is no substitute for the raw materials from China, which would be equivalent in terms of ultimate product quality, required volume and cost. USA, which only 50 years ago was a leading REE producer, by now closed almost all its plants for economic and environmental reasons; their revival will take about 15 years and large investments [2, 5]. India and Brasilia together produce no more than 3 % of the global output per year. In Australia and Canada there are three REE field development projects implemented with different progress status, the projected capacity of the fields under development is not exceeding 130 tons of scandium per year [15].

In the long run some part of the demand of the European consumers for such critical raw materials as REE and platinum group metals (PGM) could be covered by the Russian producers. While Russia's share in the global output of PGM presently comprises 27 %, its contribution to the production of REE is not exceeding 2 %, despite its second place in the world by the total reserves of REE – 19 M t or 17 % of the global reserves of REE. The main reason is that there is no stable and large-scale demand from the Russian industry: rare earth materials are extracted only by Solikamsk Magnesium Plant, and the relative share of production involving these raw materials in Russia is less than 1 % [2, 9].

Russia could potentially increase production of the critical mineral raw materials (in particular, rare earth elements), provided a guaranteed demand for these materials from Germany. But in addition to the issue of rare earth elements extraction there is another complication: USA, Europe and Russia have no REE processing (separation) technology, comparable by its efficiency with the technology used in China [13].

So far REE processing technologies (extraction of rare earth elements from apatite concentrate and phosphogypsum using sulfuric acid-nitric acid mixture) in Russia have been tested at pilot scale or are ready for industrial implementation [8]. Russian technology for production of the rare earth elements – global demand is most rapidly growing for separated elements – according to expert estimates can become economically efficient with the concentrate processing rate of 4-5 K t per year [8].

Thus it can be asserted that the further cooperation between Russian and Germany in the raw materials sector will be largely centered on joint efforts in addressing the issues of critical materials.

Scientific and technical cooperation and role of resource universities. It's evident that the mineral resources sector is getting more closely integrated with the production associated with resources processing and creation of new types of materials. This condition predetermines increase in the degree of research and technological intensity of the industry. That's why for full-fledged development of REE production in Russia a long-term business partnership with the European countries (first of all, Ger-

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many) having large share of high-tech products that require extensive use of scarce REE in their production profiles is crucial.

An important role in addressing this issue is played by the specialized (raw materials and technological) universities in the process of building mutually beneficial partnership between the Russian and German companies. The principal importance of systematic cooperation between the universities and the businesses for the development of national economy has been comprehensively described in the Russian and foreign publications and today raises no doubt [1, 6, 31]. In our opinion the role of universities in implementation of international projects, including in the mineral resources sector, is in identifying areas for industrial and scientific-technical cooperation relevant for both countries, in maintaining active contacts with the foreign colleagues, in conducting certain stages of research by request of the companies. This framework for interaction between specialized universities from different countries and businesses is new for Russia and not yet tested, but in Germany many universities and research institutes are successfully integrated in the international system of interaction 'education-science-business'.

One of bright examples is the Bavarian Competence Center for Site Development (BCS), which plays the integrating and coordinating functions in the process of creation of environmentally efficient industrial parks all over the world [27]. The Center was founded by one of the largest German clusters – the Bavarian Chemical Cluster (Chemie-Cluster Bayern, CCB), being a network of more than 260 companies specializing in chemicals and the research institutes [33]. One of the priority undertakings of the cluster is the Value Creation Partnership program, implying international cooperation between CCB and foreign research universities and industrial enterprises from the chemical and energy sectors, as well as organizations working in the field of clean and environment protection technologies [36].

Cluster management by establishing joint competence centers abroad gives the German industrial companies an opportunity to enter new markets (primarily of the countries rich in natural resources), while solving a set of interrelated tasks from issue identification and search for research teams able to solve it, appropriate foreign markets and companies to detailed planning of industrial sites in the partner companies.

Implementation of Russian-German projects in the field of critical mineral resources using the framework offered by the Bavarian Chemical Cluster can be efficient both from the standpoint of economy and intensification of the Russian research efforts.

Conclusions

Examination of the modern status and prospects of the Russian-German cooperation in the mineral resources sector provided the basis for the following conclusions.

1. Bilateral trade between Germany and Russia over the recent years witnesses negative dynamics, attributable to the growing general intensity in the external political relations between the countries Meanwhile reduction in the Russian imports is more intense than in the exports.

2. Supplies of fuel and energy resources from Russia to Germany remain a priority area of cooperation between the two countries, despite strategic guidelines of the new energy policy of Germany and ambiguous interpretation of Russia's position as the major supplier of FER to the European markets.

3. In the long term (by 2050) the Germany's dependence on the Russian supplies of oil and natural gas can become much less due to increased energy efficiency and intensive development of renewable energy sector (the projected share of RES in the structure of primary energy consumption is estimated at 35÷51 %, depending on the scenario).

4. Meanwhile demand for certain raw materials classified as critical and having no equivalent substitute in industry (e.g., rare earth metals and platinum group metals) is expected to grow considerably in Germany. This trend may potentially stimulate the development of relations between Germany and Russia in areas not related to the fuel and energy resources.

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5. It is most practicable to organize cooperative work on the projects for the development of rare earth metal fields in Russia in the form of resource partnerships. Maintaining fair balance between economic interests of the partnership members shall secure access to the required feedstock for the German companies in exchange for creation of a complete value chain on the basis of the Russian companies.

6. As the core of this form of cooperation is the transfer of technology, the role of specialized universities and research organization in providing industry with advanced technological solutions based on principles of sustainable development of the countries and their specificity is growing. In addition universities may act as a link between the production enterprises of the country and the potential foreign investors.

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