



# Modern conditions and prospects of Russia's coal mining industry development

## Condiciones modernas y perspectivas del desarrollo de la industria carbonífera rusa

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### Contents

- [1. Introduction](#)
- [2. Literature review](#)
- [3. Key findings of the research](#)
- [4. Conclusions](#)
- [Acknowledgement](#)
- [Bibliographic references](#)

#### ABSTRACT:

This research assesses the current state of Russia's coal industry and its future prospects in the context of global trends in global natural resources and energy markets; and based on a qualitative analysis of the transition problems of Russian coal extraction and processing companies. The work addresses government support measures to the Russian coal industry today and in the past (Soviet period), considering the increased profitability of the mineral resources industry in the context of environmental hazards, difficult working conditions, high transportation costs and other risks.

**Keywords:** mineral resource industry, coal mining, development trends, coal industry, coal mine

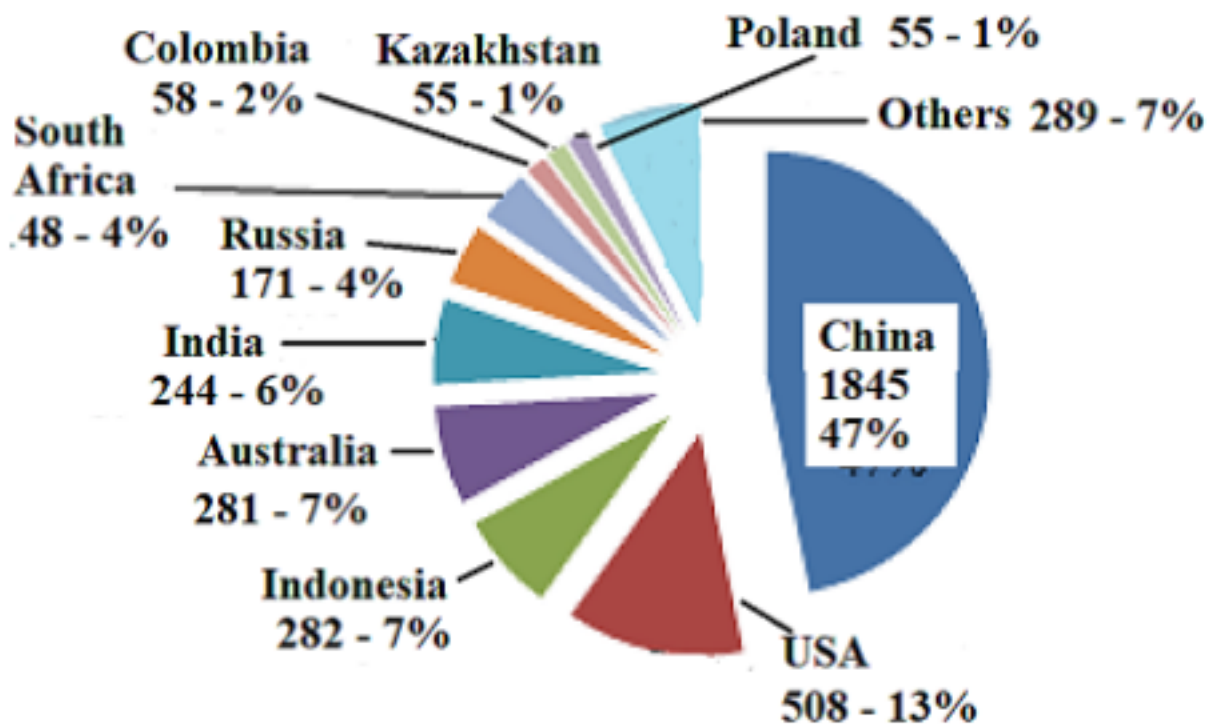
#### RESUMEN:

El documento evalúa el estado actual de la industria del carbón de Rusia y sus perspectivas futuras en el contexto de las tendencias mundiales de los recursos naturales mundiales y los mercados energéticos; y basado en un análisis cualitativo de los problemas de la transición de las empresas de extracción y procesamiento de carbón ruso. El trabajo aborda las medidas de apoyo gubernamental a la industria del carbón de Rusia hoy y en el pasado (período soviético), considerando el aumento de la rentabilidad de la industria de recursos minerales en el contexto de peligros ambientales, condiciones de trabajo difíciles, altos costos de transporte y otros riesgos.

**Palabras clave:** industria de recursos minerales rusa, minería del carbón, tendencias de desarrollo, industria del carbón, mina de carbón

## 1. Introduction

In order to evaluate the significance of mineral resource industry we will assess Russia's place in the global coal market. The structure of global coal production in oil equivalent is shown in Figure 1.

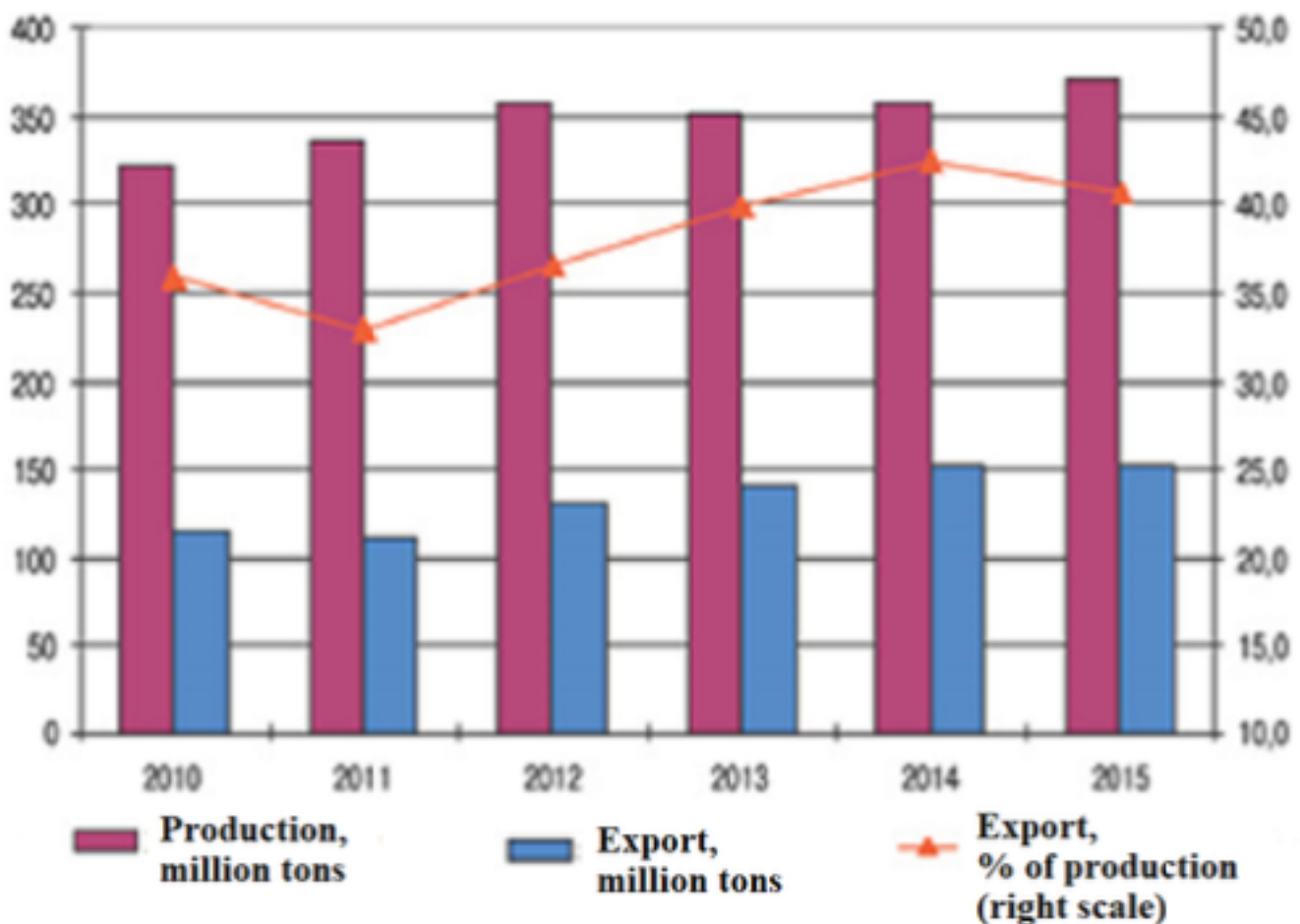


(data of Ministry of Energy of the Russian Federation)

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**Figure 2**

Proportion of produced and exported coal in the Russian Federation



(based on the Federal State Statistics Service of Russia data)

The analysis shows that almost half of global coal production is provided by China: 1845 million tons in oil equivalent. China is followed by the USA - 508 million tons in oil equivalent or 13% of global coal production, Indonesia - 282 million tons in oil equivalent or 7% of global coal production and Australia - 281 million tons in oil equivalent or the same 7% of world production. Thus, these four leading countries actually provide  $\frac{3}{4}$  of global coal production. Our research shows that this trend has been continuing for the last several years (Samarina et al, 2015). The Russian Federation, occupying the sixth place in terms of coal production volume in the world, extracts only 171 million tons in oil equivalent or 4% of global coal production.

Russia's coal industry annually produces 350 million tons of coal which is provided not only the Russian Federation needs but is exported as well. The ratio of produced and exported coal is shown in Figure 2.

As can be seen from the presented data, the share of exports in total production is quite considerable: from 33% in 2011 to 42% in 2014. Researchers believe it is a peculiarity of Russian coal industry (Samarina at all., 2015).

The purpose of the study consists in retrospective assessment of Russian coal industry achievements, analysis of its current state and determination of development prospects.

In order to solve the formulated goal, it is necessary to solve a number of problems:

- assess the coal industry development in the past, at present and in future;
- determine the impact of government support for the coal industry in different time periods;
- reveal main problems of coal production growth;
- justify the importance of coal as a source of energy for Russian economy development.

In our research we proceed from the following hypotheses:

1. Coal mining is an indicator of Russia's economy development.
  2. Government support solves many problems of Russian coal industry development.
  3. At present there is no any alternative to coal as energy source in many industries of Russian and world economy.
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## 2. Literature review

The history of the development of modern society is closely related to the history of industrial development. And the industry always needed sources of energy. Coal is the most ancient source of energy. D. B. Audretsch and A. R. Thurik (2001); D. Rodrik (2008); R. Sachsenhofer, V. Pryvalov and A. Panova (2012) wrote about its influence on the development of industry. It was the coal industry that ensured the industrial revolution development in the 19th century and enabled world productive forces to move to the second technological structure (Speight, 2011).

At present, coal mining and dressing remains one of the largest branches of Russia's fuel industry based on the value of basic production assets and the number of workers employed in this field. This is indicated by S. Herrera, J. Torrent and P. Hernández, who carried out coal industry investigations in Chile (2014); such Norwegian researchers as H. Bjornland and L. Thorsrud (2014); English scientists B. Turnheim and F. W. Geels (2013); the researchers of the European coal industry J. Sachs and A. Warner (2001).

Coal industry enterprises in many countries are city-forming and region-forming. The economy of cities and regions depends on coal mines and open-cast mines activities. In case of a crisis, workers in the coal industry lose their jobs and have no opportunity to get other ones. Population welfare declines, money supply circulation decreases. Tax revenues to local budget decrease as well. Such a thing occurs in many countries of the world. S. Herrera, J. Torrent and P. Hernández (2014), G. Sabathil (2010), A.-L. Saxenian (2006); A.N. Silin (2015); L. Suopajärvi (2016), M. Trippel and A. Otto (2009) and other researchers wrote about that.

Lots of works are devoted to the environmental problems of the coal industry. M.K. Peshkova and D.Y. Savon (2016), D. Rodrik (2013) D. Ushakov, S.G. Akhmetova, L.V. Nevskaya, (2017) and others paid attention to this problem. In our research we also have repeatedly pointed out the damage to the environment caused with coal industry (Samarina, 2008; Samarina at all., 2015; Skufia at all., 2015). Thereupon, studies of alternative energy sources that can replace coal are relevant (Alfaro, 2011, Samarina at all., 2018).

Mineral resource industry goes through ups and downs along with other branches of industry. However, its development is burdened with long-term systemic problems. Therefore, the assessment of the current state of Russia's mining industry and prospects for its development is of undoubted interest.

## 3. Key findings of the research

### 3.1. The history of Russia's coal industry development

The Russian Federation is rich in minerals. Their extraction is carried out for decades by mining enterprises, both for the domestic needs of Russian economy, and for export to foreign countries. The coal industry has always been one of the largest branches of the fuel and energy complex in Russia. Russia has one third of the world's coal reserves. Coal deposits include brown coal, coal and anthracite.

The foundation of Russian coal industry was underlay in the reign of Grand Moscow duke Ivan the Third in the second half of 15th century (Grun & Rozhkov, 2017). The formation of manufactories and development of the industry, especially ferrous metallurgy, demanded lots of coal. Actually, coal mining indicators were indicators of Russian industry development. That formed tendency was confirmed then the development of that branch of industry for decades (Samarina at all., 2015).

By the beginning of the 20th century coal mining occupied a fitting place among other industries in Russia. In 1860 annual production was 121 thousand tons. 1861 was marked by abolition of serfdom and it gave an inflow of manpower resources to the cities, and became a powerful factor of industry growth. More than 40 years coal mining increased a hundred times and in 1900 reached a point of 12 million tons. The development of scientific and technical progress demanded new energy sources. At the turn of 19th and 20th centuries there was not any alternative to coal as a main source of energy resources. The needs for coal of the metallurgical enterprises, the railway and water transport increased. Permanent growth of demand led to powerful development of mineral resource industry. Donbass, the Urals, Moscow area, the Far East coal basins began to be developed actively. From 1900 to 1916 coal production trebled and measured up 35 million tons. The number of workers employed in coal mining made up 0.5 million people (Grun & Rozhkov, 2017).

During the years of Soviet power, the coal industry reached its fullest flower. Hundreds of mines were expanded and built. Since the end of the 1920s the development of open-pit coal deposits has begun. Concentrating mills were used in all parts of the production process. Coal mining technologies were constantly improved and advanced technical equipment was put into effect at that time. New methods of deposits exploration and exploitation were used.

### 3.2 Transition period problems for Russia's coal industry

In free market economy the demand for mining products is based on price. The collapse of the Soviet Union and total economic recession led to domestic coal market stagnation. Thus, our conclusion that the coal production indicators are the indicators of Russia's industry development has been confirmed again. Russian coal was not competitive in the world coal market because of its high price. Transportation costs for the coal delivery from producers to consumers had a particular influence on coal cost price and it was not possible to reduce distances of transportation (Skufina at all., 2015).

For example, the length of the railway coal delivery route from the Kuznetsk Basin to loading port terminals for export shipments averaged about 4,000 -5,000 km. And the Russian competitors in the world market of coal sales have coal delivery routes which duration usually does not exceed 500 km. Decrepit obsolete fixed assets complicated the work of the industry as well. In the 90 years of the last century in the coal industry there were enough enterprises that were put into operation until the middle of the twentieth century. Their basic production facilities are obsolete physically and morally.

The following circumstance aggravated the situation: in most of Russia's extracting old industrial regions mining enterprises were main city-forming and region-forming ones (Peshkova & Savon, 2016; Samarina at all., 2018; [Silin, 2015](#)). The devastation and shutdown of coal mines would lead to irreversible socio-economic consequences.

Therefore, the state began actively stimulating the export of coal from Russian regions. A set of measures was developed in order to support mining enterprises. The coal industry has been subsidized for decades by the state budget. The protectionist tariff policy on railway transport played a special role. At the same time, the coal industry was restructured by closing unprofitable mines and as a result total number of operational coal mines reduced from 235 to 167 ones. In addition to the mines, six coal strip mines were removed from service as well (Peshkova & Savon, 2016).

In the process of coal mines and coal strip mines liquidation the production capabilities of the coal industry decreased by approximately 64 million tons per year. And the degree of use of the rest of enterprises which work more efficiently has increased. Other branches of the mineral resource industry also faced with similar need for industry restructuring in order to raise competitive capacity of extractive minerals (Sachsenhofer et al., 2012; Samarina et al., 2018; Silin, 2015; Skufia et al., 2015).

Government assistance measures helped to surmount industrial crisis. Russian coal production cost has been one of the lowest in the world for a long time. In addition to measures of state support, protectionism and subsidies, low cost price was provided with the prevailing of open-cut coal mining.

### **3.3. Tendencies of the modern development of Russia's mineral resource industry.**

At present moment, the accumulated reserve of Russian coal mining competitive capacity, formed under the influence of active government assistance is gradually being exhausted. It is the result of an action of a set of factors.

First of all, these are internal ones:

- miners' rise in wages;
- procurement of new (usually imported) equipment;
- construction of new and expansion of old coal mining capacities;
- rising prices for electricity;
- increase in railway tariffs;
- increase in value added tax.

In addition, it is the result of external factors related to the sanctions imposed by a number of countries on the Russian Federation. We should note separately that the amount of Russian government assistance for coal mining enterprises has decreased in the course of time.

At the same time, at present, Russian economic recession has come to an end and in almost all branches of the national economy an increase in output takes place and annual GDP growth is assessed at 5-6%. The development of Russian economy will require an appropriate increase in coal mining volume. Taking into account planned reduction in production energy intensity and material capacity, rate of coal demand growth is assessed at 3-4% of annual increase (Official website of the Ministry of energy...).

Coal extracted from mines and strip mines is used in the electric power industry (44%), for coking (17%), for population daily requirements (4%), for domestic needs (5%), goes for export (10%) and other needs (20%).

As of the beginning of 2017 the average number of workers in coal-mining industry amounted to 145.1 thousand people. 132 thousand people (90.8% of total amount) were employed in primary activity; 98 thousand workers (67.5%) were directly engaged in mining operations. As of the beginning of 2017, the total productive capacity of coal mining enterprises was estimated at 313 million tons. Considering the state and prospects of coal mining industry development, we note that total Russian coal A, B and C categories reserves are about 200 billion tons. Western and Eastern Siberia together continue to account for about 80% of Russia's coal reserves. The part of open-cut coal mining in total coal production as of the beginning of 2017 was 74.5%. We should also note that coal mining is

quite capital-intensive and an average product profitability taking into account existing price level is 3.2%. The prime cost of coal mining as of the beginning of 2017 was 1,743 rubles. per metric ton. During the year it grew by 261 rubles (Official website of the Ministry of energy...).

In our research we have repeatedly pointed out the damage to the environment caused with coal industry (Samarina, 2008; Samarina at all., 2016; Skufia at all., 2015). And the damage is cause in a complex manner. In the process of coal mining the following occurs: landscape changes, surface water courses are polluted, groundwater level is lowered, etc. In the process of using coal as an energy source atmospheric air is polluted first of all and main air pollutants are dust, carbon monoxide and nitrogen dioxide. Despite deliberate environmental danger, there is no alternative to coal as a source of energy in many sectors of the world economy because of its relative cheapness and the availability of a large amount of explored reserves.

In the long term, all existing coal mining enterprises will stop because of remaining reserves development. But economic growth requires ensuring increase in production and in order to succeed, in our opinion, there are the following ways:

- technical modernization of existing enterprises;
- the creation of new technically progressive and cost-effective enterprises.

The process of new coal mining enterprises construction is long and requires significant investment outlay therefore it is a problem of growth in coal production because of high capital intensity. The possibility of capital raising from outside depends on the degree of economic efficiency of capital investment use which is determined, in turn, by the level of technical and technological progressiveness of solutions that ensure coal production growth. This problem has not been solved so far.

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## 4. Conclusions

In conclusion, we will note the following:

1. The first hypothesis of our research proved to be correct. Coal mining is an indicator of Russia's economy development. The economy growth is accompanied by coal mining industry development; an economic stagnation leads to the stagnation in the industry.
2. The second hypothesis of the research turned out to be correct. The coal industry development in the era of Soviet power and in the period of transitional economics was largely supported by the government. In recent years, government support has declined. The main problem of growth in coal production is lack of financial resources. Government financial support has declined. Private investments attraction is a problem because of high capital intensity.
3. The third hypothesis of the research has been confirmed. Despite such factors as conscious environmental danger of coal mining and burning, low profitability of mineral resource industry, hard work in mines, open-cast mines and concentrating mills, high transportation costs and other risks, there are no any alternatives to coal as energy source in key industries of Russian and world economy.

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[\[Index\]](#)

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