REGIONAL ECONOMY

Problems of energy base development and energy security

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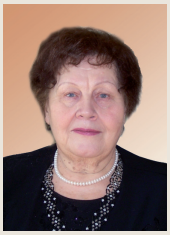
Economic and social changes in Russia's coal industry during the crisis

In this article the features of the global economic crisis' influence in its sharp phase (the 4th quarter of 2008 and the first half of 2009) on Russia's coal industry are considered. It is shown, that its restructuring in 1994 – 2007 allowed to alleviate the global crisis' influence. Major factors of the crisis' negative influence and basic anti-recessionary actions are formulated. Attributes of the branch's outlet from the crisis are designated. Opportunities and prospects of the coal-mining industry's development are appreciated within the framework of Russia's Power Strategy till 2030 and necessity of the transition from the fuel circuit of development to the coal-mining industry's diversity on the basis of the state innovational policy is shown.

Economic crisis, production changes, innovational development, social and economic problems.



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The world economic crisis which began in 2008, affected all spheres of social and economic activity in Russia. The volume of gross national product reduced, the rate of unemployment increased, the realization of almost all large-scale investment programs (except for social ones) stopped, the inflation grew, etc. The great scale of the crisis was especially caused by such factors, as the raw branches' dependence on export, the financial and banking system's

weak sides, the unsolved problems in the field of the industrial and the agrarian policy.

The first impact of the crisis was assumed by the export-orientated branches, including the coal industry because of the sharp reduction in demand for the ferrous metallurgy production and, accordingly, for the coking coal.

Re-structuring is the crisis' damper for the coal branch

As a result of the coal industry's re-structuring in 1994 – 2007, unprofitable mines were closed, the number of employees was considerably reduced, technological modernization of the basic mine and open pit facilities was carried out. The coal branch became the effective sector of the market economy. Here significant institutional changes took place; the most part of the coal-mining enterprises' assets was passed to the financial groups, metallurgical and coal-power holdings. Nowadays practically 100% of the coal-mining enterprises are in the private property or in the stock ownership. Five large-scale holdings on extraction, processing and sale of coal were generated; basically it corresponds to the world's practice. In 2008 their share made 75% of the power coal extraction and 66% of the coking coal extraction. The organizational and industrial structure of the coal branch essentially changed due to the non-profile actives' leading-out to outsourcing.

In this connection we can note, that the companies' refusal from the significant part of the subsidiary and attendant productions became characteristic for the heavy industry as a whole. The mentioned process is the reaction to the mistakes of the previous years when the large-scale enterprises aspired to practically absolute technical and economic autonomy. For example, in the structure of the machine-building factories there was metallurgical production, manufacturing of control equipment, repairing, heat power and transport workshops. The same situation was in the coal industry; its basic enterprises acquired repairing and sawing factories, building and electro-power sub-units. All social and agricultural infrastructures were the part of plant and combines management. It showed the low level of the social division of labor, but that level was also caused by the Russia's geographical features, which led to economic remoteness of the potential participants of the technological and economic cooperation. The problem of the new organization of those manufactures which were considered subsidiary and attendant earlier, nowadays has become rather actual. Their registration as independent managing subjects can be carried out owing to the regional features, for example, with a partial leading-out from the Pechora and the Southern-Yakut coal basins or, on the contrary, with the total allocation on the territories of Kuznetsk and Kansko-Achinsky basins.

At the end of 2008, after re-structuring, 231 coal-mining enterprises, including 138 open-pit mines and 93 mines with the total capacity of 376 million tons a year, 48 concentrating factories and installations with the mechanized rock excerption with the total capacity of 120 million tons a year functioned. The share of the basic Russia's basins in the coal mining is submitted in *figure 1.*

The enterprises of the basins specified in figure 1, have a rather reliable prospects of the development. Other enterprises (the Ural, the Moscow Area's and the Donetsk basins), providing 5% of the total extraction, work in the fading mode. From 1999, and up to 2008 (basically due to Kuzbass) the volume of the extraction annually grew for 15% on the average. In 2008 the volume of the coal mining in Russia made 328.8 million tons; the share of the open-pit mining made 68% *(tab. 1)*.

It is necessary to note, that at the first stage (till 2000) not all the basins could cope with the basic problems of re-structuring. So, in the Pechora basin modernization and solution of the social and economic problems caused by the market relations began only with the appearance of such a large-scale proprietor as Public Corporation "Severstal" in the mid-2003.

So, after Russia's coal branch re-structuring the latter achieved positive results: stable country and export providing with coal began; the

Figure 1. The share of the basic Russia's basins in the coal mining in 2008 [1]

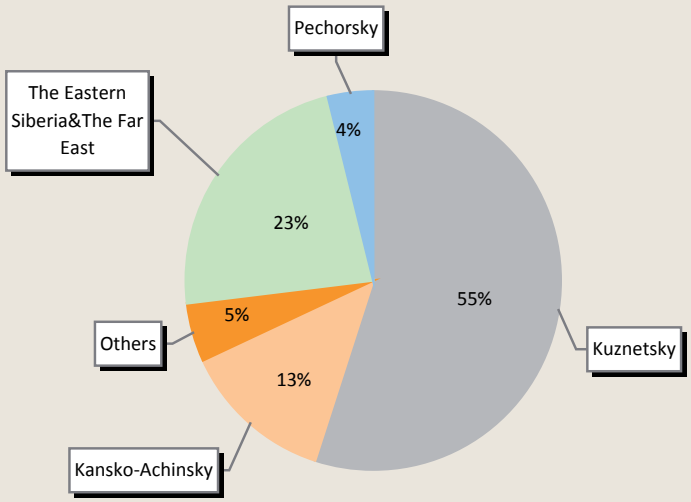


Table 1. Coal production and preparation in Russia, million tons [1, 2]

Indicators	2005	2006	2007	2008	6 months 2008	6 months 2009
Coal production, total Including:	299.8	310.0	314.1	328.8	161.3	137.6
– coal used for coking	69.9	70.5	72.9	68.7	36.9	26.5
– coal used for energy	229.9	239.5	241.2	260.1	124.4	111.1
Of the total production volume of prepared coal	91.8	98.7	114	110.4	58.8	49.6

basic parameters of the coal mining in 2008 improved in comparison with 2005 (among them the growth of the average daily loading of the functioning clearing bottom-hole in 1.34 times, and the integrated mechanized bottom-hole in 1.36 times); integrated mechanized bottom-holes' quantity reduction for 9% *(fig. 2, 3)*; the labor productivity growth for 18%; the coal sector's personnel reduction for 7% *(fig. 4)*; the export growth in 1.2 times *(fig. 5)*.

All the mentioned factors, and also the partial resettlement of the northern coal monocities' population, softened the global crisis' influence on Russia's coal branch.

Crisis' influence on Russia's coal sector

The comparison of the coal industry's data for the first half-year 2008 and the similar period of 2009 reflects the following processes:

1. *Reduction in demand* for the coking coal (in connection with the world reduction of

Figure 2. The average daily loading dynamics of the functioning clearing bottom-hole [1, 2]

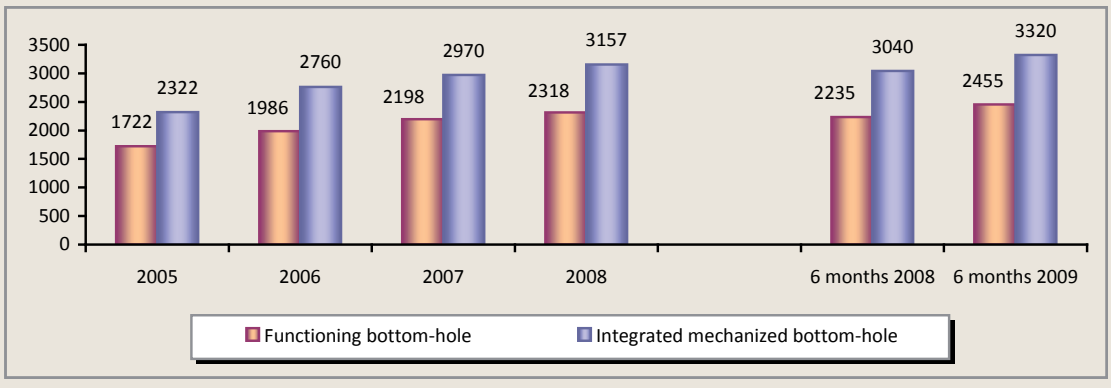


Figure 3. Dynamics of the workers' labor productivity in extraction and average functioning quantity of the integrated mechanized bottom-holes, tons [1, 2]

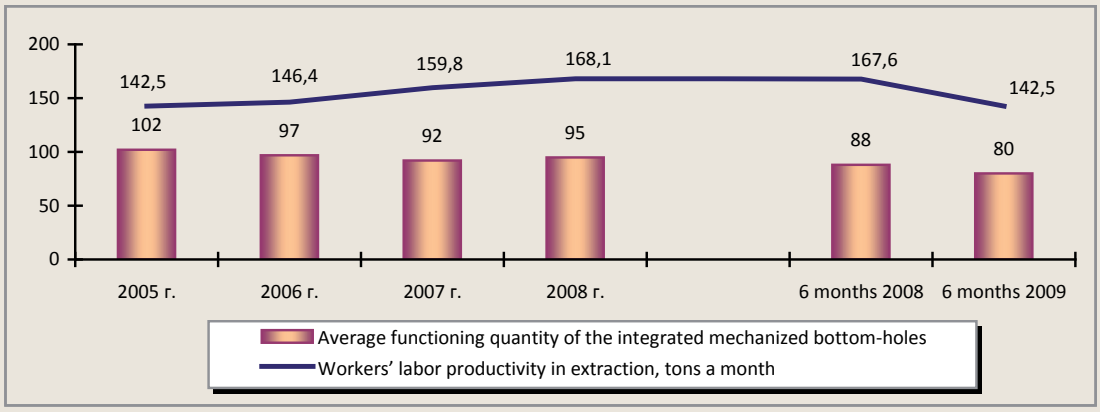


Figure 4. The coal sector's personnel dynamics and the monthly average workers' salary dynamics [1, 2]

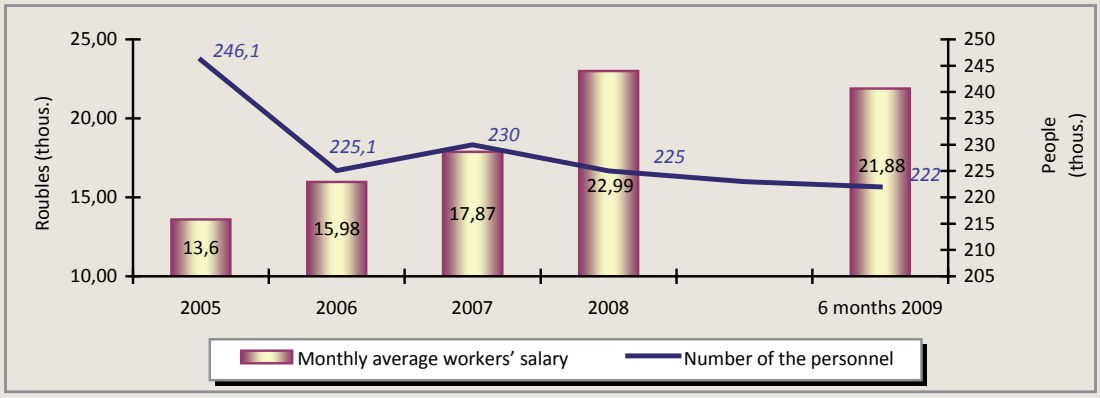
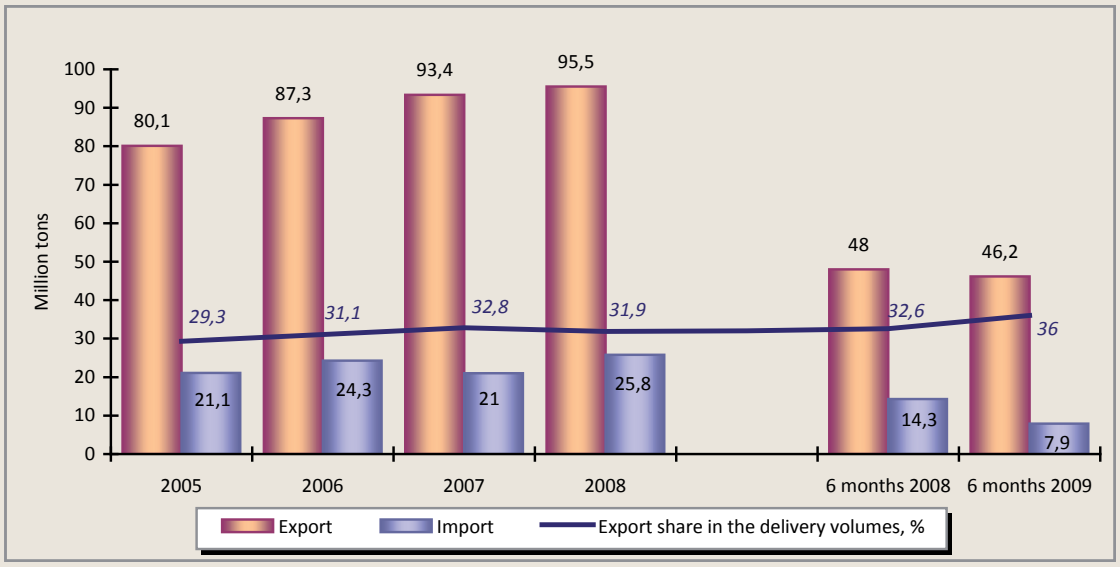


Figure 5. Russia's coal export and import dynamics [1, 2]



the steel production for 30%) in the second half-year of 2008 led to its extraction falling for 28.2% in Russia in the first half-year 2009 [3].

First of all, the crisis influenced independent coal enterprises. So, the mine "Raspadskaya" (the largest coking coal producer) in

November and December, 2008 delivered twice less coal, than in October of the same year (150th ton. of the concentrate against 650th ton. [4]). Subsequently coal-and-metallurgical holdings could not resist the crisis. For example, in 2008 a vertically integrated company "Severstal" refused many suppliers of coal for the benefit of Vorkuta and by that held its positions for a while. But in the first quarter of 2009 the situation with steel selling by the Cherepovetz metal plant worsened so much that the company "Vorkutaugol" had to reduce the concentrate production for 36%.

In the first half-year of the year 2009 in comparison with the first half-year of 2008 the coal extraction in Russia was reduced for 14.7%, including the coking coal extraction for 28.2%, and the power coal extraction for 10.7%. The number of the personnel by virtue of the companies' social obligations decreased less, than for 3%. Accordingly, the labor productivity in extraction decreased approximately for 15%.

The necessity of the optimization of the personnel number employed in the coal sector of Russia's economy, is not only caused by the crisis, but also by the general process within this branch. We believe the personnel number reduction for 10% in the coal industry in 2005 – 2009 to be quite natural.

2. *Export preservation and import reduction of coal*. Russia ranks fifth in the world in coal export, and it ranks third in power coal export. The share of coal export makes 33% of the total coal extraction in Russia. Its main part (95%) falls to the share of the power coal which is delivered from Siberia. In general coal export reduced less than for 4%.

Some reduction in coal export was caused by the fixed custom duties which don't depend on the prices' change in the world market. But the railroad rates are a real problem. So, in the coal price pattern in Russia the share of the railway services reaches 40% and tends to increase. Such circumstance reduces competitive advantages of the Russian coal exporters.

As for coal import during the crisis its reduction is quite normal for the country with the prevailing coal industry. To support the enterprises, Russia had to reduce coal import for 45%. The basic volume of the imported coal (more than 70 million ton.) was delivered from Kazakhstan for the Ural power stations. In Sverdlovsk area Reftinskaya (about 10 million tons), Verhnetagilskaya and Serovskaya (1.5 million ton. each), Nizhneturyinskaya and Krasnogorskaya (0.5 million ton. each) state power stations completely operate due to Kazakhstan coal. These and other stations owing to the crisis situation began to consume more coal from Kuznetsk, Sverdlovsk and Chelyabinsk.

3. *A great drop in prices*. In the beginning of 2009 Russia's coal industry for the first time since 2001 became unprofitable. The drop in production in the first quarter of 2009 made 17.5%; the drop in the coal consumption by the Russian power-men made 28%. It led to the great drop in prices and to the deterioration of the coal-mining companies' financial position. The price for the coking coal decreased more than twice (from 6th roub. to 1.5th roub. for a ton.), that appeared to be lower than its prime cost (for example, at the mines in Prokopyevsk, Kiselyovsk, Anzhero-Sudzhensk the prime cost makes 2.2 – 2.6th roub. for a ton.). It led to the situation that the part of the enterprises became unprofitable and they should be closed. For 1st of December 2009 the total amount of the coal-mining enterprises decreased to 188 units including 77 mines and 111 open-pit mines. Proprietors consider the "dry preservation" of the liquidated enterprises as one of the ways out from the crisis situation. But it is necessary to take into account that the open-cast mines can be stopped for some time, but the mines undergo bankruptcy, besides they are not included into the program of re-structuring.

According to the data of the "Bank of Moscow", the price increase for the coking coal in the Russian market becomes possible after the coal mining capacities' increase to 75 – 90% (first of all at more effective enterprises). The increase of the capacities is practically inevitable by the end of 2009. In the optimistic

scenario it will take place due to the growth of the internal and the external demand, in the pessimistic one it will happen due to the full inefficient manufacturers' leaving the market.

Great drop in prices for natural gas in the Russian market (from 2.2th roub. in 2008 to 870 roub. in 2009 for 1 m^3) also affected the decrease of coal competitiveness. This long-standing problem of the choice among the production sources of electricity and heat with the use of gas or coal in connection with the crisis was appreciably aggravated, as the low prices for gas constrain the development of coal power. Gas is also used inefficiently. Very often it is burnt at power stations and at boiler-houses without processing that deprives gas chemistry with a raw-material base. Therefore the policy of the price proportions' change is correct: in 2006 in recalculation for the relative fuel the prices' ratio "coal – gas" made 1:1; in 2010 it is expected to be 1:1.4-1.6; in 2020 it can make 1:2. At such ratio coal as fuel becomes much more preferable.

4. *Reduction of the modernization programs.* Dynamics of the exchange rates during the crisis first of all affected the cost of the production modernization programs realized by the companies as the most part of the equipment is imported from abroad. Investment projects realized within the branch are financed for 40% due to own means. Foreign investors' leaving from the Russian market "has frozen" almost a half of the coal enterprises' modernization programs and the development of new coal-fields.

5. *Transport tariffs' increase.* One of the key branch limiters is the transport infrastructure's insufficient development that is aggravated with huge distances. The average distance from the Kuzbass deposits to the ports of the Baltic and the Black seas makes 4,500 – 5,000 km, to the eastern ports it makes 6,000 km. Yakutia coal enterprises are in more favorable position (2,500 km from the Far East ports). Insufficient throughput of the transport network (railways, ports, etc.) and logistical costs of almost 40 % from the final coal price are constant restrictions of the coal branch development. For this reason in May and July of 2008 when the prices and demand for coal were still high, in the coal-mining companies' warehouses it was accumulated about 14 million ton. of coal, that 3 times exceeded the rules of its reserve.

The decrease of the internal demand for coal during the crisis made coal traders to increase coal deliveries abroad. Additional volumes of coal caused the railway traffic congestion at the Western-Siberian track, and the increase of the coal daily deliveries to the Far East ports exceeded the existing capacities of the processing cargoes in 1.5 times. Yet the main problem of the coal export is high railroad rates that reduce competitive advantages of the Russian coal exporters. Freight expenses of the foreign companies also make about 40%, but during the crisis they considerably decreased.

Measures on overcoming the crisis by the coal industry

Production volumes' decrease is the basic anti-recessionary measure realized in the world coal industry nowadays. According to the experts' opinion, in 2009 coal mining will be reduced to 10% or 15% in the world and, probably, to 20% in Russia, because of the difficulty of the Russian companies' joining foreign markets. In the conditions of reduction of the internal demand for the coking coal only *the increase in export* can support independent coal-mining enterprises. The number of independent companies, the leaders of the previous years, turned out to be in a difficult position such as Public Corporation "Raspadskaya" (for 8 months of 2009 the extraction volume made 82.6% from the level of 8 months of 2008), Public Corporation "Southern Kuzbass" (53.8%), Public Corporation "Yakutugol" (38.3%).

These enterprises had to search *for the new markets* in the countries of the NorthEast Asia. In the second quarter of 2009 they and the other coal enterprises of Kuzbass and Yakutia managed to conclude a number of long-term treaties with Chinese, Japanese and South Korea companies. In the first half-year "Raspadskaya" mine due to three contracts with Japan reached the export rate of 82%.

Operational expenses' decrease for the coal mining was carried out by Russia's coal companies partially, as the basis of their prime cost is made up by the conditionally constant charges (80 – 85%) which cannot be reduced. Nevertheless in 2009 many enterprises lowered their production costs, and with the workers' consent they postponed indexation of wages, and also with a view to regulate employment they took such measures, as incomplete working day, holidays under the administration's initiative, holidays at one's own expense.

For the support of Russia's coal branch development it is necessary to *intensify the role of the state regulation*. The current situation specifies the necessity of the reduction of the return terms of the value added tax (VAT), credit charges indemnity, railroad rates fall and prolongations of the branch re-structuring till 2015. However there exist the matters of the long-term character. The urgent measures of the coal-mining enterprises' state support should provide their protection against competition. It is connected with the toughening requirements for carrying out the auctions on the coal delivery for the state and the municipal needs.

Let's try to generalize all the mentioned facts in the formulations of the basic directions in Russian coal industry's overcoming the crisis and in providing its post crisis development:

1. State regulation [5]:

– granting state guarantees to the system-forming managing companies having coal assets;

– stimulation of investments into branch in the compensation form for the part of credit expenses;

– establishing lowering factors for the railroad rates (the Northern and the Far East directions);

– additional budgetary assignments in the field of assistance to the population's employment for 2009;

– establishing differentiated specific tax rates for coal mining and applying tax deduction for coalminer' safety increase;

– annual indexation of differential coal rates depending on the of market prices' changes;

– development of the national standards for the equipment providing mining safety, branch competitiveness' and energy efficient production' increase.

2. Development of the home market of coal due to its consumption's growth (coal power stations, liquid fuel production), its competitiveness' increase in the inter-fuel competition.

3. Development and introduction of the competitive domestic mining equipment, progressive technologies on extraction and processing of coal, increase in the coal companies' capacities, creation of conditions for the full use of existing capacities and modernizations of the working mining and transporting equipment.

4. Financial support of the scientific researches, in particular gathering, processing and transfer to the industrial sector the information about the latest discoveries.

5. Transformation of the whole system of the vocational training; as after overcoming the crisis Russia will have a different type of the economy, it will need the skilled staff corresponding to the modern requirement of scientific and technical development.

Practical realization of the anti-recessionary program should break the negative tendencies within the branch, stabilize its functioning during the crisis period and provide its effective post-crisis development. The state control is necessary for carrying out the works connected with mines' liquidation.

Social consequences of the crisis for the coal-mining territories

Alongside with the crisis influence estimation on the coal industry it is necessary to estimate its social consequences. As a rule, coal settlements by virtue of their accommodation specificity are mono-profile. 140 mono-settlements, of them 64 cities and 76 city type settlements, and also a plenty of rural type settlements are connected with coal mining. During the crisis the urgent social problems are especially characteristic for mono-settlements [6].

Social disaster can take place in mono-branch coal specialization settlements in case

of stopping mines, open-pit mines and concentrating factories. Kuzbass can become the most vulnerable place as more than 50% of the total Russian coal mining is concentrated in it, and the Pechora coal basin can become a rather problem place owing to the necessity of the population resettlement from Vorkuta and Inta to the other regions of the country.

The crisis condition of labor relations. The production volumes' reduction and the suspension of production at the part of the coal-mining enterprises resulted in significant personnel release. The coal companies reduced about 5 – 7% of the personnel, the part of the personnel works incomplete working hours *(fig. 6)*.

Personnel release at the basic coal-mining companies in Russia shows that the basic reductions fall to the largest companies *(fig. 7)*.

During personnel reductions at a company first of all unfair workers and pensioners were discharged. For example, at the Close Corporation "Russian coal" personnel reduction in connection with the production volumes' decrease made only 8.5% from the average personnel number.

The other form of the manpower resources' management in the conditions of overcoming the crisis phenomena is the production structural reorganization at the expense of amalgamation of several enterprises into a new one. Personnel

Figure 6. Dynamics of the personnel release in the coal industry for the first quarter of 2009 (increasing result), persons [7]

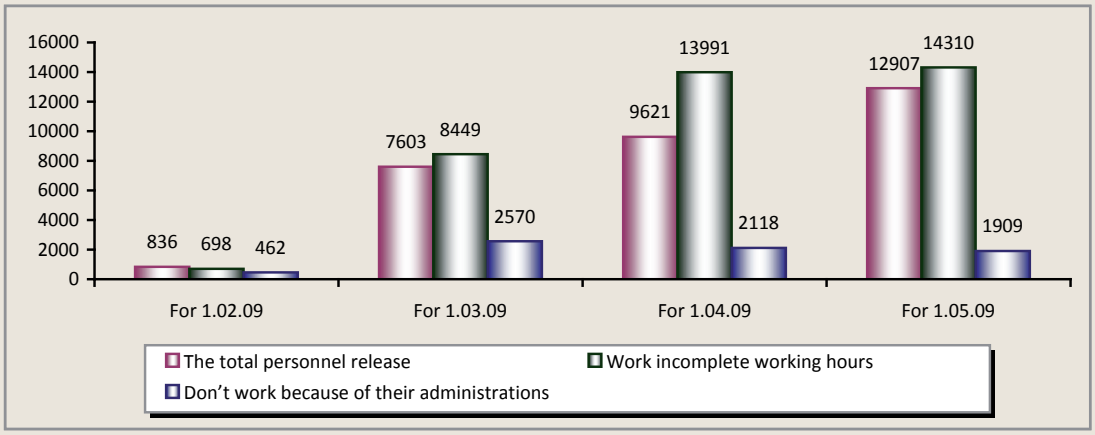


Figure 7. Personnel release at the basic coal-mining companies for 01.05.2009, persons [8]

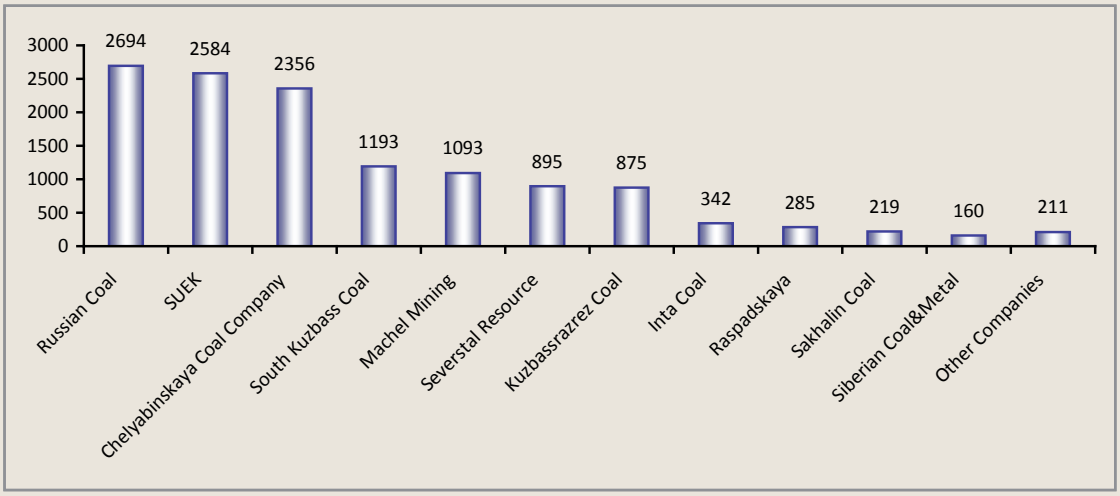


Table 2. Dynamics of the registered unemployment rate in the basic coal-mining regions and the labor markets' intensity for 2008 and for the I quarter of 2009

Region	Unemployment rate*, %		Intensity factor**	
	2008	I quarter of 2009	2008	I quarter of 2009
Kemerovo region	2.0	3.4	2.3	2.7
Primorsky Krai	2.9	3.7	0.9	1.3
Perm Krai	2.0	3.2	4.5	7.5
Komi Republic	2.2	2.9	2.5	4.4
Rostov region	1.3	1.8	1.4	2.2
Sakhalin region	1.2	1.8	0.6	1.2
Tula region	1.01	3.3	1.3	1.8
Chelyabinsk region	1.9	3.5	5.2	8.4
Average in Russia	2.0	2.9	1.9	2.7

* The ratio among the number of the registered unemployed persons (according to the data of the public employment services) and the number of the able-bodied (economically active) population for the end of the considered period (in percentage).
** The ratio among the number of the unemployed citizens registered by the public employment services to the number of vacancies for the end of the considered period.
Made up with the use of the data [8].

release at a number of the coal-mining enterprises of the country led to the unemployment growth in all coal-mining regions of the country *(tab. 2)*.

Employment is one of the basic problems for the coal-mining mono-cities. There exist some variants of the mentioned problem decision: production diversity with the new workplaces' creation; creating the conditions for people to work in nearby cities with man power shortage; the excess population's resettlement that is especially actual for the depressive mono-cities located in the northern regions of the country.

As a whole it is necessary to note, that in the conditions of mono-settlements with a weak opportunity of the released personnel employment and corresponding growth of unemployment, conversion of the full-time workers into the incomplete working ones, no-charge holidays – all the mentioned things raise social risks and social intensity. Especially it concerns the personnel of the mines liquidated during the crisis as they do not undergo the program of the coal branch re-structuring so miners will not receive social guarantees either from the proprietor, or from the state.

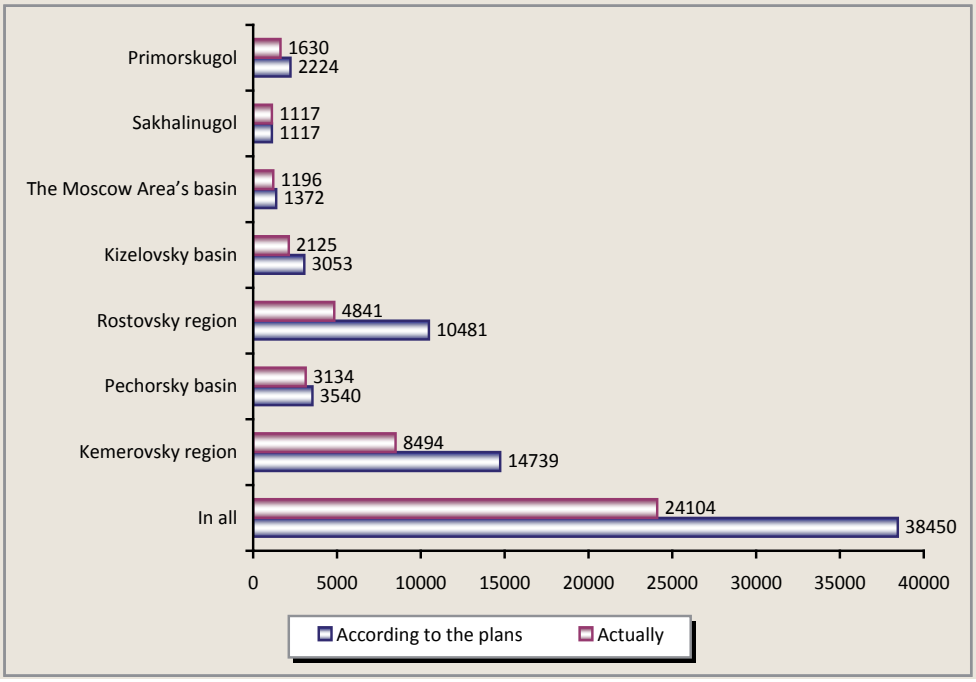
The excess population's resettlement from the regions of the Far North. The resettlement of the released personnel's families from the liquidated Far North coal-mining enterprises is carried out according to "The Complex of actions in the coal industry re-structuring in Russia in 2006 – 2010". It was planned to resettle 3,922 families for this period. For 01.01.2008 only 30% of families were actually resettled. As a whole, according to the data of "Sotsugol", 7,496 families were moved at the period 1998 – 2008, about 4 billion rubles were spent, including 4,758 families at the expenses of 2.6 billion rubles in Komi Republic [9]

The resettlement most likely will proceed till 2015 (the term of the coal branch re-structuring prolongation). It is also necessary to note, that the resettlement financing which is carried out owing to the federal means did not interrupt during the crisis period.

The program of resettlement from shabby habitation. Because of the limited financing the program of resettlement from shabby habitation during re-structuring fulfilled only for 78.2%. For January, 1, 2009 24 104 families moved into new habitation with the expense of 10.9 billion rubles *(fig. 8)*.

According to the plans of unprofitable coal-mining enterprises' liquidation 14,346 families will be resettled from shabby habitation with the expenses of 15 billion roubles (in the prices of 2007). In connection with the growth of cost for 1 m^3 of habitation these means should be increased.

Figure 8. Resettled families quantity in the basic regions for 01.01.2009 [7]



The important role in overcoming the crisis and smoothing the social intensity in the coal-mining regions is given to the Federal branch agreement (FBA), and to territorial and collective agreements at the enterprises. The crisis showed that the crisis can be much more easily overcome if there is social partnership.

First signs of overcoming the crisis in the coal branch

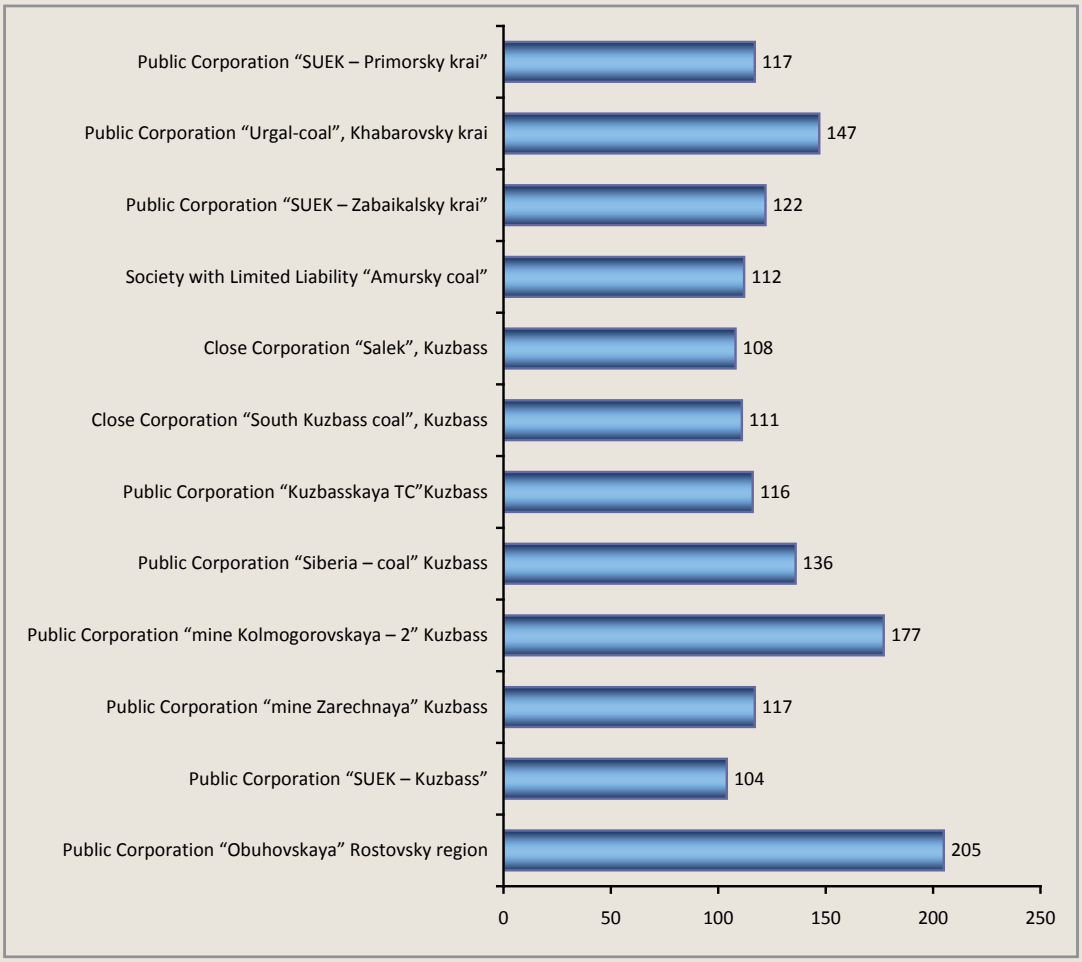
In the second half-year of 2009 some positive tendencies were planned in the coal industry of Russia. In August coal extraction for coking almost reached the level of extraction in 2008. Since October, 2009 for the first time from the beginning of the crisis the Russian producers of the coking coal have started to raise the price for their production. Mining companies are going to rise the price for the coking coal approximately for 50 – 60%. In June Kuznetsk coal delivery to the power stations corresponded to the level of 2008, and in July it exceeded that level for 6.4%; from January to July Russian power coal export also exceeded the parameter of 2008 [10].

Gradually the backlog of the coal production volumes reduced in comparison with the previous year. For 8 months of 2009 185.8 million ton. of coal were extracted; it made 86.7% from the level of the period from January to August, 2008 (including the coal extracted – 67.8 million ton. (97%), with the surface way – 118.0 million ton. (81.7%).

Even in the conditions of the general crisis a number of the large-scale coal companies for 8 months of 2009 could essentially increase the coal mining volumes in comparison with the similar period of 2008 *(fig. 9)*. As a rule, these are the companies with the diversity deliveries to the home market and for export.

These are just separate examples. As a whole the branch has not reached the level corresponding to the stable development's requirements. Export still remains its basic point of stabilization. According to the results of seven months of 2009 the export coal delivery is equal to the level of the similar period of the previous year (100.6%) and made 55.7 million ton. In August escalating export deliveries, first of all, from Kuzbass proceeded (the growth made more than 2 million ton.) [11]. At the end of 2009 the new coal-mining enterprises were placed in operation; it provides 820 new workplaces and 2.5 million ton. capacities [12].

Figure 9. Growth of the coal mining volumes for 8 months of 2009 in comparison with the similar period of 2008 at the separate companies [11]



Opportunities and prospects of Russia's coal sector development

After overcoming the crisis Russia's coal industry should receive the vector of the development based on the new extraction technologies, deep processing and complex use of coal. Preconditions for it are available.

The resource opportunities for the coal industry development in Russia are practically unlimited (30% of the world reserves). It is more, than in any other country of the world. However, in the extraction volumes Russia only ranks fifth place in the world after China, the USA, India and Australia. It is necessary for our country to overcome a lot of technological, economic, ecological, infrastructural, etc. obstacles constraining the scale development of the coal branch.

The "Power strategy of Russia till 2030" accepted by the Government of the Russian Federation on the 27th of August, 2009 allows to estimate the scales of the coal branch development in the long-term prospect including three stages.

The perspective levels of the coal mining will be determined by the demand parameters for the Russian coal both inside the country and abroad. It is expected, that owing to the outstripping rise in prices for the natural gas the demand for coal will grow outstripping rates inside the country. The conjuncture of the world power markets will also promote the export growth of the Russian power coal. At the same time the rates of the coal demand growth can be limited: consumers' higher expenses, including transport ones, and the increased ecological requirements.

Table 3. The forecast of the stage-by-stage coal mining development till 2030, one million tons

Parameter	2005 (fact)	2010	2020	2030
Coal mining, total	299	361-364	435-455	530-565
Including the coking one	70	88-101	100-129	102-132
Donetsk	8	7-11	8-13	8-13
Ural	5	3-4	4-8	13-15
Pechora	13	13-17	13-17	22-24
Kuznetsk	165	190-196	211-205	232-230
Kansko-Achinsky	37	44-45	65	108-115
East-Siberian	37	51-52	68-73	70-75
The Far East	32	42-43	60-64	70-80
Made up with the use of the data [13].				

As a whole the coal mining in Russia can increase from about 299 million ton. in 2005 to 435 – 455 million ton. by 2020 and to 530 – 565 million ton. by 2030 *(tab. 3)*.

The role of coal in the consumption structure for the period till 2030 is shown in *figure 10*.

In the "Power strategy" the significant gain of the coal mining in Kuznetsk and Kansko-Achinsk coal basins is planned. The development of the new deposits in the Eastern Siberia and the Far East, and also in Komi Republic is also presumed. The coal transportation volumes will increase; it will demand railways' and ports' transportation capacity increase. The new port with the high-efficiency coal terminal is planned to be constructed on the Black sea coast *(tab. 4)*.

The first stage includes the realization of the program measures' complex for the branch situation's stabilization; the end of the branch re-structuring actions; coal production modernization and intensification; the further increase in the coal enrichment volumes; accident risk and traumatism decrease at the coal-mining enterprises; branch export potential development.

The second stage includes coal position's strengthening at the home market; escalating of the extraction volumes; new coal deposits' scale development; cooperation in innovational technologies' researches and development; the decrease of the branch dependence on the international coal market conjuncture; the beginning of the branch industrial structure's diversity.

Figure 10. The weight of power resources in their consumption structure [13]

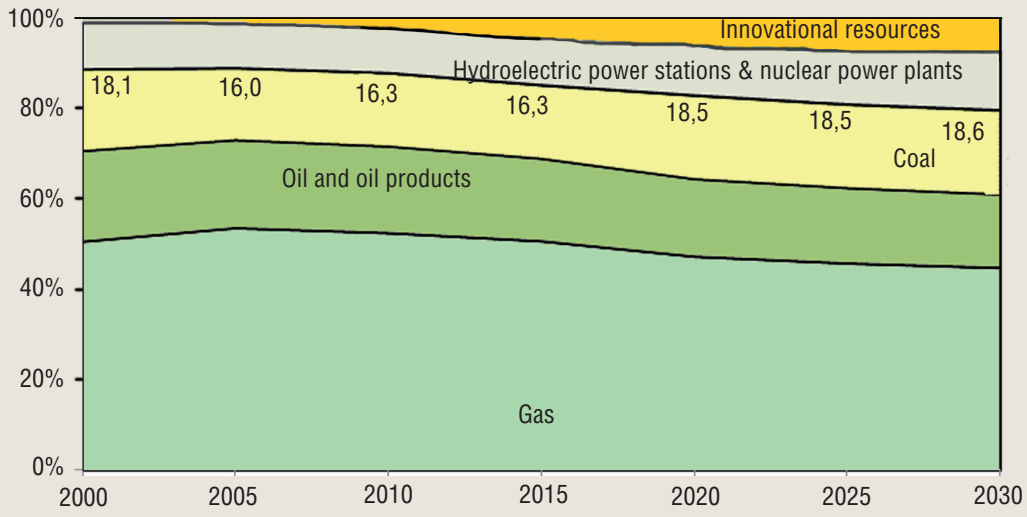


Table 3. The parameters of the coal industry strategic development for the period till 2030

Parameters	2010	2020	2030
Coal mining			
Growth of the extraction volumes (in %) by 2005	17-18	45-52	77-89
The new enterprises' weight in the total extraction amount, %	10-12	30-31	43-45
Coal transportation			
Growth of railways' carrying capacity to the level of 2005 (times)	1.25	1.5	2.0
Growth of terminals' capacities to the level of 2005 (times)	1.25	1.75	2.0
Coal processing			
Enrichment of the power coal, in % of its extraction	35-40	55-60	65-70
The share of the coal used for getting ethanol, in % of the total extraction amount		0.5	5-8
Progressive extraction technologies			
Weight in the total extraction amount:			
- The underground way ("mine – lava")	45-50	60-70	80-90
- The open way (line and stream-cyclic)	30-35	40-50	60
Coal industry's efficiency			
Growth for breakage face loading to the level of 2005 (times)	1.35-1.4	2.0-2.5	4.0-4.5
Weight of outsourcing in the extraction expenses for 1 ton of coal, %	10	15	35
Extraction growth for one worker (times)	1.5	2.5-2.6	3.75-4.2

Made up with the use of the data [13].

The third stage includes the significant labor productivity's increase in the coal branch corresponding to the world standards of the industrial and the labor safety, ecological norms; industrial getting of deep processing coal products (synthetic liquid fuel, ethanol, etc.) and accompanying resources (methane, underground waters, building materials). The coal branch's scientific and technical development is influenced by innovations in the electric power industry, and also by the power resources' structural optimization. Innovational decisions here can be designated as follows.

In the coal industry they are:

• expansion of the use of the robotized, integrated, line and cyclic-line technologies;

• providing technological processes with automatic safety systems;

• development of the selective and the hydraulic coal mining technologies;

• development of the complex technologies of the coal enrichment, individual defense equipment, landscapes re-cultivation methods and the return laying of wastes;

• development of the miniaturized technologies for exploitation of the low power coal layers;

• development of gasification, hydrogenation and biotechnologies with the use of coal.

In the coal electric power industry they are:

• creation of the condensation power units of supercritical steam parameters;

• creation of the power units with the intracyclic coal gasification;

• creation of the firm fuel thermal power stations with the zero emission of hotbed gases;

• creation of the small power on mine methane.

Technological and economic coordination of all parts of the fuel and energy country's complex is an indispensable condition of its effective development. At the same time various industrial circuits' coordination should not be considered as the state controls' activity only, but as the firm strategy. In particular, the coal companies should make for the economic structure's diversity and alongside with the fuel vector of the development explore coal fuel chemistry, gas fuel chemistry and other directions [14].

From the analysis above we can note that the best way of protection against the general financial and economic crises is duly modernization of the production methods and institutional

management structures. Without such work which was carried out at the end of 1990 – first half of 2000, the coal industry could not stand. Probably crises will repeat (the nature of the commodity-money relations in the conditions of disproportion between the real sector of economy and the virtual financial turn-over). That's why it is necessary to improve the ways of protection against them. The stability measure of the coal industry in many respects depends on its technological "cohesion" with metallurgy, electric power industry and chemistry within the in-Russian market, and also on the coal companies' industrial structure expansion (to use not only firm fuel, but also liquid synthetic, coal graphite, gas, non-conventional kinds of electric power industry).

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