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MACROECONOMICS

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The book is the collected articles presenting the results of the author's studies on the problems of macroeconomic dynamics, innovation development and economic security of the Republic of Belarus. It gives a comprehensive idea of the "Belarusian economic model" genesis in the context of the planned economy transforming into the market one, innovation institutions establishing and the economic security enhancing. In this book there have been examined the topical issues of the world economy current state and development, given theoretical foundations of these processes, the place occupied and role played by the Republic of Belarus. The empiric material is used to demonstrate the advantages of the neo-Keynesian instruments of the macroeconomic regulation at its transition from a planned to a market economy.

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Introduction

Republic of Belarus is a buoyant medium-size European state with no global ambitions and pretensions. During the independence period of 19 years (after the USSR collapse in 1991) Belarus has paced the way which many countries of the world managed to do within several decades: the GDP at the PPP in years 1999–2009 increased by 2.6 times and reached 119.5 billion USD. Within a short period in history there have been created the base market institutions, made a transition to the mixed economy functioning mostly as a market-based system. Since 1996 the country has stably positive economic growth rates being noticeably higher than those of the EU and CIS. During the world crisis period of 2008–2009 the GDP didn't go down as compared to the pre-crisis level; the employment rate managed to be retained, that couldn't fail to contribute to the well-being of the people progressively improving. Belarus is not a poor country according to all three definition criteria: 1; 2.15; 4.3 USD at the PPP resources available per capita/a day. Belarus is rather an egalitarian country from the inequality point of view. The Gini coefficient in 2008 was 0.284 that is slightly below the average in the EU – 0.3. The political stability and low corruption level observed by both foreign and national businessmen are real facts of life. The economic development of Belarus having fallen in some discord with the general trend of the CIS economic dynamics gave birth to the term “Belarusian model of economic development” which came to be used by economists, political scientists and journalists. International experts were the first to explain the Belarusian economic growth rate being one of the highest in the CIS. The World Bank and International Finance Corporation in a joint research *Doing Business, 2009* stated, that Belarus became one of

the leaders in judicial reforming aimed at the easier business rules introduction and one of the four leading states-reformers in this sphere. The WB group representative in Belarus Craig Bell remarked that this was a very good result proving the government's efforts to improve the business environment.

The purpose of this book is to give to an interested reader a comprehensive idea of the socioeconomic development of Belarus, of the "Belarusian economic model" genesis in the context of the planned economy transforming into the market one, innovation institutions establishing and the economic security enhancing. This is thought to have an objective reason as the Western economic literature lacks the complex studies on the mentioned problems of the Belarusian economic development, accounting for the fact that similar studies for Ukraine, Russia, Kazakhstan are presented on a wider scale. In a number of English books the stereotype approach is used along with the standard mathematical models and regressions which don't consider the transformation peculiarities, the undeveloped market institutions, specific human capital, etc. As a result, the wrong tools bring to the predetermined formal conclusions: liberalization – privatization – credit restriction – monetary stock sterilization, etc.

In the given book there have been examined the topical issues of the world economy current state and development, given theoretical foundations of these processes, the place occupied and role played by the Republic of Belarus are shown. The empiric material is used to demonstrate the advantages of the neo-Keynesian instruments of the macroeconomic regulation at its transition from a planned to a market economy. The author's working experience in the Belarusian economic management proved to be relevant and so many very important for Belarus problems have been covered and interpreted exactly from these positions. Unlike the widely spread concept of the shock therapy, the author's concept of the gradualist strategy of the market reforms, target-programme management and evolutionary process of the effective innovation institutions formation is being put forward and progressively grounded, not rejecting a significant role of the state in this period. The empirical data and arguments are adduced to show that shock therapy methods not only fail to stimulate the economy but often provoke a recession

and unemployment, and as a result may cause a deep political crisis fraught with the polity decay. A scientific analysis presupposes an impartial valuation based on facts and clear analytical tools. And as for the states in transition, wide use of the institutional economic theory methods are to be at hand along with the keen insight into the nature of economic relations and pattern of the economic agents behavior. The works included into this book display just this system approach, revealing both the weaknesses and strength of the Belarusian economic policy and working out particular recommendations on its evolutionary adjustment in the real economic situation.

This book being published just now is still more important accounting for a considerable interest of the science community and the experts both in the West and in the East to the issues of the Customs Union of Belarus, Russia and Kazakhstan in the framework of the EuroAsEC (European-Asian Economic Community) which is to be transformed in the coming years into a common economic area of the three states; further development of the Union State of Belarus and Russia; Republic of Belarus' participation in the "Eastern Partnership" initiated by the European Union; the intended Belarus – USA constructive dialogue on a wide range of the socioeconomic and political problems; dynamic development of the trade and economic cooperation and strategic partnership of Belarus with Venezuela and China, more close intergovernmental relations of our country with the states of Latin America, Asia and Africa. The first in the book is a large scientific article on the Customs Union of Belarus, Russia and Kazakhstan, which hasn't yet been published before and is an analysis of the EuroAsEC Customs Union real process of formation as viewed by the economic scientist and direct participator of this process on behalf of Belarus.

The author's analysis of the economic security (technological and energy ones included) of the Republic of Belarus in the conditions of the economic transformation and national innovation system formation is distinguished by a new approach, that is still more important as the problem of the economic threats counteracting effective mechanism development is of the barest necessity at present stage. The evolution of the economic security

enhancement taking into consideration the Republic of Belarus' participation in the global economic processes, transnational corporations drawn to our economy and the Union State of Belarus and Russia development constitute a major block of works represented in this book.

The interested reader, I hope, will find in the book of articles the reasoned and contemporary methodology-based answers to many actual problems of the economic development, innovation policy and strategy of the economic security enhancement in the Republic of Belarus.

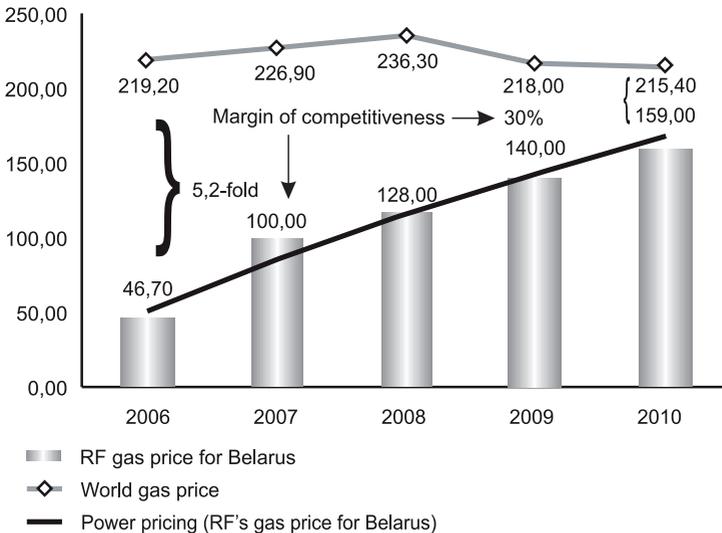
Prof. Mikhail V. Myasnikovich

Macroeconomics

Current Period of Belarus' Economic Development

Modern Belarus demonstrates one of the highest rates of economic growth in Europe. However, the environment in which the country's economy will have to operate in the years to come is subject to change (see Fig. 1).

Prices for imported energy, raw materials and supplies will be gradually catching up with the world prices. Following Ukraine, Russia will join the WTO, thereby escalating competition in these countries' markets. The crisis-induced slowdown in global economic growth and slump in demand will hamper the export



Source: authoring based on MEDT and ME data.

Fig. 1. Natural gas price dynamics in the world and for Belarus, USD per 1000 m³

of Belarusian goods, while the western competitors will have the opportunity to capitalize on the reduced energy prices, which have been skyrocketing until recently, to bring down the prices for their goods. This would jeopardize the price advantages of Belarusian products which Belarus currently enjoys and reduce their competitive edge. Such a situation necessitates decisive and effective actions to restructure and modernize the economy.

The current situation decrees that a framework for the country's competitiveness needs to be developed to build it up in 2011–2015, namely, to implement effective state programs at a higher rate, create an institutional environment for the innovation-driven economic growth and draw up and embark on implementation of new programs aimed at developing production facilities of the fifth and sixth tenor of technology.

These are the challenges of formidable scale and difficulty, in particular, against the background of the global financial crisis, the “second wave” of which affects raw materials markets and then industrial and trade sectors. The world economics proves that an economic strategy should be flexible and responsive to changes in the competitive environment, scaling up its own ambitions and capacities to implement them. For example, China which flooded world market with its toys and inexpensive knitwear has not rested on its laurels, but already has started developing the electronics and space technology markets.

Michael Porter, a renowned theoretician of international competition, has stated that the countries compete based on successive advantages [1]: initially, based on factors of production (extract the utmost). Then, based on the investment, volume growth and economy of scale. The next stage is an innovation-driven competition when the economy and management acquire a new quality ... or “fall out of the race”. And the last stage is the wealth-based competition. It is logical. Only having extracted the utmost from the effective system and having accumulated sufficient resources, one may take the risk of using a fraction of them for exploratory research and innovations. Given its economic development, Belarus is likely to capitalize on this advantage.

Identifying the role of the innovative activity in economy development, the contemporary Belarusian economic history needs to be divided into three periods covering 1996–2008

which correspond to three five-year planning periods. The first period lasted from the second half of the 1990s up to 2005 when Belarus implemented the socially oriented market economy model characterized by shockless and gradual transition of all its spheres to the market economy. Following the drop in GDP, industrial output and consumer goods production by 35%, 41% and 40% respectively in 1995 vs 1990, the objective to stabilize economy was set and successfully achieved.

In 1996–2000, the GDP increased by 36% and made up 88% of the pre-crisis level, the industrial output increased by 65% exceeding the 1995 level by 1% and, above all, real cash incomes of the population amounted to 106% by the beginning of the stabilization period. However, the innovation activity and modernization of production were not and indeed could not be a principal vector of the industrial policy at that time. The investment in the fixed assets increased by 28.5% vs 1995, i. e. about 2-fold less compared to the rate at which they dropped in 1990–1995 – 61%. The main target of that period was to prevent an economic collapse and maintain economic security of the country.

An objective set for the next five-year period (2001–2005) was to achieve economic growth and macroeconomic stabilization, i.e. to drastically reduce the inflation level and stabilize monetary and foreign exchange policy. Therefore, without reducing economic growth rates as a whole, a framework for investment and innovative activities was developed not only by implementing the target state programs and budget resources, but also by attracting private and foreign investors. Those prerequisites were only essential, but not adequate: there was a need to revise a great deal of provisions of the tax legislation and aspects of the pricing system, develop major components of an innovation infrastructure and so on. At that time, the share of the research intensity in the Belarusian GDP made up about 0.7%, the share of the budget-financed research expenses of the total consolidated budget expenses reduced from 1.12% in 2001 to 0.81% in 2005 and to 0.78 – in 2006 (this indicator is 2.5–3.5% in the OECD countries). However, even under such conditions the national economy sectors contributed to nearly 90% of GDP growth through intensive factors of production (labor productivity, scientific

and technical progress and modernization of production), that substantially exceeds indicators of the Belarusian economy under the Soviet rule (51%) [2].

Currently, the “growth inertia” and well-elaborated techniques of mobilization management help meet major estimated parameters for 2006–2010. The majority of critical estimated parameters attained in 2008 (see Table 1), supplemented by the results achieved in 2006–2007, helped essentially reach in 2008 the levels set by the Program of Social and Economic Development of the Republic of Belarus for 2006–2010 due to a positive growth dynamics of actually all major indicators.

Table 1. Dynamics of Belarusian economy development, 2006–2008

Indicator (% change vs previous year)	Year		
	2006	2007	2008
Gross domestic product	110.0	108.2	110.0
Industrial output	111.4	108.5	110.8
Agricultural output	106.0	104.1	108.9
Consumer goods production	111.4	108.2	112.1
Total area of housing constructed	108.0	114.1	110.3
Investment in fixed assets	132.0	115.1	123.1
Foreign trade volume, including export	128.7 123.5	125.9 124.5	136.7 135.5
Real cash income of population	117.8	115.0	112.7

Source: authoring based on data of National Statistical Committee of the Republic of Belarus.

It may be stated that by the time of abrupt mounting of the foreign economic challenges such as the energy price rise and global financial crisis, the Belarusian economy has been performing fairly well as a whole to consistently follow the path of the socially oriented development. Over three years of the five-year period, the GDP grew by 31%, industrial output – by 33.9%, investment in the fixed assets – by 87% and real cash income of the population – by 52.7%.

According to the UNCTAD Report on *Developing Countries on International Trade 2007: Trade and Development Index*, the Republic of Belarus is ranked 57th in the world and is among the most dynamically developing CIS countries. The UNCTAD experts specifically pointed out among the Belarus' most significant strengths such as high indicators of economic and social well-being of the population and consistent growth in the foreign trade. These indicators rank Belarus 34th in the world and it surpasses all CIS countries.

According to the UNDP 2007 Human Development Report, Belarus has improved its human development indicators and for the first time became a country with a high level of human development ranking 64th, which is the highest indicator among CIS countries. The Russian Federation ranked 67th, Kazakhstan – 73rd and Ukraine – 76th.

Table 2. Countries with high human potential level

Country's HPDI rating	1975	1980	1985	1990	1995	2000	2005
1 Iceland	0.868	0.890	0.899	0.918	0.923	0.947	0.968
2 Norway	0.870	0.889	0.900	0.913	0.938	0.958	0.968
3 Australia	0.851	0.868	0.880	0.894	0.934	0.949	0.962
4 Canada	0.873	0.888	0.911	0.931	0.936	0.946	0.961
5 Ireland	0.823	0.835	0.851	0.875	0.898	0.931	0.959
6 Sweden	0.872	0.882	0.893	0.904	0.935	0.952	0.956
7 Switzerland	0.883	0.895	0.902	0.915	0.926	0.946	0.955
8 Japan	0.861	0.886	0.899	0.916	0.929	0.941	0.953
9 Netherlands	0.873	0.885	0.899	0.914	0.934	0.947	0.953
10 France	0.856	0.872	0.884	0.907	0.925	0.936	0.952
11 Finland	0.846	0.866	0.884	0.906	0.918	0.940	0.952
12 USA	0.870	0.890	0.904	0.919	0.931	0.942	0.951
13 Spain	0.846	0.863	0.877	0.896	0.914	0.932	0.949
14 Denmark	0.875	0.883	0.890	0.898	0.916	0.935	0.949
15 Austria	0.848	0.862	0.876	0.899	0.918	0.938	0.948
16 Great Britain	0.853	0.860	0.870	0.890	0.929	0.931	0.946
17 Belgium	0.852	0.869	0.883	0.903	0.931	0.943	0.946
18 Luxembourg	0.836	0.850	0.863	0.890	0.913	0.929	0.944
19 New Zealand	0.854	0.860	0.871	0.880	0.908	0.927	0.943
20 Italy	0.845	0.861	0.869	0.892	0.910	0.926	0.941

table continues № 2

Country's HPDI rating	1975	1980	1985	1990	1995	2000	2005
21 Hong-Kong (China, Special Administrative Region)	0.763	0.803	0.830	0.865	0.866	0.919	0.937
22 Germany		0.863	0.871	0.890	0.913	0.928	0.935
23 Israel	0.805	0.830	0.850	0.869	0.891	0.918	0.932
24 Greece	0.841	0.856	0.869	0.877	0.882	0.897	0.926
25 Singapore	0.729	0.762	0.789	0.827	0.865		0.922
26 Republic of Korea	0.713	0.747	0.785	0.825	0.861	0.892	0.921
27 Slovenia				0.851	0.857	0.891	0.917
28 Cyprus		0.809	0.828	0.851	0.870	0.893	0.903
29 Portugal	0.793	0.807	0.829	0.855	0.885	0.904	0.897
30 Brunei							0.894
31 Barbados							0.892
32 Czech Republic				0.845	0.854	0.866	0.891
33 Kuwait	0.771	0.789	0.794		0.826	0.855	0.891
34 Malta	0.738	0.772	0.799	0.833	0.857	0.877	0.878
35 Qatar							0.875
36 Hungary	0.786	0.801	0.813	0.813	0.817	0.845	0.874
37 Poland				0.806	0.822	0.852	0.870
38 Argentine	0.790	0.804	0.811	0.813	0.836	0.862	0.869
39 UAE	0.734	0.769	0.790	0.816	0.825	0.837	0.868
40 Chile	0.708	0.743	0.761	0.788	0.819	0.845	0.867
41 Bahrain		0.747	0.783	0.808	0.834	0.846	0.866
42 Slovakia							0.863
43 Lithuania				0.827	0.791	0.831	0.862
44 Estonia		0.811	0.820	0.813	0.752	0.829	0.860
45 Latvia		0.797	0.810	0.804	0.771	0.817	0.855
46 Uruguay	0.762	0.782	0.787	0.806	0.821	0.842	0.852
47 Croatia				0.812	0.805	0.828	0.850
48 Costa Rica	0.746	0.772	0.774	0.794	0.814	0.830	0.846
49 Bahama Islands		0.809	0.822	0.831	0.820	0.825	0.845
50 Seychelles							0.843
51 Cuba							0.838
52 Mexico	0.694	0.739	0.758	0.768	0.786	0.814	0.829
53 Bulgaria		0.771	0.792	0.794	0.785	0.800	0.824
54 Saint Kitts and Nevis							0.821

table continues № 2

Country's HPDI rating	1975	1980	1985	1990	1995	2000	2005
55 Tonga							0.819
56 Libyan Arab Jamahiriya							0.818
57 Antigua and Barbuda							0.815
5B Oman	0.487	0.547	0.641	0.697	0.741	0.779	0.814
59 Trinidad and Tobago	0.756	0.784	0.782	0.784	0.785	0.796	0.814
60 Romania		0.786	0.792	0.777	0.772	0.780	0.813
61 Saudi Arabia	0.611	0.666	0.664	0.717	0.748	0.788	0.812
62 Панама	0.718	0.737	0.751	0.752	0.775	0.797	0.812
63 Malaysia	0.619	0.662	0.696	0.725	0.763	0.790	0.811
64 Belarus				0.790	0.755	0.778	0.804
65 Mauritius		0.662	0.692	0.728	0.751	0.781	0.804
66 Bosnia and Herzegovina							0.803
67 Russian Federation				0.815	0.771	0.782	0.802
68 Albania		0.675	0.694	0.704	0.705	0.746	0.801
69 Macedonia. FYR							0.801
70 Brazil	0.645	0.685	0.700	0.723	0.753	0.789	0.800

COUNTRIES WITH AVERAGE LEVEL OF HUMAN POTENTIAL DEVELOPMENT

71 Dominica							0.798
72 Saint Lucia							0.795
73 Kazakhstan				0.771	0.724	0.738	0.794
74 Venezuela	0.723	0.737	0.743	0.762	0.770	0.776	0.792
75 Columbia	0.663	0.694	0.709	0.729	0.753	0.772	0.791
76 Ukraine				0.809	0.755	0.761	0.788
77 Samoa			0.709	0.721	0.740	0.765	0.785
78 Thailand	0.615	0.654	0.679	0.712	0.745	0.761	0.781
79 Dominican Republic	0.626	0.660	0.684	0.697	0.723	0.757	0.779
80 Belize		0.712	0.718	0.750	0.777	0.795	0.778
81 China	0.530	0.559	0.595	0.634	0.691	0.732	0.777
82 Grenada							0.777
83 Armenia				0.737	0.701	0.738	0.775
84 Turkey	0.594	0.615	0.651	0.683	0.717	0.753	0.775
85 Surinam							0.774
86 Jordan		0.647	0.669	0.684	0.710	0.751	0.773
87 Peru	0.647	0.676	0.699	0.710	0.737	0.763	0.773
86 Lebanon				0.692	0.730	0.748	0.772

end table № 2

Country's HPDI rating	1975	1980	1985	1990	1995	2000	2005
89 Ecuador	0.636	0.678	0.699	0.714	0.734		0.772
90 Philippines	0.655	0.688	0.692	0.721	0.739	0.758	0.771
91 Tunisia	0.519	0.575	0.626	0.662	0.702	0.741	0.766
92 Fiji	0.665	0.688	0.702		0.743	0.747	0.762
93 Saint Vincent and the Grenadines							0.761
94 Islamic Republic of Iran	0.571	0.578	0.615	0.653	0.693	0.722	0.759
95 Paraguay	0.667	0.701	0.707	0.718	0.737	0.749	0.755
96 Georgia							0.754
97 Guyana	0.682	0.684	0.675	0.679	0.699	0.722	0.750
98 Azerbaijan							0.746
99 Sri-Lanka	0.619	0.656	0.683	0.702	0.721	0.731	0.743
100 Maldives							0.741
101 Jamaica	0.686	0.689	0.690	0.713	0.728	0.744	0.736
102 Cape Verde			0.589	0.627	0.578	0.709	0.736
103 Salvador	0.595	0.590	0.611	0.653	0.692	0.716	0.735
104 Algeria	0.511	0.562	0.613	0.652	0.672	0.702	0.733
105 Vietnam			0.590	0.620	0.672	0.711	0.733
106 Occupied Palestinian Territories							0.731

Source: 2007/2008 Human development report.

The International Rating Agency “Standard & Poor’s” assigned the following sovereign credit ratings for Belarus: long-term foreign currency rating “B+”, short-term foreign currency rating “B”, long-term national currency rating “BB” and short-term national currency rating “B”. In the process of assigning the rating, the Agency identified the following key factors which effect the ratings assigned for Belarus most: stable high economic growth rates, low level of national debt, country’s substantial economic potential, progress in curbing inflation, high living standard of people among the CIS countries and also availability of skilled labor. It is noted that the Belarusian economy is one of the most developed among the countries in the “B+” category.

However, despite the progress reached, as far back as the beginning of 2007, a growing share of the import component in the manufactured products and low research intensity of production in addition to the energy/food price rise outweighed economic performance, thereby reducing the share of added value in the Belarusian products. Notwithstanding a favourable foreign trade situation and substantial export growth – more than 1.5-fold – a stable trend in the trade balance deficit growth has emerged (see for more details in Section 9), which eventually influences the inflation level and exchange rate of the national currency. In December 2008, consumer prices reached the level of 113.3% vs a similar period of 2007 and the industrial producer price index – 114.2%. As the pressure was building up in the global financial system, 742 Belarusian businesses operated at a loss, while 52.3% enterprises of the total profitable industrial enterprises have profitability less than 10%, i.e. lower than a credit rate.

Insufficiently high production efficiency in addition to growing “import intensity” of products necessitated heavy crediting of enterprises – more than half of them (54.7%) has overdue accounts payable. The increased import had to be compensated by growing foreign credits of enterprises and external debt. Over six months of 2008, Belarus’ external debt increased 1.5-fold, i.e. from USD 9.2 billion as of 1 January 2007 to USD 14.1 billion as of 1 July 2008. It is noteworthy that short-term liabilities make up more than 60% in the external debt structure. While short-term liabilities of the banks increased by 42%, long-term liabilities – by mere 15%. The amount of foreign currency loans of the state-owned enterprises increased by Br 167 billion in equivalent vs a relevant period of the previous year, while the amount of their troubled loans increased 5.4-fold.

Nevertheless, even in the following months the production growth rates were maintained above 10% level due to increased capacity utilization and, in part, due to rise in prices for Belarusian export (this factor contributed to 80.5% growth in export) making up nearly half of the GDP. That was done for the sake of achieving a strategic objective, i.e. to increase the population’s income, since increasing the population income is not only an objective of the entire economic system, but also

a condition for its efficient performance. In this context, the government of the Republic of Belarus rather efficiently capitalized on benefits offered by favourable trade with Russia and other countries to substantially increase real wages. In its turn, increase in wages stimulated expansion of domestic demand which promoted development of services, agricultural and construction sectors. The share of a disadvantaged population reduced from 41.9% in 2000 to 11.1% in 2006. The Gini index was 0.262 – a moderate indicator of the household income inequality [3].

The issue of theoretical discussions of income structure levels has a number of aspects characterizing interrelations and regularities.

“Money is a vile intermediary”, F. Castro said.

“Money”, young K. Marx wrote, “... is a universal disorder and displacement of all things, an inverse world, confusion and displacement of all natural human qualities” [4]. However, no one has ever offered and arguably would invent something more ingenious to stimulate production and productivity growth and for satisfaction of people with results of their labor. In Cuba, Che Guevara together with Castro promoted application of moral incentives when they specifically had found that Cuba could not simultaneously progress in the spheres of consumption and increased investment in production [5].

According to some statements China has managed to maintain a stable production growth over nearly 20 years not based on moral incentives, but owing to low wages which increased at a far lower rate than labor productivity. Undoubtedly, a “Chinese phenomenon” will be an example for imitation and admiration and for thorough exploration by academics and politicians for many years to come. A system analysis of development of macroeconomic global processes allows for a presumption that the life of this phenomenon cannot be very long. Rather high energy intensity of the GDP, a trend in convergence of rates of productivity and wage growth and holding ground in the markets – these and other challenges are seen and are being adequately responded by the Chinese leadership.

This turn from description of the money role and worthlessness of moral incentives only and authoritarianism has been made

because a foreign experience cannot be copied by other country one to one.

However, the problems are available which need to be resolved within a short-term period, since the Belarusian economy reached a full-employment status. A growing demand of the real sector of economy and services sphere for skilled labor resources indicates that there is a need to a) develop a package of measures to efficiently utilize them and b) form an environment to stimulate innovative thinking (creative consciousness), promote an “education for a lifetime” system and develop projects of the innovative competitive business.

Primarily, it is a matter of shortage of the skilled personnel required for the innovative economy – skilled designers, technologists, engineers, etc. The economy faces a shortage of labor in the construction, agricultural and medical sectors. A comparatively new phenomenon has emerged – virtual emigration – which is characteristic of highly skilled specialists, namely, scientists, programmers and designers. Without leaving Belarus, they fulfill individual foreign orders, while financial flows are difficult to monitor.

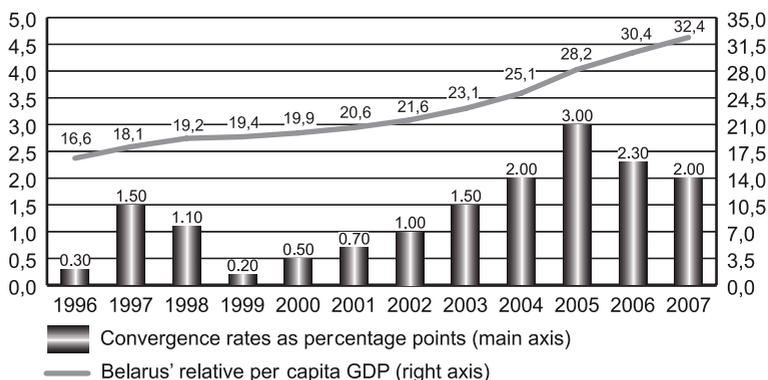
One of the primary causes resulting in such a situation is that Belarus lags behind the CIS countries in rates of growth of nominal and real wages and real household incomes and yet more in growth of household incomes in the currency equivalent. In the mid 2008, the wage level in Belarus (USD 396) was lower 2-fold than that in Russia (a year ago – 65% of that of the RF), 2.4-fold lower than in Lithuania and 3.3-fold lower than in Poland. It is noteworthy that Belarus lags behind Russia, Ukraine, Kazakhstan and other CIS countries in rates of wage growth in the dollar equivalent.

Now that the EU and Russia are vigorously attracting labor from abroad, unsubstantiated wage differentiation based on educational and qualification characteristics also poses a potential threat: the wage level in the spheres of public healthcare (Br 698 ths), education (Br 634 ths), culture (Br 658 ths), science (exclusive of sectoral designing institutes) is 1.5–2-fold lower than, for example, in construction (Br 1,081 ths) and transport (Br 971 ths). Uncompetitive wages result in labor outflow from the country and official employment

sphere. Formally, there is no record of nearly 1.0 million people of the working-age able-bodied population – actually 20% of the country’s labor resources – as employed or students. Given an average labor productivity, this equals Br 15 trillion earned in the “shadow” sector of economy or abroad.

Lagging behind in income growth is closely related to the reduced rate of convergence of the per-capita GDP in Belarus toward that of the developed countries. In 2007, the rate of convergence reduced to 2.0 percentage points a year, i.e. 1.5-fold vs to 2005 rates. Given such a rate, it would take not less than 34 years to converge toward the West-European countries, i.e. this convergence is likely to occur not earlier than 2041 and toward the USA – in 2053 (see Fig. 2). Therefore, we believe that setting the GDP growth targets should take into consideration not only previous GDP dynamics, but also rates of development of other countries for the purpose of converging toward economically developed countries in foreseeable future.

The crisis aggravates this problem by posing a threat of unemployment growth, with this indicator being one of the lowest in Belarus among other countries – 1%. Employment and economic activity should be maintained by expanding state investment programs and also housing construction crediting.



Source: authoring based on IMF data.

Fig 2. Belarus’ per capita GDP vs West-European countries, %

This measure is a standard recipe which J. Keynes formulated as follows, “In the years of crisis, build, build even pyramids”. To expand financing investment programs not requiring substantial import, the budget should be adjusted by restraining wage growth by labor productivity growth rates as well.

Strategically, this problem may be solved by changing to innovative way of development and restructuring the economy.

It should be reminded that as far as in June 2004, the Head of the State addressing the ongoing innovation policy seminar of administrative officials of national and local authorities in Vitebsk identified the innovation activity as one of the priorities of the Belarusian economy development. Promotion of the innovation activity was stipulated in the Program of Social and Economic Development of the Republic of Belarus for 2006–2010 and in Resolutions of the I Congress of Scientists of the Republic of Belarus as major program guidelines. The country has approached a new stage, a new paradigm: from the economic growth toward economic and social development when research and innovation activities turn into not “one of”, but the major system-forming factor of social development. The modern economics consider this as a new classification of stages of development: from industrial to postindustrial and then to knowledge-based economy through an information society.

This fully conforms to modern trends of the global economy, primarily, to processes of forming a “new economy” and involves establishment of a self-developing system, with an intensive flow of innovations and a high degree of responsiveness of the public production to them being a condition of its safe existence.

Like all ideal models, the model to be explored requires tremendous efforts to be translated into life. The model is being developed in a rather complicated foreign economic environment. As yet inadequate rates of the Belarusian economy modernization may fail to provide backing by the increased output of domestic goods and services for the higher household incomes. It may turn out that the scope of innovative efficient technologies would be insufficient and as a result, the cost (expenditures) would be reducing at a lower rate than the rate of deterioration of foreign trade terms.

Therefore, the current state of the Belarusian economy may be assessed as complicated for the manufacturers with a changeable business environment. A classic transition period implies complete freedom of business activity. In our case, it should be underlined, that the state sets rates of growth in the output, employment, inflation and social indicators, while the state does not fully accept responsibility to systematically support the material production as it was the case in the FSU. The Government, realizing that efficient performance of the economy in such an environment is problematic, takes actions to financially support specific manufacturers and also to implement a number of state development programs.

The current situation cannot last too long and requires the change-over from a mobilization management model to a more scientifically substantiated state economic management in terms of content and more tuned in terms of tools. What is meant by this?

Currently, Belarus operates actually a planned economic management system, however, in its down-sized version. Gross production growth targets calculated using a current base are set for the enterprises, which is the worst of available planning techniques. Neither material, labor and financial resources, nor sales markets are stipulated in these plans. We proceed from the assumption, being to some degree true, that production relations are established, proportions are defined by “life” and there only remains to increase production. However, even the Soviet planning, specifically during the years of development of the centralized economy, was founded on scientifically substantiated, adjusted sectoral and intersectoral balances and on matrices of interaction of the “input” and “output” of sectors, regions and also the economy as a whole with the rest of the world. Today, this experience is lost. As a result, the enterprises having worn-out equipment and the fixed number of employees are tasked by the government to achieve target output, while it is the business of enterprises to sell their products wherever possible and at the government-set prices. At that time when not only production, but also consumption was planned, the situation was somewhat under control. Currently the input and output prices are dictated by the world market and the quality – by transnational corporations.

This matrix as requiring frequent and prompt intervention of state officials, the actions of whom are prone to subjectivity, is likely to be cardinally reformed. This assertion is based on the assessment of capacities of the state, the potential of which objectively reduces during transition to the open economy and world prices.

What is suggested? Not rollback to total regulation or withdrawal of the state from economic regulation, but reacquisition of skills of scientific forecasting and planning. This assertion, to some extent, is based in the positive experience gained by a number of economically developed countries and big corporations when calculation of major macroeconomic proportions should encompass all stages of production and distribution and be accompanied by change-over to economic stimulation to achieve these proportions. The state sector of the Belarusian economy, which is still dominant, should be tasked with achieving a strategic goal of production renovation and development of new capacities through direct financial involvement and tight control of modernization processes by the state. Mechanisms of healthy competition and market pricing should be activated in the private sector, the significance of which should rapidly grow subject to Dèng Xiǎopíng's strategy – “one country – two economies”.

From force of circumstances, modernization of economic mechanisms and liberalization of the economic system in Belarus will take place amid the global economic crisis. At first sight, this gives grounds to opponents of reforms to hamper them in any possible way upon the pretext that it is necessary to wait for more enabling environment to emerge, etc. However, the “more enabling environment” has already been missed – the foreign economic conditions, both in terms of relations with Russia and in terms of prices for our export goods have never been so favorable for Belarus like over the recent 5 years. However, this has not inspired the functionaries to reforming exploits or to more or less radical managerial innovations. This is proved by the statement made by S. S. Sidorsky, Belarusian Prime Minister, at the sitting of the Presidium of Council of Ministers 26 November 2008, “We have missed many important offers. The time decrees that you should intensify your activities to attract investment. We shall not survive without investments

and without new production facilities. We might achieve multifold progress compared to what we have today”. He also expressed his opinion that it might be reasonable to “abandon indicators” and not to tie production only to purely statistical execution. “Let’s embark on this path: we shall be constructing, otherwise we may beat about the bush for years, defer modernization and record indicators”.

All economic theories prove that crises indeed form conditions for “shocking” an economy, restructuring some of its elements and renovating a technology infrastructure and economic structure. It may be argued that by virtue of some factors specifically Belarus would be affected by the global “tectonic movements” to a lesser extent compared to other countries. This is true, but Belarus is an integral part of the global economy and it will be integrating into the global economic relations at an ever increasing scale. Therefore, this would also entail stronger interdependence. However, this does not necessarily mean that we should strictly follow the suit of other countries in managing the crisis and modernizing the economy.

It is a very delicate point the significance of which ensues from understanding the theory of “weak actions” dealt with in the first Sections of our study and which reads that even not very strong actions can bring a system into absolutely new state corresponding to requirements of the environment. We work in the environment of the socially oriented market economy formed over 13 years and approved in principle by the nation. It is characterized by multiple specific features distinguishing it from market economies of the developed countries which have been evolving for centuries and even from more close to us socially oriented models of Scandinavian countries. Despite “here and now” existing realities and traditional tendency of Belarusians to gradual and “soft” innovations in management and not to abrupt avalanche-like reforms, some recommendations to maintain stable development rates being paradoxical at first sight are selected.

What is the difference between our recipes and proposals worked out by economically developed countries?

Firstly, standard recommendations amid crisis include labor redundancy and reduction in wages. Our strategy involves

maintaining employment, industrial potential and continued income growth due to the above reasons: the new economy requires the best specialists. One should take a philosophical approach to increase in wage differentiation, also within the framework of one sector, that would allow more efficiently-run enterprises to focus all best resources, including intellectual and professional, to achieve stable competitive advantages and compensate low output of more poorly performing enterprises through the efficient operation of the former. As regards payments to the budget, they will be more guaranteed, since, as a rule, “bad” enterprises have problems in paying taxes or are entitled to tax privileges. Increasing the share of remuneration of labor in total production costs, while reducing material and energy intensity of the production may be identified as one of the priorities by the managers of enterprises and be subjected to the governmental control.

Secondly, the trend toward enhancing the state economic regulation is observed worldwide: banking operations and rating agencies are put under control, big companies are nationalized, etc., while Belarus has embarked on economic liberalization, and the Head of the State repeatedly stressed that it was a strategic policy. Out of two conceptual foundations of the social and market economy – “strong market – strong state” we have only the latter in full. However, even the strongest state has no capacity to efficiently manage all economic agents and operations in the country, particularly when an initiative and creative entrepreneurship become a decisive factor of the development. Indeed, untightening regulatory functions of the state opens up new vistas for activity not only for genuine innovators, but also for such “entrepreneurs” like Ostap Bender. However, after all, the degree of confidence the state places in its people and mentality of the functionaries as to who prevails in the Belarusian nation – creative people or swindlers – define the degree and tightness of regulation. The answer is clear for us: the Belarusians have been always law-obedient and demonstrated an initiative. Suffice it to remember the Belarusian self-financing experience and the Belarusian experiment in the construction sector in the 1980s. The state is exclusively responsible for monitoring and control to allow only good faith foreign partners to make business in the Belarusian economy.

The liberalization course has been embodied in the Plan of priority measures to liberalize conditions of economic activity in 2009 approved by V. V. Makei, Head of the Administration of the President of the Republic of Belarus, and S. S. Sidorsky, Prime Minister of the Republic of Belarus. It provides for more freedom for enterprises and softer state regulation of the real sector of economy. It suggests that free pricing should be expanded. However, the prices will be regulated with respect to specific socially significant goods and monopolists' products. It is a right stand. It also provides for reduction in the tax burden of enterprises: allocation of taxes to the national fund for the support of agricultural producers and local special-purpose taxes paid from profit, including transport special-purpose tax for replacement and renovation of the public transport are to be abandoned.

Some of the above measures are already provided for in the draft forecast of social and economic development for 2009: the rate of tax to be paid to the national fund for the support of agricultural producers is to be reduced to 1%; uniform rates of local retail sales tax and local services tax are set at the level of 5%; an active part of the fixed assets is excluded from the real estate tax unit; 12% income tax from natural persons is to be charged subject to a linear (uniform) rate of this tax.

One of the most important lines of economy modernization is to promote small and medium-sized business. Further measures are to be taken to reduce administrative barriers and streamline administrative procedures, shorten the list of activities requiring licensing and provide a wider access to credit resources. Proposals to improve lease conditions provide an opportunity for small and medium-sized business entities to buy out premises to be leased for 3 and more years at a balanced cost, etc. Denationalization and privatization in Belarus and other measures are to be intensified. As predicted, these measures would result in increase of the share of small business up to 18.5% of the total revenue from sale of goods and services in the national economy in 2009.

The main goal of the economy modernization is to enhance competitiveness. Besides, by "modernization" should be meant not only implementation of advanced technologies and equipment,

but also mainly modernization of economic institutions and organizational and economic mechanisms.

Thirdly, a generally accepted approach to counter reduction in the economic activity is to expand access to credits by reducing interest rates. This is what specifically was done by the US Federal Reserve System and EU Central Bank in November 2008, while the National Bank of Belarus somewhat *increased* the credit rate. It would seem that this contradicts to a “classical” behavior of the Central Bank amid economic recession. However, this decision reflects an optimal approach to ranking priorities between the goals of curbing inflation and expanding an investment resources base. The experts are quite right in saying that the main reason due to which the Belarusian economy has not been actually directly affected by financial crisis is its minor involvement in global capital flows and stock market. However, contrary to western financial institutions the resources of which are formed predominantly by financial funds, insurance companies and corporate assets, the household deposits make up a larger part – nearly one third – of the Belarusian banking system’s resources. Retaining them means to avoid a collapse of the financial system.

It is noteworthy that the global financial crisis sweeping the material production sector leads to depreciation of currency and import of inflation to Belarus. Therefore, positive deposit interest rates should become one of the major measures to prevent an outflow of money resources from deposits and weakening of the banks’ financial base.

As far back as August 2008, the reduction in economic entities’ resources deposited with Belarusian banks began and the banks lost 6.5% of the total amount just in October, while the Belarusian households did not surrender to panic: in October, the resources deposited by natural persons in banks reduced by mere 0.8%, moreover, as the National Bank reported, that reduction was mainly due to fall in the euro exchange rate and reduction in the amount of deposits in euro denominated in Belarusian rubles.

Whatever the case, the Belarusian economic entities and households withdrew Br 830.4 billion from the banking system in October 2008, while an average monthly increase

in these resources amounted to nearly Br 490 billion over nine months this year.

Under these conditions, the Belarusian model's strength which the Western experts considered to be as the "violation of a generally accepted practice" – a high degree of cooperation between the Belarusian President, National Bank and Government – played a decisive role. These concerted actions have resulted in adoption of a number of normative legal acts to enforce state household deposit guarantees, prevent an attempt to revoke right of depositors to terminate long-term deposit agreements, reduce standards of reserve requirements for the banks and the standard of a fixed part of reserve requirements. In addition, direct losses and short-received deposits were compensated by the National Bank which as far back as August 2008 began to gradually increase the resources provided for the banking system and added Br 1.3 trillion all at once in October 2008.

All this enabled the National Bank to set as a key target of the monetary policy in 2009 further stabilization of the national currency. In doing so, the National Bank, we believe, absolutely justifiably pursued the policy of pegging the Belarusian ruble to the currency system. This system should include foreign currencies having the largest share in the country's foreign exchange market and forming a nominal real effective exchange rate of the Belarusian ruble. This would enable to more flexibly and deliberately respond to fluctuations of exchange rates of key world currencies, smooth fluctuations of the real effective rate of the Belarusian ruble reflecting stability of the national currency external value and enhance flexibility of Br exchange rate to dollar fluctuations of which are assessed in the range of plus/minus USD 5.

On the other hand, we are of the opinion that a regulation needs to be put into effect with respect to foreign depositors requiring to invest capital for a specific term (minimum for 6 months) to shield the Belarusian currency, credit interest rates in which exceed foreign ones multifold, from speculative attacks.

We believe that an innovative idea of change-over to the Russian ruble in trade settlements with Russia in the monetary policy and establishment of a new zone of a strong regional

currency should be put on the agenda. The financial crisis results in the reduced effective demand for the Belarusian products, primarily, in the key Russia's and Ukraine's markets accounting for nearly half of the Belarusian export. Therefore, the year when even Soros announced the "end of the era of the dollar" it would have been more consistent and logical if two Union states had discussed at the negotiations that "the gas would cost not USD 120 or USD 150", but, for example, Br 3.000. There is a need in pursuing a more coordinated policy by the RF Central Bank and RB National Bank.

It should be reminded that the 1998 RUR devaluation reduced the Belarusian export to Russia by one third and the export volume was restored only five years after. Slump of the Belarusian export to Russia will depend on the degree of RUR devaluation by Russia and on the rate at which the resources poured into the Russia's banking system reach the end use. Therefore, change-over to settlements in RUR (ruble pool) is possible, provided that the RUR is strong. Guaranteeing this for Belarus implies a fixed price for gas in the Russian rubles for a period of at least one year.

Amid the reduced export demand, the devaluation which automatically increases the price competitiveness of the export products is considered to be a standard technique in the world practice to stimulate export. However, we share the opinion of M.M. Kovalev stating that in our environment, "Due to extremely high import intensity of the Belarusian economy, this measure would not result in the expected effect, except a social explosion (loss of ruble deposits, dropping wage in the dollar denomination and problems of repayment of currency loans)". And this is true, indeed, since according to the Bernanke-Gertler model an abrupt depreciation of the currency triggers a self-evolving crisis for an open economy. The devaluation is dangerous both in Russia and in Belarus for enterprises and households – the former obtained multiple loans for modernization, while the latter – USD credits for purchasing houses, cars and other consumer goods. In addition, those who placed confidence in the national currencies and saved money on deposit accounts will be the losers.

Moreover, the scientist believes that Belarus will not be able to counter a profound devaluation of Russia's and Ukraine's

currencies – our main trade partners – since this would lead to further rise in prices for Belarusian products in these markets. “Therefore”, M. M. Kovalev proceeds, “if the financial crisis in Russia is not stabilized and a decision on a profound RUR devaluation is taken (more than 20% vs dollar-euro basket), it is necessary just now to state that the Br exchange rate should be pegged to that of Russia within the framework of the ruble pool and be ready to simultaneously devalue it vs RUR, if the situation decrees”.

To hold and expand positions of Belarusian exporters in the Russia’s markets, the Belarusian banking system should more efficiently use modern tools for export financing: various forms of letters of credits are rather more efficient tools to stimulate buyers and guarantee revenues, than, for example, a ban on prepayment of import deliveries. There is also a need to cardinaly simplify the procedures for and reduce the term of VAT refunding to Belarusian exporters.

From our perspective, an extremely important factor in terms of maintaining competitive advantages is implementation of provisions of the economy modernization program stipulating flexible pricing for enterprises to sell export products for currency. On the one hand, it is the right to independently form prices for new products to maximize the exporters’ revenues. On the other hand, it would be reasonable to provide for flexible pricing (including cost recovery), provided that export is paid in currency, for most problematic and low-profitability markets with a tight competition, with Belarusian exporters operating in the majority of such markets.

Simultaneously, there is a need to further harmonization of the Belarusian banking system with international standards developed by the Basel Committee on Banking Supervision and other international financial institutions, including standards provided for by the Basel II Capital Accord, improvement of principles and tools of the banking supervision, change-over to a financial accounting complying with the international principles and standards of financial accounting.

Like in the economy as a whole, these processes imply new steps toward legislation liberalization: change-over from administrative to registration procedures for effecting currency

transactions by residents to buy shares, a share in the authorized fund or real estate by residents from a nonresident based in the CIS member state; opening accounts with the banks of the CIS member states by resident natural persons for performing transactions not related to the entrepreneurial activity.

Given the forecast 110–112% GDP growth and change in other factors of the demand for money in the economy related to further modernization of the economy, higher profitability of investment projects and involvement of new production assets into the market turnover, the Br monetary expansion is estimated to be 32–40% in 2009. The broad money expansion is estimated to be 32–30%. The Belarus' international reserve assets in the national definition are to be increased by nearly USD 2.25 billion.

In 2009, key lines of the banking system development would include expanding the market of various banking services, improving their quality, offering new operations for the clients and further introducing state-of-the-art software and hardware.

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Economic theory of state management

The issue of the economic theory of social and economic planning and forecasting at the current stage deserves in-depth exploration.

Findings of scientific analysis and theoretical apprehension of the problem in question are discussed in the works of Belarusian and Russian scientists (P. G. Nikitenko, V. G. Gusakov, S. P. Tkachev, V. N. Shimov, A. N. Tur, S. S. Polonik, S. Yu. Glaziev and others).

Though adequately studied, there exist only particular theoretical and methodological approaches to the concept of development of the Belarusian economy. Due to a strong state power, these elements are not in contradiction with each other, but weakness of some of them impedes the development of the rest, that is why an integrated and long-term system is required.

It is generally recognized that a planned approach as a core of the administrative-command system has worked itself out in the mixed economy.

However, even a purely market economy based on demand and supply has also demonstrated its inefficiency by multiple market failures, defaults, shocks and even civil turmoil. It is not possible to offset such cataclysms using exclusively the market environment amid the global competition.

Reasonable synthesis of elements of plan and market approaches which proved their efficiency in practice is required. The economic theory should suggest in the near future a complete concept of a system, including techniques for forecasting, planning and creating incentives and a legal environment for development of the society, state and individual. There is a need to integrate separate elements of the economic theory, prove its practical efficiency in performing a key function

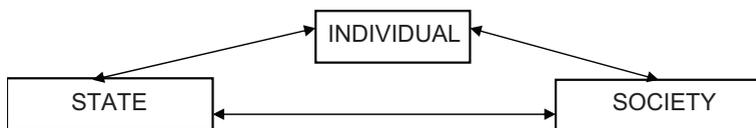


Fig. 1. Key elements of socio-economic system

of the state – guaranteeing national security and decent standard of living for citizens (Fig. 1).

A socio-economic system may be stable (like a pyramid), provided that, firstly, it ensures a comprehensive interaction of all its key elements – the individual, society and state; and, secondly, the individual is placed on the top of the pyramid.

The forecasting and planning system developed in Belarus encompasses all planning horizons and comprises plans of development of both sectors/enterprises and regions (Fig. 2). In the first five-year period, this system was supplemented by an extremely critical element – priorities of the socio-economic development, and in 2006 – priorities of research and research-and-technology activity. Presidential Decree (N 315 of 06.07.2005) approved priority spheres of research-and-technology activity for the first time in the entire history of the BSSR and Republic of Belarus and the Council of Ministers’ Resolution (N 512 of 17.05.2005) – priority spheres of fundamental and applied research. Adoption of these system documents helped create the necessary environment at the governmental level to efficiently utilize the country’s scientific potential and establish new and maintain available markets of high-technology products).

The State Programme for Innovative Development of the Republic of Belarus for 2006–2010 is an important stage of establishing the state management system. This system must be complete and integrated, take into consideration international factors, a multidimensional economy, diversity of ownership forms and so forth.

Given an extreme openness of the Belarusian economy, even the most seemingly reliable partners demonstrate elements of unpredictability in their economic behavior (gas), the problem of formulating a strategy for developing the foreign

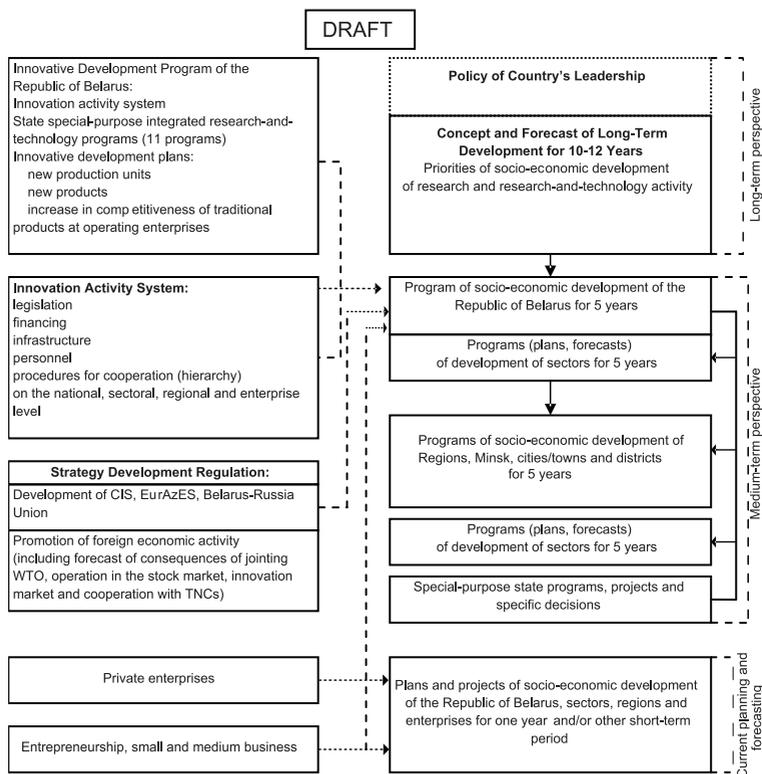


Fig 2. Forecasting and planning system of the Republic of Belarus

economic activity, including the forecast of implications of joining the WTO, operation in the stock market, in the world innovation market and cooperation with TNCs is especially acute. Such a strategy should make provision for different scenarios of foreign economic and political situation, while it should provide for a general strategy (but not common tactics) of a competitive struggle for all Belarusian economic entities and present our competitive advantages with respect to foreign partners. This is all the more important if we clearly realize that commodity international cooperation offers no great opportunities.

The state support has already triggered the process of exporting the Belarusian capital and Belarusian technologies and an environment is emerging for a civilized high-tech outsourcing through the High Technology Park.

The Head of the State has underlined that a specific formulation of the strategy for development of such integration alliances as the CIS, EurAzEC and Belarus-Russia Union is required.

The next element of the system is a result-oriented approach, which should be a through approach, function at all managerial levels and encompass all economic entities. The world and domestic experience has proved that only those economic entities which follow strategic plans in their operation may be competitive and successful in their business. Formulation and alignment of these strategic plans is prerogative and responsibility of sectoral ministries. But there exist specific circumstances requiring attention.

Currently, the ministers actually manage mainly sectors' state-owned enterprises. However, the private sector is also available and its share is increasing and will be increasing. In this case, the manageability should be maintained and strategic horizons should not be blurred. Given this, it is proposed to supplement the system with a new block. This approach is fundamental for improving the sectoral management. Setting plan targets for private enterprises is not in question. The state forecast and sectoral strategy should include incentives and conditions for developing the entire business along the required strategic line.

In this case, the private enterprises like the entire entrepreneurial corps, small and medium-sized business will benefit, indeed, if they are competently integrated into the entire strategic management system. Opportunities for an extensive access to the country's intellectual resources, vision of perspectives of the scientific and technology development of the sector's in which they operate and, hence, demand perspective, and, ultimately, opportunities to receive state orders – these are only some of additional development factors. The entrepreneurs worldwide are well aware of this.

The State Programme for Innovative Development for 2006–2010 is intended to stipulate the methods of achieving targets set by the III All-Belarusian People’s Assembly and by the Programme for Socio-Economic Development of the Republic of Belarus for 2006–2010.

The Program may be conventionally divided into three lines. The first line is to establish new enterprises (production units) and launch absolutely novel products. It is planned to commission nearly 50 such enterprises (including 29 in Minsk Region, 7 in Brest Region, 6 in Gomel and Vitebsk Regions each, 4 in Grodno Region and 2 in Mogilev Region). It needs to be pointed out that over 80% of them are to be established by implementing domestic research and technological developments.

The largest projects of such a high-tech level are to include establishment of production facilities for manufacturing seamless hot-rolled tubes, high-productive grain combine harvesters, development of submicron technologies for production of 0.5–0.35 μm devices, construction of a newsprint mill in Shklov, bleached pulp mill in Svetlogorsk and a number of important chemical and construction materials facilities. It is planned to commence the preparatory works for the construction of a nuclear power plant in 2007.

The National Academy of Sciences of Belarus (NASB) plans to launch small-tonnage production of pharmaceutical substances and officinal drugs. Agrarian biotechnological selection centres and other production units of the V and VI set-ups of technology are to be established.

The second Program line is to commercialize innovative products by implementing advanced technologies at the existing enterprises. In total, 350 new production units are planned to be established in Belarus, out of them, 90% – by implementing domestic scientific work results. By the way, it is a definite answer to the question of the R&D efficiency.

The above facilities would include production of new state-of-the-art caterpillar tractors (Minsk Tractor Works, USD 40 mln); a new family of MAZ – 6430 trucks and Euro-3/Euro-4 coaches (USD 256 mln) and new perspective mine dump trucks at the BelAZ plant, including 320 ton-capacity trucks.

The third line – high-tech – is to be based on implementation of advanced technologies to encompass 826 enterprises throughout the country.

The Programme additionally comprises three levels: sectoral, regional and facility levels, thereby encompassing actually all economic entities. Inasmuch as the problems of the innovative legislation, innovative infrastructure, finances and personnel support are being addressed, the innovative system of the country as a whole and in a finalized form is in question.

The implementation of the National State Innovation Development Programme of the Republic of Belarus for 2006–2010 would result mainly in as follows (Fig. 3):

- creating an enabling legal environment and a new innovative infrastructure to support the innovation activities;
- introducing new mechanisms of motivation and incentives and also developing the information support of innovation activities (electronic innovations exchange, technology transfer centres, etc.);
- improving intellectual property management;
- increasing innovative products output and the number of innovationally active enterprises;
- modernizing the economy by using advanced technology concepts (establishing new enterprises (I level), in total 54 in the country, out of them 7 – by implementing foreign technologies and 47 – by implementing domestic technologies); establishing new production units (by implementing advanced technologies) at the existing enterprises (II level), in total 234 in the country, out of them 21 – by implementing foreign technologies and 213 – by implementing domestic technologies); modernizing existing production facilities by implementing advanced (novel and high) technologies (III level), in total 826 in the country).

Once the above plans are implemented, the country would make a huge leap forward in the development capitalizing on a fundamentally new scientific and technological basis.

The primary target of the Belarus-pursued policy is to improve the quality of life of the nation. This may be embodied in three dimensions as described hereinafter.

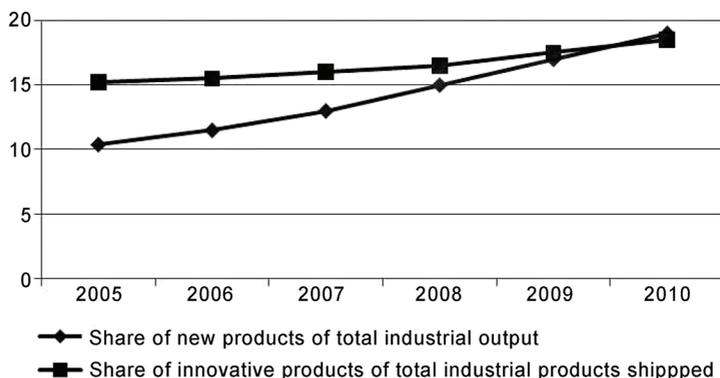


Fig. 3. Main indicators of innovative development of the Belarus' economy in 2006–2010

The first dimension is embodied when the individual actually possesses (or does not possess) the most important attributes such as high quality of health, diet, cloths, housing, servicing sphere, environment, personal security, rights and freedoms, purposeful work, communication and leisure and accessibility to cultural values. This is an aspect of the present. The second embodiment of the quality of life is confidence (lack of confidence) in realizing aspirations and goals. This is an aspect of the future. The third dimension which we underestimate is to maintain the most precious and important recollections and impressions for an individual (this is an aspect of the past). Specifically the unity of these three embodiments makes the quality of life real and highly valuable for the man.

Realization of the principle of the current five-year period – “state for the people” – primarily implies that the main value target of the state’s activity is the individual, his/her development, well-being and security (Fig. 4).

Actually, the state policy also pursued this objective in the past. Contemporary Belarus has pursued this policy over the recent years. However, currently this policy has acquired a new dimension. The national economy and state institutions are developing sustainably and dynamically.

However, not only the state should care for the well-being of its citizens.

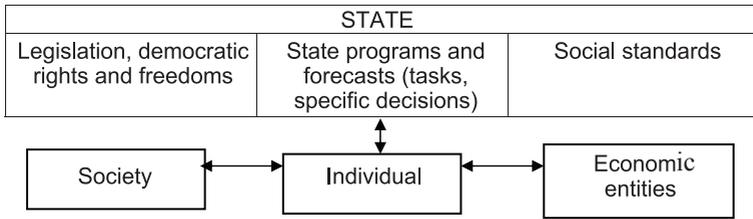


Fig. 4. “State for the people” principle diagram

Undoubtedly, achieving a new quality of life (as it is comprehensively understood) of the Belarusian citizens depends to a great extent on appropriate environment to be established by the state, while the need to independently improve well-being – both his/her own and his/her family – should be gradually instilled in the consciousness of the people and individual. Each citizen should be responsible for active involvement in the state and economic construction.

Stability in the country cannot be maintained exclusively by developing the material production sphere. A social component which is primarily characterized by the level of development of civil society institutions plays an important role in this process.

The civil society, being a system of relations of non-governmental institutions, is a certain social space in which various needs of individuals are satisfied and private interests are realized.

The civil society institutions are involved in addressing the problems of self-government, self-organization of the socium and are necessary for a law-governed state.

It should be noted that the idea of cleavage between the state and civil society is widely-spread and dangerous, in our opinion. It would be more correctly to deal not with cleavage, but with delineation and differentiation. Each individual is simultaneously both a natural person and a citizen of the state. These two hypostases in one individual are interimplicated and integral, while they are different, are not identified with each other but supplement each other. Therefore, an interaction between the state and civil society should be founded on the principles of cooperation and not confrontation, which is

frequently advocated by the opposition. Contraposition is counterproductive and harmful.

The state and civil society have a different nature, a status, a structure and a function. A key internal function of the state is to maintain a social and political stability in the society and serve the common good. The state seeks to act as if not the only, but at least a chief arbitrator in the collision of political interests. Its task is to prevent aggravation of social conflicts and to settle them peacefully, if possible.

The civil society is an independent sphere in which various needs and interests of people – economic, social, political and spiritual – are realized. Can all these problems be addressed separately? Most certainly – no.

With regard to the above, it is reasonable to pay attention to the following facts. The middle class is the basis of the civil society in social terms. This large and active class softens severity of social stratification, cushions forceful actions from the side of “upper” and “lower” classes, prevents their direct confrontation and acts as one of the main guarantors of social and economic stability and social accord, since it is vitally interested in this. Specifically the state and society have created comfortable conditions of life and activity for it. The middle class is underdeveloped in Belarus and this problem requires an active input from the academic and managerial community.

Political parties and non-governmental organizations are an important component in the civilized interrelations between the state and society. The polls conducted by the Institute of Sociology in 2003–2006 demonstrate that confidence in the official trade unions increased more than two-fold over that period (from 14.5% in 2003 to 31.5% in 2006).

Confidence in political parties actually increased more than 2-fold (though from extremely low level – 4.7%), while the level of confidence in them in the Belarusian society is low and it cannot be stated that political parties have become determinant social institutions in building the civil society. The reason is extreme destructivism of political, specifically opposition leaders.

Over the recent 10 years, the current political authority has managed to unify the society, maintain and strengthen the country because it actually serves the people and relies on their

support. Objective prerequisites have emerged in the society and the time is already ripe to consider the issue to rally proponents of the idea of the “state for the people” ideologically, politically and organizationally.

Many Belarusians in all spheres and social groups have settled civil convictions and are real patriots. They have ideological accord, but they lack an organizational unity. This problem may be solved by establishing a political party. In our opinion, charted objectives and political aims of such a party should be founded on constitutional principles of building a democratic, law-based and socially just society and on the ideas of the III All-Belarusian People’s Assembly. This party should become not only a consolidating political force, but also the party of social justice and civil initiative.

No ruling party yet exists in its pure form in Belarus, when all offices are occupied by representatives of the party which won an election. However, the party control and party support (it should be underlined – not party caste of power) are needed. It is a long way to go for Belarus until appropriate prerequisites are established. It is believed that an organized and ideologically consolidated community of people having progressive views would not only actively contribute to efficiently addressing socio-economic and political targets and effect ethical and moral development of the society, but also provide some kind of an internal control over observance of ethic norms and maintain a party discipline in the party’s ranks.

The present knowledge-based period is characterized by ongoing complication of all social and political relations. In such a complicated environment, the President of the Republic of Belarus enjoys an absolute support of the Belarusian people, the policy of whom fully corresponds to requirements of the present time.

So far, the academic community has inadequately explored the significance of the contemporary history for the Belarusian nation, importance of the current period of the socio-economic development of Belarus, political, national, cultural, religious and other transformations in the Republic of Belarus in the context of the role of an individual in these processes.

There is a need to get rid of influence of destructive ideas with which mentality of a number of academics was lumbered

in the late 80s – early 90s, when Belarus was looking for new ways of state and economic development. Currently, Belarus has a strong and stable economic and political footing and a multiyear experience of the sustainable development, and the economic theory should not lag behind a real situation in the country, but instead suggest theoretically and practically adjusted recommendations for the state leadership and economic entities and identify and substantiate trends and regularities for further development of the nation and enrichment of world science.

Resource and Energy Efficiency: Essential Prerequisites for Competitiveness

Directive No. 3 of the President of the Republic of Belarus of June 14, 2007, titled "Economy and Thrift - the Main Economic Security Factors of the State" is a system-based document aimed at making the use of all types of resources from primary products, materials and fuel to finance, land and intellectual resources more efficient. In fact, the directive is a strategy for growing the factor productivity and, consequently, the competitiveness of the national economy. The accelerated execution of this document becomes increasingly urgent during this time of the global economic downturn sparked by the world financial and economic crisis and the growing price competition in many countries which used to be traditional sale markets for Belarusian producers.

To reduce production costs. The only way to save work teams, maintain the nation's industrial potential and ensure export growth is to pursue a system-based policy aimed at reducing production costs. In 2008 the material intensity of the Belarusian economy, which is calculated as a share of companies' intermediate consumption in the selling price without taxes on products, was at the same level as 20 years before (Fig. 1).

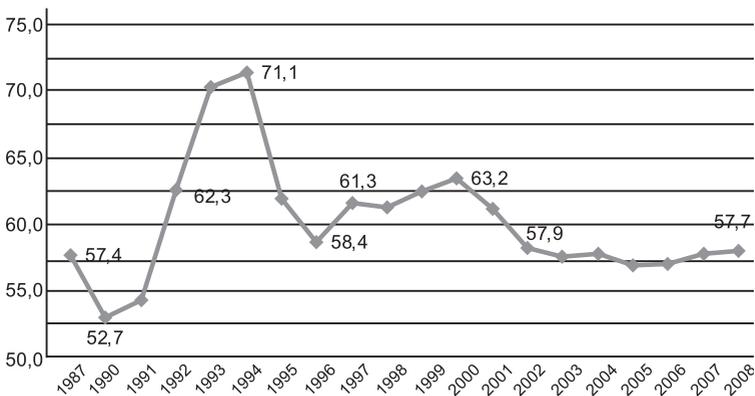


Fig. 1. Material intensity of the economy of the Republic of Belarus in 1987–2008

To reduce material intensity and imports is not an end in itself but a real opportunity to expand the share of domestic added value in products, which is a source of profits for producers, the population and the national budget. In addition, the reduction of the share of primary goods in the structure of costs can give Belarusian producers the room they need to make their prices more competitive, and thus contribute to national economic security both at the level of individual companies and the country as a whole. The structure of material costs of the Belarusian economy by element in 2006 and 2008 is shown in Fig. 2.

The reduction of imports in the structure of material costs is one of the priorities of the Belarusian government’s economic policy during this time of the world economic crisis. The current slowdown in economic activity in all commodity markets has triggered related price adjustments. Fig. 3 shows the price dynamics in 1992–1999 – oil, natural gas, coal, – measured as against one energy unit, a barrel of oil equivalent (bbl). The most expensive energy resource up until September 2008 was oil. In July 2008 it reached its price peak of \$ 133.9/bbl (Brent), but no later than in March 2009 its price was already \$ 46.9/bbl

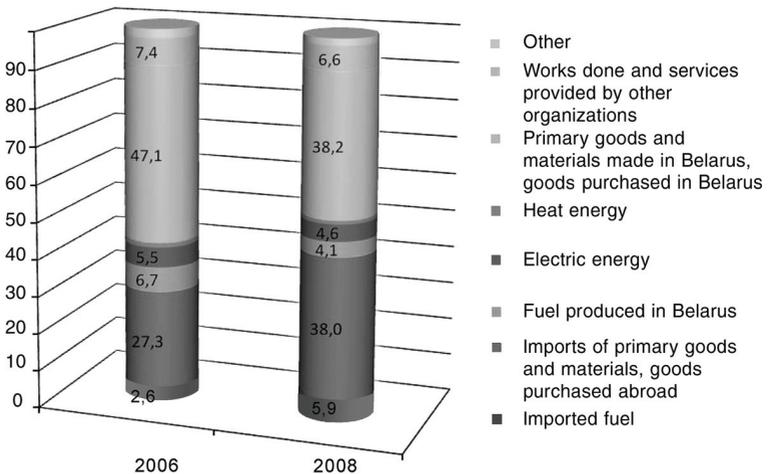


Fig. 2. The structure of material costs of the Belarusian economy by element in January-September of 2006 and 2008

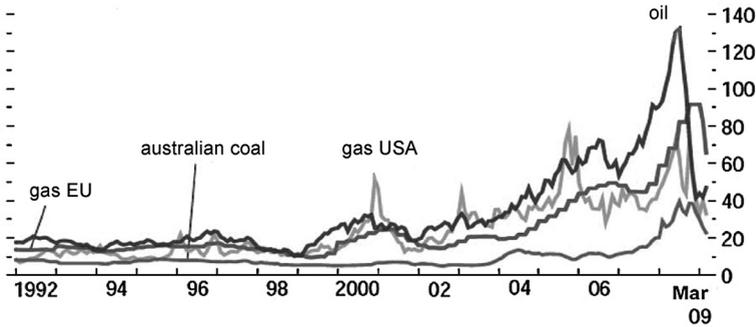


Fig. 3. Prices for energy commodities (in US dollars per barrel of oil equivalent)

(thrice as less) which proves there was a “substantial contribution” of the speculation factor to the spiral growth of oil prices in 2007–2008 (Fig. 3).

But here one should also take into consideration the fundamental factors shaping the balance of demand for and supply of oil in the world market. These are the low flexibility of demand for oil caused by the absence of substitutes of the oil products used in the transport sector, and a marked deterioration of the geological conditions of oil production in new promising oil fields.

To adapt the economy to energy shocks. The explosive growth of energy prices in 2007–2008 and their plummeting in late 2008 – early 2009 have pushed to the forefront the issue of resilience to energy shocks. An economy’s ability to adapt swiftly to changes in energy prices has become critical for national energy security and competitiveness.

Over the last 10 years (as against the level of 1998), Belarus’ GDP grew 2.05 times, while the gross consumption of energy and fuel resources increased by mere 7.1% (the energy intensity of GDP reduced by 48.0%). If we took the year 1996 for comparison (when the energy efficiency policy became a national priority in Belarus), the results would look even more impressive: once being among the group of the most energy intensive economies in the world, Belarus advanced to the middle group. But if compared with the average European indicators, we do see a significant room for cutting the economy’s energy intensity.

To see how much Belarus can reduce the energy intensity of its GDP and domestic demand for energy, let us take a look at the countries that are small in terms of population and similar to Belarus in terms of population and similar to Belarus in terms of climate conditions (according to data for the year 2006 provided by the International Energy Agency, Table).

Specific energy consumption indicators by

Nation	Gross consumption of energy resources, tce per capita	Electricity consumption thousand kW per capita	GDP energy intensity, tce / \$ 1.000 of GDP	GDP energy intensity against PPP, tce / \$ 1.000 of GDP against PPP
Belarus	2.94	3.32	1.42	0.38
Austria	4.13	8.09	0.16	0.13
Denmark	3.85	6.86	0.12	0.12
Norway	5.60	24.29	0.14	0.14
Finland	7.11	17.18	0.26	0.24
Sweden	5.65	15.23	0.18	0.18
Latvia	2.02	2.88	0.36	0.15
Lithuania	2.52	3.23	0.48	0.18

The specific per capita energy consumption in Belarus is slightly higher than that in the neighbouring countries (Latvia, Lithuania, Poland), but smaller than in Estonia and economically developed countries. Specifically, we lag far behind in terms of electricity consumption.

It is a well-known fact that energy intensity of an economy depends not only on the structure of the economy itself, but also on the structure of energy consumption by type of energy resources. Electricity is the most civilized form of energy which allows controlling the process of energy consumption with great precision and computerizing it.

A whole range of technologies featuring electricity (heating with high-frequency currents or in a micro-wave oven, etc.) makes it possible to reduce the loss of energy several times comparing with the use of solid, liquid and gaseous fuels.

In order to ensure economic growth in Belarus during this time of external energy threats and the world financial crisis, it is planned to reduce energy intensity dramatically, increase the share of electrical energy in the general structure of national

energy consumption, pursue a vibrant structural economic policy and raise specific energy consumption to the level of developed countries. The history of transitional economies shows that the contribution to the realization of the energy saving potential comes in the following proportion through a variety of actions:

- 20% – improvement of organizational mechanisms of encouraging energy saving;
- 50% – implementation of the latest developments in science and technology, efficient energy- and resource-saving technologies;
- 30% – structural reorganization of the economy and implementation of the economic mechanisms geared towards boosting the less energy intensive economic sectors, the services sector, etc.

A considerable effect that we have got from leveraging organizational and target-programme mechanisms of energy saving has enabled us to achieve a sustainable growth in the energy efficiency of the economy. The effect of the mobilization methods subsides over time, and they should be replaced with mechanisms of structural and technological policy and economic stimulation which are usually responsible for as much as 80% improvement in resource- and energy-saving.

Comprehensive scientific support. As a rule, to reduce the resource intensity of production, you need to go down the road of comprehensive technological modernization. It is a very science intensive and complicated task that can be accomplished provided there is comprehensive scientific support. The National Academy of Sciences can now provide this type of service to a concerned customer: from technological audit (including energy audit) to specific projects on a turn-key basis.

Nearly all the innovation technologies developed by the National Academy of Sciences of Belarus are resource saving (in 2008, 155 advanced production technologies were developed at the Academy, or 41% of the total number developed in Belarus; of these, 133 are new in Belarus, 19 are new abroad and three are fundamentally new), but the priority is given to large-scale innovation projects bringing a system effect and contributing to the export potential of the country.

Specifically, we are speaking about the modernization of foundries, metallurgical furnaces, thermal and galvanic manufactures. The Academy has put forward the solution to this

issue in Belarus, having acted as the main developer of the related programme and providing scientific support in the course of its realization. Our researchers have come up with technological solutions regarding the modernization of the three main types of furnaces used in the Belarusian industry: chamber furnaces, through-type furnaces and shaft furnaces. Nearly 70% of them run on natural gas and have the operation life of more than 25 years, and a total of furnaces used in the industry are more than 1,500 units. According to the estimates of researchers, there is a potential of a two-fold improvement in the energy efficiency of furnaces.

The prototypes of shaft furnaces featuring modern-day lining and heat-isolation materials, which were created at the Academy of Sciences of Belarus on the basis of the latest achievements of Belarusian and foreign scientific schools in the fields of thermal physics and metallurgy, make it possible to save up to 40% of natural gas, reduce the size of furnaces, ensure a ten-fold reduction in the mass of lining, shorten the period of reaching the designed operation capacity to 1.5–2 hours instead of the former 8–10 hours. The use of modern flat-flame, impulse or acoustic gas-running burners designed at the Academy ensures a better and fuller burning of natural gas and saves 10% to 15% of fuel.

A pilot turn-key project realized by the Academy jointly with JSC “Atlant” (Baranovichi Machine-Tool Plant) resulted in the achievement of a complete innovation cycle: from the initial idea and design work to modernization and sending in operation in 2008 of a 100-percent Belarusian-made production piece of a computerized thermal annealing furnace, to normalization of deliveries (Fig.4).

The modernized furnace is one of the biggest in size that are utilized in the country. The fulfilment of the project has resulted in a 4–5 time decrease in the factual consumption of natural gas during thermal treatment of metal (before the modernization it was 250 kg of coal equivalent per tonne and after it – 40–60 kg of coal equivalent per tonne), and the efficiency of the furnace for the nominal charge weight is 45–50% which meets the best world analogues. Equal effect can be obtained at other similar facilities in Belarus where through-type furnaces and shaft furnaces are used.

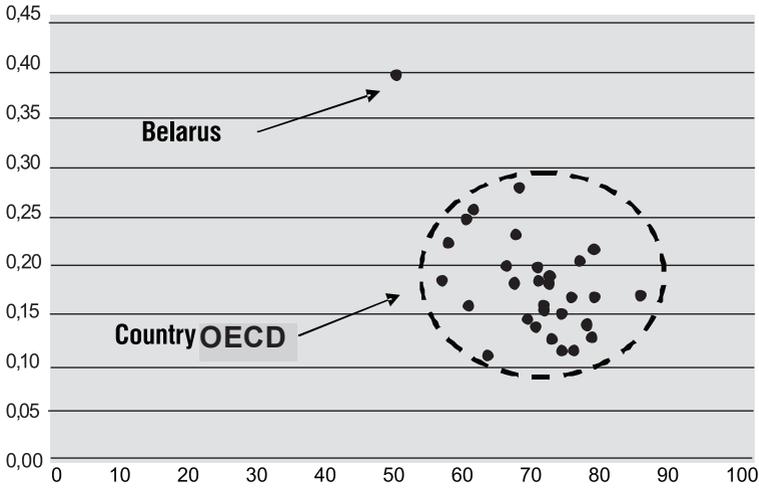


Fig. 4. GDP energy intensity as per the PPP and share of services in GDP (%), OECD member states (excl. Iceland), 2005

The modernization of the through-type furnace at the MAZ (Minsk Automobile Works) is being carried out by specialists with the Heat and Energy Research Institute. The designed efficiency of the furnace is over 50% and the specific economy per tonne of heated metal is 25.8 USD/t.

The technological solutions put forward by Belarusian researchers regarding chamber and through-type furnaces can be applied in modernization of shaft furnaces too. A company's objective here (which was successfully accomplished by JSC "Atlant" is to purchase the equipment and materials and carry out the installation work. The record of accomplishment at the JSC "Atlant", MAZ and Zhodino Blacksmith Factory makes it possible to apply this approach all across the country, and start to export the engineering services at some point in the future. For example, at JSC "Atlant" it is possible to set up one's own production facilities to manufacture Belarusian industrial furnace equipment. The markets of Belarus, Russia and Ukraine with their technologically advanced foundries and steel mills are very promising in this respect.

The light effect. There is another example organization of manufacture of LED products and its components, application of energy-efficient technologies in lighting systems. According to estimates of the International Energy Agency (IEA), the lighting sector is one of the most energy intensive due to the wide use of glow lamps. In these lamps as little as 5% of the electric energy consumed is transformed into light, while the rest 95% is transformed into heat. Besides, as a rule, the operation life of glow lamps does not exceed 2,000 hours. According to a larger estimate of the IEA, no less than 38% of all electric energy used in the world for lighting can be saved. Considering that other light sources (halogen lamps, sodium vapor lamps and luminous tube lamps) are not widely used in residential houses due to the inadequate perception of light by the human eye and their expensiveness, LED light sources are the best alternative to the traditional ones.

They are more efficient, reliable, sustainable, and their operation life ranges between 50,000 to 100,000 hours (between five to 11 years of non-stop performance). The world market of LED products is one of the fastest growing despite the global economic slowdown. The Academy of Sciences of Belarus has become the initiator, the customer and the main contractor

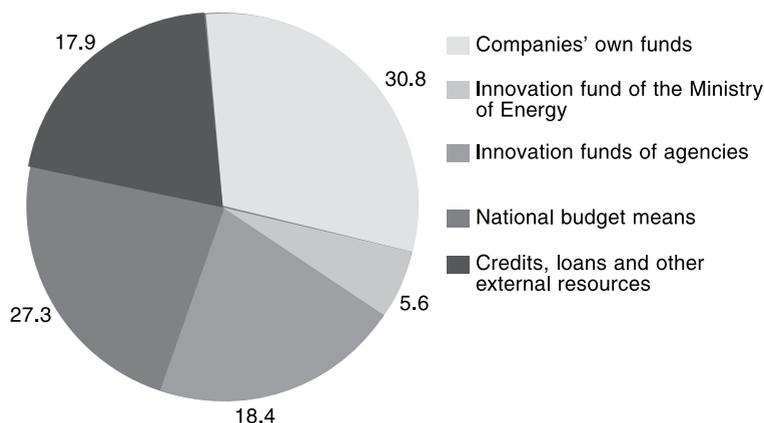


Fig. 5. Energy saving investments portfolio, Belarus, %

of the project involving the construction of a LED plant, a company of the 6th technological setup (Fig. 5).

The project was started with the involvement of the world leader in the field, Philips. It will be carried out in three stages. At the first stage (approximately 2009–2011), the manufacture of LED products is to be launched in Belarus through cooperation between the organizations attached to the Academy and other Belarusian companies fulfilling orders related to development and production of main component parts and assembly of the articles. At the second stage (2012), it is planned to expand the range of LED products manufactured in Belarus. At the third stage (2013–2015), plans are to organize the production of mounted light-emitting diodes by using imported crystals (chips), and by 2015 – to set up the production of crystals in Belarus.

The effect from the production and use of LED products in 2010–2015 is expected to come in the form of electricity-saving amounting to 1.1 billion kW/h (USD 113.5 million). Beginning 2015, the annual economy of funds on electricity bills will be no less than USD 50 million. The export potential of the new products is also deemed considerable.

The energy and technology-related benefits from the production and use of LED products will be not only the reduced consumption of energy per product item and attraction of advanced foreign technologies to the Belarusian science and technology sector and their adaptation to the local environment. The mass use of LED energy-saving equipment across the national economy sectors will help dramatically reduce the load on the generating facilities of the Belarusian energy system, which will lessen the investment needs of the electrical power sector and stop the operation of the least economical units.

Potash resource. For Belarus, potash fertilizers have always been and will remain one of its main exports. Considering the strategic importance of this economy sector, the National Academy of Sciences has created a system of scientific support for it. Today's innovation-based development of the Production Association “Belaruskali” almost fully relies on Belarusian resource-saving technologies.

The Academy has developed technologies of selective mining of thin layers of potassium salt of complex structure

which application has helped increase the extraction of ore by 30–40% in comparison with traditional technologies, reduce the extraction costs 1.5–2.0 times and improve mining security. The Academy has also designed and applied technologies and reagents based on domestic primary goods for conditioning fine-grained and granulated potash fertilizers, which meet the world's best analogues.

These innovations have helped expand exports, including to countries with tropical climate. The economic effect from the use of these new Belarusian technologies in the mining business in recent years has amounted to nearly Br30 billion, that with respect to chemical reagents Br11 billion. The extensive expertise and experience of Belarusian researchers in the domestic market can become a driving force behind the export of engineering services.

In this respect it is necessary to note that collaboration with the leading producers and advancement to world markets require intensifying the engineering elaboration of projects, and coordinating the design, research and technological work. In other words, we are speaking about a rounded service.

In 2008, following the developments of the Academy, the second mine management department of the “Belaruskali” began installing the technological line of an experimental machine to produce the granulated potash fertilizers in roll briquettes. The implementation of the new granulation technology will help save 25% of the raw materials and energy used in the process compared with the traditional technology. Approximate estimates show that the production of 250,000 tonnes of rounded granules per year makes their prime cost 1.4 times lower than that of pressed granules. Due to the scientific developments of Belarusian researchers, in 2009 the Belarusian agricultural sector will be fully supplied with Belarusian-made granulated potash fertilizers.

For the needs of agricultural sector. Innovation technologies and cutting-edge equipment are key to efficient agricultural production. The National Academy of Sciences of Belarus has initiated a new approach to production of domestic farming machines, which is to design tools for cultivation of specific crops rather than for performing specific operations. Thus, Belarusian farming tools designers develop technologies to cultivate

a specific crop (flax, rape, etc.). This approach helps optimize the designed functional characteristics of the farming equipment which in turn helps reduce energy consumption. The target for new plant cultivation tools for 2006–2010 is 424 items. As of March 1, 2009 over 65% of new machines were designed.

New innovation technological solutions will reduce material consumption while the strategy of multifunctionality (combined operations of cultivation) will reduce fuel consumption and increase operational life of equipment. Development and production of plant cultivation machines will save about \$96.5 million by 2010. At the same time, the average annual consumption of tractor and boiler fuels will be down 8% to 10%, that of metal and electric power – 12% to 15%, labour intensity will be reduced by 20% to 25%. On the whole, energy saving technologies and machines included into the programme of the development of the above-mentioned tools will allow cutting energy consumption 1.2–1.3 times.

Economic construction. One of the most material and energy consuming sectors of the national economy of Belarus is industrial, housing and road construction. When it comes to the production of building materials, energy resources account for about 40% – 60% of the prime cost of certain products.

It should be noted that as a rule the resource-intensive industries benefit greatly from solutions offered by our scientists. The National Academy of Sciences of Belarus in partnership with branch institutes has developed and introduced new energy and resource-saving technologies in the road industry with the use of bitumen emulsion and modified bitumen. Large-scale introduction of new technologies in road construction helped significantly reduce consumption of gravel chippings, bitumen, electric and heat power, boiler fuel, hence greatly reducing the construction cost. The cost of surface works fell by 35%; that of membrane technologies – by 30.8%; emulsion gravel mixtures – by 21.5%; asphalt surfaces – by 47.7% per 1 square meter. All in all, the savings will approximate Br5 billion a year.

However, we can increase benefits of energy and resource-saving technologies based on bitumen emulsions by starting using the chemical reagents of Belarusian production (bitumen emulsifier and adhesive additives). Production of these chemicals

will save at least USD 3 million a year. The works on launching the production of the reagents are now in progress.

Accountability and control. The National Academy of Sciences regularly conducts energy audits of the country's manufacturing giants that consume more than 50,000 tonnes of coal equivalent. In 2008, two energy audits were completed. Now audits of seven companies are under way. The solutions offered by specialists of the National Academy of Sciences after comprehensive energy audits are projected to save about 500,000 tce.

Energy audits as a tool to raising efficiency of fuel consumption should become an important part of the comprehensive technological audit of manufactures. Its purpose is to streamline consumption of all resources in line with a company's development strategy. Technological audit at large companies should be conducted by a specially selected team of scientists, economists, in-house manufacturing engineers, and other specialists. It was suggested to include this tool into the industrial policy system of Belarus.

It is extremely difficult for an industrially developed country to reach post-industrial targets of the GDP energy intensity. The analysis of statistics of the OECD member states (but for Iceland which is not taken into account due to its climate peculiarities) shows that the share of services in GDP varies from 55.4% in Norway (GDP energy intensity is 0.183 tonnes of coal equivalent per \$1,000 based on PPP) to 83.4% in Luxemburg (0.168). In Canada the figures are 66.3% and 0.276; Denmark – 74% and 0.112; Sweden – 70.6% and 0.186, Finland – 65.8% and 0.228. In Belarus, the correlation between the services and GDP energy intensity is 49% and 0.39. Thus, in order to achieve energy efficiency targets of the developed countries it is necessary to speed up the development of non-energy intensive production. This is our top priority in the next ten years.

The recommendation of the National Academy of Sciences to strengthen control over consumption of all types of resources has proved right. Metering systems pay out very quickly and guarantee good results, given they are reasonably priced. According to the rational consumer effect, a well-known fact

from the theory of consumers' behaviour, the fact that somebody keeps record of energy consumption engenders consumption frugality. The results received by the country's municipal economy show that the same factors influence decisions of consumers everywhere. For instance, when the government announced its intention to stop subsidising water bills of the households that did not have water meters installed starting May 1, 2009, 94% of them arranged for the meters to be installed. This is approximately the same number as in most West European countries. Owing to the installation of water meters, water consumption fell by 140 million cubic meters in the last two years, which in turn helped save energy resources necessary for water extraction and supply.

The same principles will be adopted in the power engineering. Many Belarusian producers are believed to improve control over energy consumption when automated metering systems are introduced. It is necessary to improve the tariff policy for households as well, i.e. it is advisable to fit them with the latest digital electric power meters.

Wider use of economic leverages. The policy of energy efficiency at the current stage of the country's development envisages a wider use of economic mechanisms and stimuli, modern forms of partnership between the private sector and the state in the energy area. It becomes clear when we look at investments in the energy saving solutions in Belarus in 2008. The share of own funds of companies remains insignificant, while direct investments from the country's budget and innovation funds account for the half of all the investments in the area (51.3%). The main reserve for boosting private investments in the energy sector today is to develop institutional mechanisms of the partnership between private and state sectors in the power engineering together with the development of decentralised sources of energy, efficient tariff policy and long-term energy delivery contracts concluded with independent producers. It is believed that all these areas can be developed owing to the liberalisation of the national economy.

Despite the world economic slowdown and hence constantly narrowing investment opportunities, non-traditional renewable

sources of energy and projects for energy export within the East-West Energy Bridge remain quite attractive for foreign investors. There is still some room for development of Belarusian transborder energy corridors and diversification of energy supplies. The energy security concept of Belarus sets the goal to cut the share of the dominating energy supplier down to 75–77%. So far, we have not been even close to these figures. To reach the goal it is necessary to look for alternative sources of energy taking into account their feasibility.

Boosting the share of local energy resources in the country's energy balance is none the less pressing. In 2008, local and secondary energy resources accounted for 18.4% of the total. By 2010 and 2012 this share of local resources should reach 22.5% and 25% respectively.

The National Academy of Sciences believes there are some drawbacks in this issue: although we gained some experience in gas supply technologies, liquid and gas fuels, recycling of pellets, briquettes and other solid fuels, these technologies are still at the development stage and are not ready to be put in operation. Creation of domestic biogas technologies needs to be sped up too. In the next two years we will be ready to construct 125 kW biogas plants. The country's demand for these plants is estimated at 650 units.

Development of own biofuel and biodiesel is promising too. This work is covered by the Bio-Energy sub-programme of the National Innovation Biotechnologies Programme developed by the National Academy of Sciences. By 2015, the share of biofuel will be increased from virtually zero to 12% in the total petrol consumption of Belarus; that of biodiesel should reach 8% of the total diesel consumption. All these measures will enhance the energy security of Belarus.

Improving the Belarusian Economic Model under the Global Economic Crisis: Innovation, Industrial Integration and Transnationalization

The global financial crisis followed by the economic crisis has become a trying ordeal for the nations and governments worldwide exposing many internal problems of national economies and turned out to be some kind of a test for stability of current social and economic models.

The theory of economic cycles reads that open economies are more prone to external cyclic impacts due to objective causes. As is known, however, unlike other countries, the Republic of Belarus managed to avoid a substantial economic recession, maintain a low unemployment level and a relative financial stability. The credit for this is undoubtedly given to the system of state economic regulation.

The established vertical power system has demonstrated its capacity to hold economic situation under control and prevent most severe crisis implications affecting the population. A bulk of data, however, indicates that the first rolled “shock wave” of the crisis is just the beginning of a storm. The analysis shows that the global economy will have to live through consequences of mass pumping with dollar liquidity, swing in energy and food prices, aggravation of competition and change in balance of forces between “old” and new expanding economies (China, India, Brazil, etc.). Most economic discussions arrive at a conclusion that the current crisis means not only the time of ordeal, but also a chance for changes and adaptation to a newly acquired configuration of the global economy. It is believed in this connection that Belarus has to augment efforts at the end of 2009 and in 2010 to purposefully improve the state economic regulation system and significantly expedite the work to modernize it.

This work will have to be performed under tight restrictions imposed by unfavorable external conditions, commitments to

IMF's terms constraints, other tight terms of international agencies and multi- and bilateral agreements (control over state budget deficit, money issue, inflation, rules of trade of gross-consumption products (petroleum products, fertilizers, milk, sugar))



Global crisis-induced problems. Drop in demand for Belarussian products (foreign commodity and financial markets shrinking, specifically those of Russia), global surplus of products produced in Belarus

Inadequate competitiveness of Belarussian economy, limited budget/banking system capacities, high cost of social programs, including investment in consumer sector

Fig. 1. Basic constraints for the Belarussian economy

the IMF and also internal structural problems (see Fig. 1). In this regard, it is reasonable to focus efforts on addressing internal problems, since the country's position in the world market and inflow of foreign exchange and investments are directly related to the level of performance and competitiveness of its economy.

Currently, the first and most pressing problem is growing negative foreign trade balance (Fig. 2). The National Academy

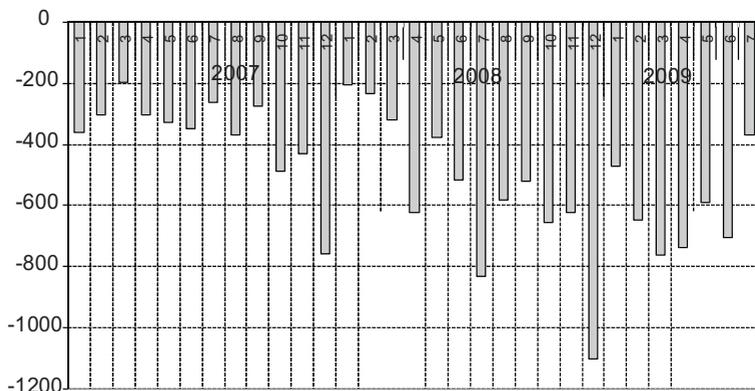


Fig. 2. Balance of foreign trade in 2007–2009, USD million

of Sciences of Belarus (NASB) developed a package of strategic proposals to change methodology of import substitution in the country and submitted them to the Council of Ministers and Administration of the President of the Republic of Belarus. Instead of attempts to substitute the entire import, it was proposed to focus efforts on stimulating new production units to use local resources providing to them actually a tax-free status. That document analyzed actually all import commodity items categorized into 3 groups:

1. Commodities the import substitution of which needs to be increased at the existing enterprises.

2. Establishment of new production units for the import substitution using local resources.

3. Commodities the import substitution of which is economically unfeasible.

A specific system for stimulating the production and export was proposed for each commodity group.

In addition, to increase the macroeconomic stability amid growing foreign economic threats, it was proposed to adjust the role of gross figures in the state economic regulation system. Setting gross growth figures to be achieved by all sectors without consideration for their performance, added value and import intensity produced an adequate effect at the time which decreed complete utilization of the enterprises' capacities and restoration of the industrial potential. At a new stage, this approach worsens the foreign trade balance, increases inventories in warehouses and reduces the product quality and range. The volume of sales and profitability level should become a key measure of stimulating enterprises – actually the same measures used by capital owners worldwide to primarily evaluate performance of the companies' managers, namely, a share of the market and return on capital.

The NASB proactively and purposefully not only contributes to establishing new production units, but also independently establishes them to produce specific commodities. The spheres in which the Belarusian resource base and intellectual potential contribute to success are prioritized.

For example, owing to developments of the NASB scientists, Belarus will entirely meet its demand for granulated potash

fertilizers from 2010. New varieties and cultivation technologies helped achieve 100% of demand for malting barley and vegetable oil. Locally bred varieties allow the country's demand for the corn seed to be met by 50%. New veterinary preparations are being developed and commercialized to meet not less than 80% of the country's demand.

The Belarusian government supported ambitious state programs for the NASB developments – “Innovative Biotechnologies” and “Import-Substituting Pharmaceutical Substances” – aimed at establishing new research-intensive production facilities with a total export potential of not less than USD 250 million/year and import substitution of USD 200 million. It is just the beginning to lay the foundation for developing a new economy of the Republic of Belarus.

Since the beginning of 2009, the import structure has not changed substantially in Belarus in general, while the reduction in the import volume is only due to slumped output and export. The proposals as to impracticability to rely exclusively on gross figures were accepted with delay to respond to a sky-rocketing growth in inventories in warehouses of the Belarusian enterprises. The analysis shows that the share of indirect import accounts for 48.8% of the total finished products stock (nearly Br 6.3 trillion as of 1 September), i.e. the enterprises accumulated over one billion US dollars of their own and purchased currency in their warehouses. Selling these products in the domestic market instead of exporting them leads to earning Belarusian rubles and manufacturing new products using imported materials and components. The enterprises buy the currency at the currency exchange, and the RB National Bank has to sell it from reserves.

For example, Br 2.7 trillion are to be spent from the national budget in 2009 to procure equipment of the following domestic manufacturers: Minsk Automobile Plant, Minsk Tractor Works, Belarusian Automobile Plant and Minsk Wheel Tractor Plant. The budget resources are also to be used to purchase units and assemblies from automotive components manufacturers which would lead to an estimated USD 0.5 million increase in the currency demand.

In this regard, the second package of problems is related to efficiency of the state support of the economy. The analysis

shows that one of the main causes of poor performance of enterprises to modernize and improve efficiency is the current system of state support of the real sector of economy. A multiyear state aid to poorly performing enterprises has created some kind of an “innovative trap” in the mind of their managers: until subsidies are granted, there are no incentives for modernization, and if the financial aid is cut off, why the authorities should bother to press for innovative development and modernization. It is clear that the state aid should not be completely discontinued under the crisis. Therefore, the NASB proposed to the Government to change over to selective support measures. According to these proposals, it is recommended to divide all enterprises being in need of subsidies into three groups:

The first group – **high-technology enterprises**, including those under development. They should be primarily supported by subsidizing credit rates, promoting their products at the interstate level, incorporating their modernization projects into the investment and other state programs and establishing a system of preferences not contradicting to the WTO standards.

The second group – **medium and low-technology enterprises** with the large number of the employed and low import intensity and maintaining sufficient sale volumes. Owing to their operation, the budget is recharged and employment is maintained in general. An enabling environment should be established for their operation.

The third group – **loss-making enterprises** with a high level of material/energy intensity and low product quality. It is considered that they could be gradually excluded from the sphere of responsibility of the state through investment-driven modernization and conversion. Township-forming and agribusiness sector enterprises are an exception – special programs need to be designed for their development.

In our opinion, enterprises with high added value, export potential and a low import component should be eligible to the aid.

The next, third package of our proposals, necessitates updating the methods of centralized programming of the economy. The crisis forces to view the formation of forecast and target indicators from another angle. There is a need to develop a new approach to the system of national, sectoral and regional balances

and to mathematical forecasting and strategic planning of the real sector development with consideration for future changes in external and domestic demand and the economy structure. The role of indicators characterizing efficiency of utilization of all resources in comparison with average world figures should be enhanced.

In addition, we believe that many appropriate measures need to be more promptly implemented. For example, the economy dollarization needs to be more consistently reduced. A decision to curtail currency credits for households which stimulated the purchase of imported goods, mainly cars, and substantially worsened the trade balance, was absolutely correct, however it was made one year late.

The problem of stimulating domestic demand for local products needs to be addressed more consistently. It is still difficult to obtain soft credits for purchasing Belarusian goods. In our opinion, inadequate actions were taken to stimulate temporary employment and self-employment.

The NASB actually continuously cooperates with the Government and submits its proposals aimed at improving the industrial policy and economy balance. For example, it has been repeatedly proposed to implement a reward system for executives and employees for higher export and output of consumer goods manufactured, in particular, using local resources.

The banking system could have more promptly provided export financing – purpose-oriented crediting of exporters on payment for the delivered products (forfeiting), establishing favorable conditions of refinancing for the banks serving exporters based on full factoring and exporting on installment terms.

The fourth package of problems concerns the **country's economic security**. In 2010, the domestic consumption needs to be precisely balanced with export capacities. Increase in the total and state debt is dangerous. We believe that it is reasonable to optimize social spending to achieve a deficit-free budget, while a modern efficient system of subsidizing disadvantaged citizens needs to be approved and established at all levels. The consolidated budget expenditures should not exceed its revenues (see Fig. 3).

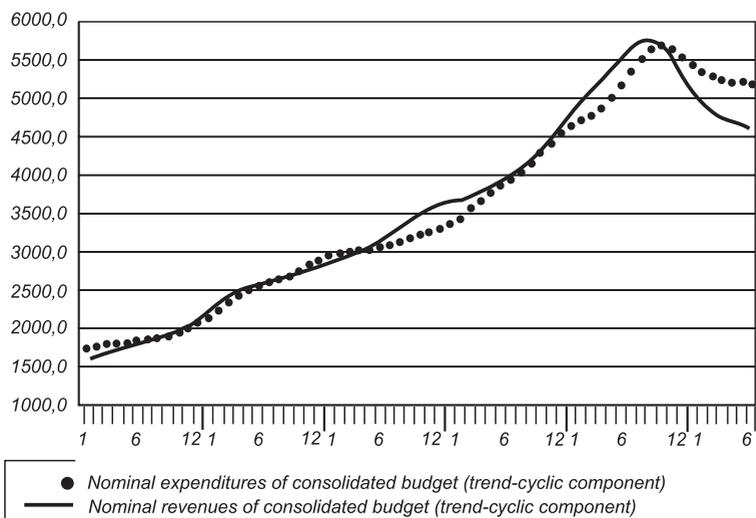


Fig. 3. Expenditures and revenues of consolidated budget of the Republic of Belarus in nominal terms in 2004–2009 (seasonal and random factors-free)

One of the key factors of the antirecessionary measures system resides in changing the investment strategy and tactics for attracting foreign investments. Currently, Belarus is among few countries which increase investments (see Fig. 4). The Belarusian investment portfolio, however, is mainly socially-oriented and costly – a housing and social spheres account for more than half of capital investments, while the share of machinery, equipment and transport facilities makes up less than 40%.

It is reasonable to spend new investments for reproduction and development of capacities to produce high value-added products. The NASB General Meeting session held 9 October 2009 approved an extremely important document – Strategy of Research for the period up to 2015 aimed at promoting innovative development of the Republic of Belarus and creating research products able to compete in the international markets. The academic community was unanimous in its opinion that establishment of new high-technology production facilities and intensified technological refurbishment of the basic sectors of the economy using technologies of the V–VI set-ups

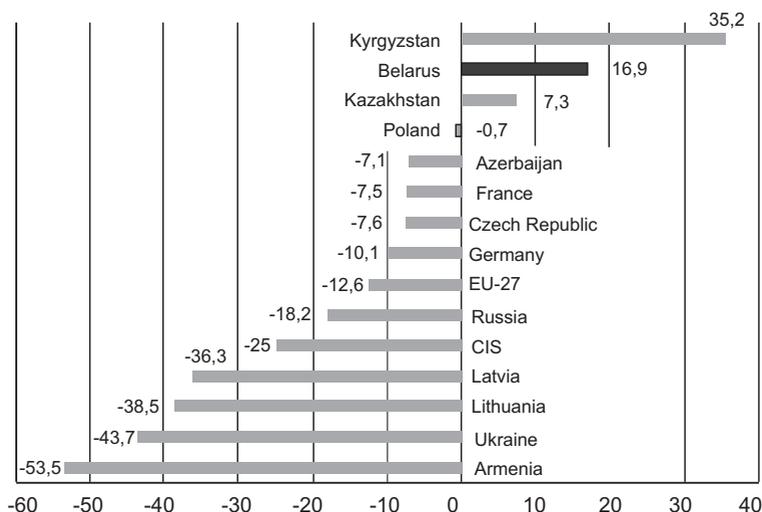


Fig. 4. Investments in I half of 2009 vs relevant period of 2008, %

(nanotechnologies, photonics, alternative power engineering, cell technologies, genetic engineering, biotechnology, CALS-technology, etc.) are an important factor for successful innovative development of Belarus and its global competitiveness.

What is the way of expediting implementation of the research results? The most important factor is to improve the innovative legislation and innovative system in general and to further internationalize the Belarusian economy. This cannot be achieved through reliance on ourselves. The capacities are not adequate and there is no need for this. Accelerated industrial integration into TNC is of principle importance.

In our opinion, each large enterprise should analyze which transnational corporations may become their strategic partners. Investors and partners will not line up for integration. There is a need to purposefully and enterprisingly interest them, also at the governmental level, in the integration. Promoting specialization in specific spheres of technological competence while integrating into transnational corporations will provide access for Belarusian production facilities to technologies, information and markets. So far, the solution of these problems

is extremely delayed. The regulatory legal framework is imperfect either. Yet the political decisions have been taken to improve the business environment as a whole.

Our studies have revealed an alarming trend (see Fig. 5): given the accumulated foreign capital – USD 7.1 billion equity capital and USD 0.7 billion worth credits for subsidiaries as of 01.07.09, nearly USD 0.7 billion are to be withdrawn annually from the Belarusian economy in the years to come, provided that foreign investors maintain the current proportion between the withdrawn and reinvested profit. In case of complete withdrawal of the earned income, nearly USD 1.2–1.3 billion may be withdrawn.

USD 249.6 million were withdrawn from the Belarusian economy in 2007 and USD 421.0 million in 2008, while in the first half of 2009 as much as USD 264.2 million. According to the World Investment Report 2008, Belarus ranked 104th in 2007 among 202 countries in terms of accumulated foreign direct investments being on a par with such countries as Chad, Uruguay, Bangladesh and Honduras.

Therefore, to maintain the country’s economic security, there is a need to attract investments primarily in new modern enterprises having a high export share in the product sales pattern. New approaches to management should be also

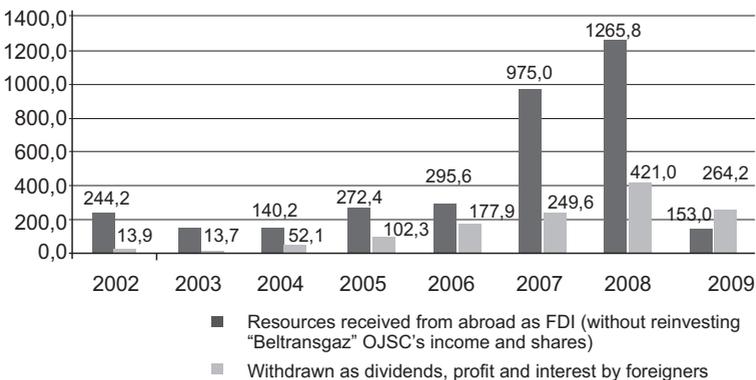


Fig. 5. Currency resources received (without “Beltransgaz” OJSC’s shares) as foreign direct investment in Belarusian economy and currency outflow, USD million

implemented at the state-owned enterprises: establishing holding and corporate structures, training Belarusian top managers and mid-level managers in modern business management technologies.

In general, economic development and growth should be prioritized. To this end, the shortage of domestic resources for development should be supplemented by external borrowings also using opportunities of the “Eastern Partnership”. Credits should be provided to the real sector of economy, but primarily to those working in the expanding markets.

Formation and Prospects for the Customs Union of Belarus, Kazakhstan and Russia Development: Theory and Practice

The Customs Union of Belarus, Kazakhstan and Russia, its founding documents being signed by Heads of States on November 29 2009 in Minsk, is of great geopolitical importance for the integration nucleus on the post-Soviet space to be formed. The role of the Republic of Belarus in this process is very indicative, as the formation of the Union State of Belarus and Russia is a decisive factor of the integration processes in the post-Soviet space. It is exactly Belarus that the other CIS countries are looking at when making decisions on closer cooperation with Russia and with each other. If the Customs Union development and the EurAsEC common economic space formation are a success, the attractive image of this project will become the most significant factor of the economic integration in the CIS. This train of events seems logical. Still the theoretical study of its development mechanism followed by the system of measures elaborated and timely realized are needed to ensure the success of the Customs Union and to accelerate the common economic space formation.

Some Theoretical Aspects of the Customs Union: Mutual Economic Interest as the Basis for Success

According to the General Agreement on Tariffs and Trade (GATT), the Customs Union (CU) is an agreement of two or more states on the customs duties removal in trade between them, a form of collective protectionism. According to the article XIV of GATT, the CU means a substitution of several customs territories by a single one with a complete removal of customs duties within the CU and the introduction of a consolidated external customs tariff. It is significant, that this definition, first,

does not separate import and export duties, it implies *the removal of all customs duties*. Second, the customs territory is one common customs territory, but not a body of separate territories.

As the theory of economic integration gives it, the customs union is a mandatory stage for all the integration unions to pass. In 1961, Robert Mandell (Mandell R. A theory of optimum currency areas [1]) put forward the following stages of integration:

- Preferential trade agreements;
- Zone of free trade with no waivers and restrictions;
- Customs union;
- Common economic space (common market), understood as equal conditions of management in all spheres of activities, including common social policy, equal civil rights, etc.;
- Monetary union (sometimes called economic union);
- Political union, including a military one.

Economic integration is one of the most important mechanisms of the world economic development. The term integration is of Latin origin, *integratio* – *renewal, restoration*. Notably, the root of the Latin term «*integratio*» fully reflects the processes observed in the CIS during the last decades (formation of the Union State of Belarus and Russia, formation of the EurAsEC, of the Customs Union). Today, these processes are often called «*reintegration*», which seems to be incorrect, as it implies a certain tautology. Reference to the Latin stem – *integer* meaning *entire, integral, unbroken* gives even more exact understanding of integration.

Objective laws of the integration processes are studied in different spheres of science. The economists have suggested the conceptual framework which is most detailed, including such types of integration as *global, interstate, regional, transregional* [2], *monetary, debt, agro-industrial, military-industrial, integration of science and manufacturing, integration of innovation systems, enforcement structures* [3], and others.

Scientists of other branches of humanitarian knowledge study *political, social, educational, ethnoconfessional* [4], *linguistic* [5] and other types of integration. Natural scientists analyze the patterns of *technical, scientific* [6] and *information* integration, integration processes in *biological* [7], *physical, chemical, ecological* and other systems. So, it is obvious that the term *integration* today stands for one of the basic concepts

of the present times, and the very process is as attributive of nature and society as the law of the energy conservation.

Considering the objects of the integration processes in the territory of the CIS, the researchers of the late 1990s identify such a criterion as the nature of the integration processes. It enabled to recognize a *single speed integration, integration in common format* [8], on one side, and on the other – a *variable speed, stepwise, differentiated, «flexible» integration* [9]. Besides, depending on the direction of integration processes, some researchers distinguish also *negative and positive integration*: «In the context of the CIS countries, «negative» integration means, in the first line, the removal of obstacles as for the mutual trade and production factors exchange, thus creating a single regime of the economic agents cooperation. «Positive» integration suggests joint development and implementation (on the scale of the CIS or some of its member countries) of the coordinated economic policy, and the proper institutional and legal tools being a kind of common «management system» [10].

Well-known Hungarian economist and researcher on the integration processes Bela Balassa has formulated the following implications of the effective integration process [11]:

1. Comparable levels of economic development and market maturity of the integrating countries.
2. Geographical proximity of integrating countries, common borders and historically existing economic relations.
3. Common economic and other problems in development, finance, management of the economy and political cooperation.

Many unions, blocks and economic associations have passed these stages, in full compliance with theory. It took them over half a century to realize this concept in the framework of the European Union.

The theoretical and practical ends of the Customs Union of Belarus, Kazakhstan and Russia formation are to be considered, first, on the basis of the current and future economic (and political) interests of its members coordinated level being evaluated. Second, the analysis of this integration form should base on the fact that the Customs Union is one (assuming, rather advanced) stage of more developed forms of economic integration allowing for its economic and social effects best manifestation.

Evidently, the countries joining the Customs Union do not follow this theory at full length. Within their independence period they have moved to the market economy being guided by different economic models (liberal-market, socially oriented ones). Institutional features and ways of doing business may vary significantly. Therefore, the expected effect of the Customs Union in general is thought to be not so synergetic, as rather complementary.

What differences are principled, objective, and should be accounted first when the economic interests are coordinated by going integration process?

First, the member countries differ significantly in their **national economic structures**. So, if Russia and Kazakhstan are major exporters of raw materials and at the same time produce a wide range of intermediary commodities, Belarus specializes in finished commodities produced of raw materials imported mostly from third countries.

Difference in the national economic structures limits the possible spheres of **joint investment projects development**. Russia and Kazakhstan are big exporters of oil and gas resources, while Belarus considers and protects its interests as an importer and transport corridor to the West. Kazakhstan is interested in free transit of energy resources and freights through the territory of Russia, while Russia seeks to influence the development of the energy market and the hydrocarbon supply policy in Central Asia, and restructures the fuel and energy resources system of deliveries to the European Union.

Size is important, too. Russian economy is significantly greater than economies of other countries. Consequently, Russia finds itself in a type of a «trap»: on the one side, objectively, it is a powerful player dominating in the process of negotiations, imposing sometimes its own rules on other countries, that prevents them from delegating a part of sovereignty to the supranational bodies and impedes the development of integration processes. On the other hand, geopolitically and geoeconomically Russia must initiate the integration processes in the post-Soviet space; this requires the partners' interests taken into account and mutual concessions as for the key sensitive issues made. In foreign trade policy, this results in Russia's efforts to impose its control system

on other countries. Yet it may cause damage to its partners as a result of this policy and due to the differences in their economic structures, this is not compensated by the Russian side. For this reason, Russia's partners in the Customs Union need some other compensatory measures.

In the process of the Union formation, serious obstacles had to be overcome to change the current **tariff policy** of the member states. In view of the general tendency to lower the average rate of customs duties in Russia, import tariff rates for some groups of goods were lower than those in the partner countries. National customs tariff in Kazakhstan was significantly lower – with lower protection of national economy – than that in Belarus and Russia.

The Union countries have **different experience of integration**. If Russia and Belarus have a 10-year experience of the Union State building, the supranational bodies with a range of powers, then for Kazakhstan this is the first experience of such a high level integration alliance. It should be emphasized, that if lacking the experience, both negative and positive, coordination of interests, approaches, tariffs and legislation in foreign economic activities that has been accumulated by Russia and Belarus in the course of the Union State building, it would be difficult to expect whatever successful integration within the EurAsEC.

In particular, the major threat for integration processes that came to be obvious in the process of the Union State formation seems to be a «paper integration». The typical scenario of the «paper integration» looks like the following: at first, the fundamental integration decisions are taken; action plans are developed and work on their implementation starts. Then, the implementation of measures «slips», stops or even moves backwards. New integration documents are being adopted after that, new measures are undertaken (many of them follow the previous unrealized ones), and again the process begins to «slip».

These negative phenomena are indicative of the very low influence of inter-government bodies on the integration processes, and reveal the ambitions of some participants trying to solve the immediate and sometimes long-run problems on their own, having forgotten the obligations before their integration partners.

Evidently, the agreements realization greatly depends on the negotiations results corresponding to the interests of the parties,

and on the expected long-term economic effect but not the immediate political gains. The official position of the Republic of Belarus remains the same: «If we build the Customs Union, we shall proceed from its classical understanding, classical principles, which are well-known. Just to this kind of union we agreed from the very beginning» [12].

What economic effects could be expected according to the modern theoretical views? The Canadian scientist Jacob Viner stood at the origins of the economic integration theory, and analyzed the customs unions economic effects, in particular [13]. According to his theory, the customs union formation causes two kinds of effects: *static effects* – immediate consequences of the customs union, and *dynamic effects*, visible at later stages.

The dynamic, long-term effects of integration becoming manifested when the integration deepens, include the growing competition of the producers from different countries (in the first run, the integrating ones). This results in lower prices, better quality of products and new technologies. Indeed, whatever measures to protect the producer are undertaken, to be a success in a competition, you are to enter the competition, no matter, if these goods come from the Customs Union countries, and are, as is general knowledge, mostly below the world level.

Two more dynamic effects are expected to snap into action. First, it is the influx of investments based on the world technologies and developments both from the Customs Union countries and outside. Besides, the corporations from the non-aligned to the Customs Union countries will seek to keep the segment of the market closed by the common tariff barrier by creating enterprises inside the integrating countries. Finally, the participating countries can use the effect of scale due to the increased capacity of the common market, and expand the production, reduce costs and enhance price competitiveness.

Among short-term and so not very sensitive for the population static effects, of greater significance are those of the trade creation and trade diversion.

Trade creation effect is the removal of import duties and price-cutting for member-states goods in the home markets of these countries as a result of customs union formation. At the same time, if the home produced goods turn to be more expensive

than the imported ones, the consumers choose the cheaper imported goods, thus creating new trade flows. As is our case, accounting for large volumes of trade between the countries even before the CU was formed, this effect could have been defined more exactly as *the effect of trade intensification*.

Trade diversion means the consumers reorientate from the outer integration area purchasing source to that of inner integration area after the CU is formed. The effect of trade diversion is opposite to that of the trade intensification, as the goods deliveries from the integrating countries often are not most efficient, and the countries separated by the common tariff barrier from the integrated ones could supply the same produce at considerably lower prices (e. g., cars from the EU to Belarus).

If there appears a trade digression effect as a result of the customs union formation, then the well-being of the member states may either decrease, in case the trade diversion effect by cost values surpasses the trade intensification effect, or increase if the case is the opposite one. The estimates show that the trade diversion effect is mostly overlapped by the trade intensification effect, thus resulting in the integration raising the well-being.

Static effects of the integration include lower administrative costs of customs and border control agencies. However, in this specific case, the customs border shift will benefit only the respective services of Russia.

Lower aggregate demand for imports from the non-CU countries may improve the conditions of trade for the member states, meaning the correlation of import and export price dynamics. Still it should be noted that small and large countries have different potential to influence the conditions of trade using the trading policy instruments: «In a large country, which can influence the foreign export prices, the duty reduces the price of import, and thus makes a benefit from the improved conditions of trade [14] ... Smaller countries can't significantly influence their export and import prices, so they can't use neither duties nor other similar instruments» [15].

According to the theory of the customs union, such unions have positive effect only if the tariff for third countries is not increased. Already in the middle of the last century [16], the theory «of the second best» of the English economist J. Mead

proved that apart from free trade there are no other variants of trade policy that would positively ensure growth of the aggregate well-being. According to this theory, non-interference policy in any market is desirable for the only reason of all other markets operate smoothly. If this is not the case, the state intervention may improve the well-being, neutralizing the defects of the market consequences.

It should be noted, that these integration effects are observed only when the integrating countries have market pricing conditions, and when there are no administrative and technical barriers for to redirect the commodity flows if the trade creation and diversion effects come into play. The theory suggests that first of all, import duties protecting uncompetitive goods from cheaper world imports are removed. In our case, when the integrating countries have regulated pricing (direct pricing and other types of state support), their internal prices may differ significantly from the world ones. It refers to the Russian and Kazakh internal prices for fuel and oil products, and to the Belarusian prices for many socially important goods.

The theory reasonably underlines the effect of increased competition intensity after the Customs Union being formed, that containing the price growth and helping the home producers acquire the competition habits in the world market. However, these effects are true only for two conditions. First, full renunciation of the price regulation (that is impossible neither in Russia, nor in Kazakhstan, nor in Belarus); second, if the government market regulation is still maintained, there would be required the equal business and competition conditions for all companies of integrating countries viewed as a competitive access to state purchases, preferences, etc.

World experience shows that in the countries with developing markets, all the CU countries being among them, coordinated industrial policy comes to the forefront, particularly in the period of active economic restructuring under the world economic crisis. This exactly approach along with the sound competition is deemed to be able to strengthen the competitive positions of the Customs Union producers in the world market and their influence on the world economy in general (e. g., world markets of oil products, fertilizers, heavy-duty trucks, etc.). Yet,

if after the customs borders having been opened the member countries will spend their limited investment resources for the alternative productions and transport infrastructure objects creation – these actions could hardly be called «rational economic behaviour», which is an underlying notion of all liberal economic theories.

It is noteworthy, that the Ukrainian scientists also stress a priority of the industrial and innovation integration over the trade one: «At the initial stage of entering the market economy, the CIS common innovation space model should be preferred. This model should be constructed on the basis of the scientific and technical cooperation of the CIS enterprises and institutions embodied in the common programmes, business orders to the R&D products, mutually beneficial exchange of scientific and technical information, etc. Taking into account the historical scientific-technical and economic relations of the former USSR republics, they being re-established on a new ground would be very beneficial» [17]. It has been discussed in Belarus since 1991. And these were not only the discussions but the attempts were also made to keep and develop the scientific and technical contacts with our neighbours (a more detailed consideration for that will be given in the part 3 of this work).

Theoretically, the common industrial policy can be most efficiently implemented within the common economic space. Exactly for this reason, the President of the Republic of Belarus, A. G. Lukashenko, when signing the documents on the Customs Union, said that the decisions adopted in Minsk in November 2009 are of no practical value for Belarus, but taken seriously, they create prerequisites for the common economic space formation. And, moreover, for this space accelerated formation, as accounting for the Russia's consistent protection of its economic interests, many enterprises in the Union countries can't count on getting to the higher stage of integration.

So the brief review of the economic integration theoretical aspects shows that the quality of political decisions based on trade-off approach and harmonized economic interests of the participating countries is of paramount importance for the economic integration positive effects realization. A brief historic survey of different integration unions on the post-Soviet space

provides argumentation on how difficult is to reach compromise, proving that integration is not developing «per se», because of some economic need.

**Brief History of the Post-Soviet Integration:
«In Order to Unite, it is Necessary First to Separate» (V. I. Lenin)**

In December 1991, Russia, Belarus and Ukraine signed an agreement on the formation of the Commonwealth of Independent States (CIS), which was to create conditions for economic cooperation between the countries formed after the Soviet Union disintegration. In the years to follow, Azerbaijan, Armenia, Georgia, (in 2009 withdrew its membership), Kazakhstan, Kyrgyzstan, Moldova, Uzbekistan, Tajikistani, Turkmenistan have joined the CIS. The CIS countries account for more than 25% of the explored world mineral resources, 20% of world military production, and 10% of the world industrial potential. 12% of world scientists work in the R&D centres of the CIS countries [18].

Already in the CIS early history, the disintegration processes began to prevail over the integration ones, mainly due to the political reasons. The economy suffered: in 1992–2000, mutual foreign trade turnover decreased by two times (from USD 138 to 59 billion), only in 2006 it recovered and exceeded (USD 147.1 billion). In pre-crisis 2008, the trade turnover of the CIS countries reached USD 248.4 billion, but the share of mutual trade in a total volume of foreign trade continued to decline: from 67.4% in 1991 to 23.1% in 2007, and 21.5% in 2008 [19].

The importance of political reasons restraining the integration processes is proved by the fact that of 37 agreements concluded within the 1991–2008 period, and requiring mandatory ratification, only three agreements have been ratified by all member countries. Moreover, for 290 documents requiring state procedures, these procedures were fulfilled only for one document [20]!

As early as at the Yalta summit in September 2003, the CIS countries have recognized as a priority the free trade area, formed and functioning, with further developing into the common economic space. An Action plan for the most important measures was adopted, aimed at the development and higher efficiency

of the CIS member states cooperation in the economic sphere for 2003–2010. However, until now, the conditions for the common economic policy have not been created.

To further the economic integration, on October 5, 2007, the Concept of the CIS further development and the Action Plan of measures have been adopted. These documents foresee 12 priorities in the CIS development in 2007–2010. Yet in the Strategy of the CIS economic development for the period until 2020 adopted in Kishinev in November 2008 at the meeting of the Council of the Heads of States there are only six target economic priorities. Differing interests of some CIS countries in tempos of integration were most vividly revealed in the first half of the 1990s. Since 1994, five sub-regional economic integration unions have been created within the CIS, only three of them are in operation today [21].

As for such integration form as the customs union, in 2010 it was 15 years since the first attempt to form it in the CIS territory has been made. The first Agreement «On the Customs Union» was signed on January 6, 1995 by Belarus, Russia and Kazakhstan. The work has been done to uniform the customs duties, permitting the presidents of Russia, Belarus, Kazakhstan, Tajikistan and Kyrgyzstan to sign in Astana the treaty on the Customs Union transformation into the EurAsEC. In 2003, the United Nations recognized it as the international organization, and the EurAsEC received the observer status at the United Nations General Assembly. After the decision to unite the EurAsEC and the Organization of Central Asian Cooperation was made in 2006, Uzbekistan became the member of the Community. On October 6, 2007, all six members of the EurAsEC signed the document on the Customs Union formation. The process was expected to be completed in 2010.

In the framework of the EurAsEC there was developed also the Concept of the EurAsEC countries cooperation in monetary sphere starting from 2005. According to this document, the common financial market was to be formed, and the collective decision on the common currency introduction and the monetary union formation will be made in 2010. It was planned also to conclude a treaty on the separation of powers between the national bodies and the EurAsEC interstate ones.

In April 2004, parliaments of Russia, Belarus, Kazakhstan and Ukraine ratified the Agreement on the Common Economic Space creation (CES). The governing bodies of the CES were to be formed as a combination of the intergovernmental elements and the principle of the parties share of authorities delegated to the CES Commission which was to become the first supranational body in the post-Soviet space. In the framework of the CES, it was planned to integrate four leading economies of the Commonwealth, accounting for 99% of the CIS countries GDP and 92% of the total volume of foreign trade.

In August 2006, the leadership of the EurAsEC made a decision to move the work on the CES formation to the EurAsEC framework, and on October 6, 2007, at the meeting of the EurAsEC Interstate Council, the presidents of Russia, Belarus and Kazakhstan signed the base documents on principles of the common economic space creation on the basis of the customs union, its institutional structure, and other states joining mechanisms.

The given brief survey shows that not all the countries in the post-Soviet space appeared to be ready for real integration processes, albeit declaring their actuality and economic necessity. As a result, we observed quite an impulsive process of the integration unions creation and transformation, ambitious plans made and their regular failure. The reasons for that were different economic potentials, structures, approaches to the economic regulation, and finally, most important – lack of political maturity to take the resolute steps.

The arguments for the most successive actions to settle the economic conflicts in the integration process in the post-Soviet space can be found on the background of the Union State of Belarus and Russia creation.

The Russian – Belarusian integration was initiated by the treaty «On the Unification of the Monetary System of the Republic of Belarus and the Monetary System of the Russian Federation», according to which on May 1, 1994, Belarus introduced the import and export duty rates identical to those in the Russian Federation. Besides, Russia got the right of the military objects free use in the Belarusian territory for 20 years and toll-free transportation of Russian products throughout the Belarusian territory.

The next stage was the «Treaty on the Creation of a Community of Belarus and Russia», signed on April 2, 1996, which put the aims of the common information space formation, synchronization of reforms and the creation of the single normative and legal base. In April 1997, the Treaty on the Creation of a Union of Belarus and Russia was signed which was to promote the economic integration and further development of the existing institutions of interstate integration within the CIS and the Customs Union.

The Charter of the Union of Belarus and Russia laid down the principles of the economic union, provided for all the economic legislative norms unification, common currency introduction, state budget of the Union and the supranational governing bodies represented by the Parliament, Executive Committee and the Supreme Council of the Union formation. The treaty extended the range of issues falling within the common competence in the sphere of foreign economic policy, military-strategic and economic sectoral cooperation. It was supposed to establish common sources of financial support for programmes and projects, derived from the national budgets. Besides, there was established a system of the joint decisions to be made and realized, mandatory for governmental bodies, management and business entities.

Not everything was managed to be realized, yet these measures being realized only partly increased the trade turnover between Russia and Belarus (from 1995 to 1997) by 1.9 times, and Belarus became the third, and in 1999 – the second trade partner of Russia [22]. The target programmes have contributed to the successful building of the Union: Medium-term programme for the development of the Union of Belarus and Russia for 1998–2002; the Programme of coordinated actions in foreign policy of the Union of Belarus and Russia for 1998–1999; the Concept of common defense policy of Belarus and Russia; the Agreement on common regional security ensured in the military sphere; the Programme for the economic reforms in the Republic of Belarus and the Russian Federation synchronization and targeting; the Programme for economic cooperation of the Republic of Belarus and the Russian Federation for 1999–2008.

As soon as the Union functioning was not ensured on a full scale, particularly the concerted decisions making, and so the proper economic partnership was not provided, in December 1999 Russia and Belarus entered a new form of economic integration – the Treaty on Creation of a Union State which emphasized the creation of the common economic space as a priority goal.

In contrast to many other initiatives in the post-Soviet space, the Treaty on the Creation of a Union State had a concrete Action Plan of the Russian Federation and the Republic of Belarus for 2000–2005. Within this framework, it was planned to create a common economic space of the Union State and to lay the foundations of the economic union.

Disregarding the approved Action Plan, the objective economic contradictions persisted. They were related to different views of the parties on the state system, currency union and price formation, support of agricultural production, etc.

One of the major problems was the creation of a common currency area. According to the Agreement between the Central Bank of the Russian Federation and the National Bank of the Republic of Belarus, the Russian ruble was to become a single means of payment in the Union State beginning from January 1, 2005, and the common currency of the Union State was to be introduced on January 1, 2008. The major contradictions were related to the common emission centre. The heart of the problem for Belarus was not so a partial loss of economic sovereignty, as any integration process suggests the delegation of some administrative functions to the supranational bodies. Most important was that not all the mandatory stages of the common economic space formation were covered by that time: free movement of goods, capitals and workforce; single foreign trade, tax, industrial and price policies.

At present time, the most important problems of the Union formation and the Customs Union development are related to the inconsistent approaches to the state support of national producers and pricing system. In the process of Russia joining the WTO, it had to abandon the pricing system unification implied by the Union formation. This policy generated the gas conflicts between the Union states, which escalated at signing the basic agreements on the gas and oil supply to Belarus in 2003, 2006 and 2009.

In 2009, there arose serious antagonisms between the countries in the field of agricultural policy, as Russia claimed that Belarus uses higher subsidies in this sector. Actually the Belarusian agricultural subsidies are really higher than those in Russia, yet they are significantly smaller than those in the developed countries. Besides, Russian producers of agricultural products buy cheaper energy resources in the home market, and their taxes are smaller.

The Republic of Belarus was developing its system of the agricultural sector support since 2000, while Russia adopted the state programme of agricultural development only in 2008. Thus, the estimate of demand and supply balance for the major agricultural products in the framework of the Union State for 2008–2012 was developed only in 2008.

In general, the balances may be considered to be a new and important instrument of the integration process. Theoretically, competition in the common economic space optimizes the cost rates and competitors quantity, but it is a long and painful process. With powerful mechanisms of state market regulation being available in Russia, Belarus and Kazakhstan, the production – consumption balances making up for the CES, can and shall become the major instruments of planning and forecasting. With them lacking, all talks about the common economic space and the customs union will remain only good intentions and profanation.

Integration of Russia and Belarus in the area of military and technical cooperation is an example of a consistent and successful cooperation of our countries. However, we could be more efficient, if there were created equal conditions for the Russian and Belarusian enterprises in obtaining the Russian defense orders. The R&D potential of Belarus in microelectronics, specialized equipment, precision mechanics and optics will not be used to its full capacity in the Union armed forces until the decrees of the Russian President limit the access of Belarus to this vast market.

Theory of economic integration and the European Union experience have proved that the common trade and industrial policy, based on programme and target management, demand and supply balances, providing for the production quotas, volumes

of sales and limit prices calculation is a normal practice of successful integration unions. There is no news of trade wars between France and Italy, Germany and Luxemburg in the reports of information agencies for last several decades. This is the result of the integration planning and regulation in the EU countries.

Yet in the EurAsEC and in the Customs Union there is no such a coordinated investment policy. This is the reason of trade wars, unequal conditions of business, and barriers in access to markets. All this puts in question the future of the common economic space.

Under the world economic crisis, when most governments of the world allocated considerable resources for the development of strategic industries, of particular importance become the joint actions of the integration unions members on the basis of concerted programme documents in the medium- and long-term perspective. It suggests the working documents being adjusted and the new strategic ones being developed. For instance, in Russia there has been developed and is being realized the Concept of the Long-Term Socio-Economic Development of the Russian Federation for 2008–2020, the Strategy of national security of the Russian Federation to 2020. The similar conceptual documents are being developed in Belarus and Kazakhstan (The Programme of the Accelerated Innovation Development of the Republic of Kazakhstan to 2014, the National Innovation Development Programme of the Republic of Belarus for 2011–2015, the Redraft Concept of National Security of the Republic of Belarus, and others.)

So far each country develops these documents on its own, this may result in different priorities of the development and their implementation instruments, enhanced methodological controversies, that in their turn may require extra efforts to narrow the differences and coordinate these documents. It seems to be unreasonable. For instance, the Concept of the Long-Term Socio-Economic Development of the Russian Federation for 2008–2020 hasn't got any reference of the Union State as the integration priorities of the cooperation in the post-Soviet territory.

Strategic planning should be made jointly and immediately using the each country's experience and knowledge. Belarus has the most long-term experience of the programme management – more than 15 years, which may be adapted

for the common goals to achieve. Such projects as the development of the power engineering cooperation, bio- and nanoindustries creation, the transport and logistics corridors «Europe – China» and «Europe – Middle East» establishing, extended framework of current and future scientific and technical programmes of the Union State with Kazakhstan and other countries joining the common economic space as future members can become the priority joint projects. The joint development of the military and technical complex has a great geopolitical potential as well.

One of the major lessons of the world economic crisis is the understanding that in the process of the national development and integration unions strategic management, the emphasis should be laid down not to the planning of the financial and economic indicators but to the strategy of scientific-technological and innovation development. In this connection, the common research and innovation area creation briefly analyzed, as one of the basic conditions to operate within the common economic space is thought to be significant. The most obvious case is the cooperation between Russia and Belarus.

Common Scientific and Innovation Area of Russia and Belarus: Creation Stages and Unsolved Problems

The history of the common research and innovation area of Belarus and Russia creation beginning from the middle of the 19th century to the present days suggests the following stages to be differentiated [23]:

- The initial stage of Belarusian-Russian research and educational cooperation in the Russian empire (second half of the XIX – 1917);
- The stage of the most close cooperation of Belarusian and Russian science within the common research and technological area of the former USSR (1929–1991);
- The stage of the bilateral cooperation of Belarusian and Russian scientists in the framework of the Agreement on scientific and technical cooperation between the Russian Federation and the Republic of Belarus (1991–1993);
- The stage of Belarusian and Russian scientific cooperation in the framework of the International Association of the Academies of Sciences (1993–2006);

- The stage of Belarusian and Russian scientific cooperation in the framework of the Agreement on the common research and technological area of the CIS countries creation (1995–2005);
- The stage of the bilateral cooperation of Belarusian and Russian scientists («integration at different speeds») in the framework of the Action Plan of the Republic of Belarus and the Russian Federation intended to realize the provisions of the Treaty on the Union State Creation, paragraph 13, «Creation of the Common Research and Technological Area» (1999–2006).

The first formal background for the close cooperation between scientists of the post-Soviet countries being renewed (in fact, this cooperation never broke, especially between Belarus and Russia) was laid in 1992, when the International Coordination Council on the Scientific and Technical Information (ICC STI) was formed. The ICC STI provided consultation support for government decrees in the sphere of the national systems of scientific and technical information based on new information technologies formation, the development of innovation activities and use of international experience of the CIS countries.

In 1993, the International Association of Academies of Sciences (IAAS) was formed, having united the national academies of the CIS countries and Vietnam (President of the IAAS – B. E. Paton, Academician of the NAS Ukraine). In November 1995, in Moscow, the CIS leadership signed the Agreement on the Common Scientific and Technological Area of the CIS Countries Creation.

Russia and Belarus have a long common history, and in the beginning of the third millennium they managed to preserve the unanimous views to the priorities of development and mechanisms of the goals achieving. As the main priority, both countries put the science and innovation way of national development. These priority lines acknowledged in both countries coincide. Goals announced by the Union State of Belarus and Russia, no visa inspection and customs borders have created favourable conditions for joint scientific and innovation activities.

Signing of the Treaty on the Union State Creation and the Action Plan of its realization was an important landmark in the process of the common scientific and technological area of Russia and Belarus creation.

In accordance with the Action Plan of the Treaty (1999), there have been developed «The Guidelines for the Common Scientific and Technological Area of the Union State Creation». In the framework of the Union State, the measures were developed to create the effective organizational background, legal, information and financial-economic conditions for the common scientific and technological area. The priority tasks of the «Guidelines» have been defined, main events for 2006–2007 have been planned, the coordinating organ, the Russian-Belarusian commission on the scientific and technological cooperation has been established. However, the Treaty on the Union State Creation did not define the principles and mechanisms for the material and intellectual potential use, meaning, first of all, the joint projects financing and property rights to the R&D results ownership.

For all that, a range of major joint projects has been realized, including the «TV and radio equipment production at the Russian and Belarusian Enterprises» («Union TV»), the programmes of the Union State «Equipment for the special chemical fibers production» for 2002–2006, «Computer technologies and equipment, new materials and instruments to treat the optical details from micro- to astrooptics, made of the traditional and non-traditional optical materials» for 2004–2008, «Development of effective and biologically safe new generation medicinal preparations based on human proteins, received from transgenic animal milk», «Development and use of advanced space tools and technologies for the purposes of economic and scientific-technological development of the Union State» (Cosmos US») for 2004 – 2007, and many other Union programmes.

Union programmes for the development of the 0,15–0,1 mc VLSICs, UHF-microelectronics, supercomputers, space exploration and the development of the Earth remote sensing systems, and many others are underway.

Naturally, in the process of the common scientific and technological, as well as scientific and educational area of Belarus and Russia creation there arise certain problems, the most important being the Action Plan of the Treaty on the Union State Creation provisions realization not accomplished in full. Of no solution still remain the problems of patents and other forms of the R&D results mutual recognition.

The process of the scientific-technical and economic programmes development persists to be highly bureaucratized, that preventing the timely response to the global competition challenges. Legal issues related to the property created within the Union State, as well as the intellectual property rights, have not been solved.

There appeared an urgent need for the full-scale innovation system created in the Union State. Beginning from 2010, it would be relevant, as a first step, to provide for the Union State targeted research subject programmes development and their financing from the Union budget. The agreed propositions on these programmes adjusted for the research priorities of the Union State and the planned scientific and technical programmes can be submitted by the Presidiums of Russian and Belarusian Academies of Sciences. The selection of Russian-Belarusian projects shall be strictly competitive.

The issue of the joint extra-budget funds to finance research should be considered, including venture funds for the predisccovery R&D financing.

Very important is the solution of the following key problem: according to the current legislation in Russia and Belarus the other country's scientists are not allowed to participate in tenders for research projects financed from the national budgets. The amendments to the legislation of both countries are welcomed for to provide the equal participation of the Russian and Belarusian scientists and institutions in the tenders for research projects in both countries. As a result, the subjects doubling will be avoided in the territory of the Union State, thus spending the allocated funds will become more rational, that, finally, will make the both countries more competitive.

Economic Background of the Customs Union: Grounds for Optimism

The Customs Union came into force on January 1, 2010. By July 2011, Russia, Belarus and Kazakhstan will have common customs border. Despite the fact that heads of governments had the flat customs rates agreed not for all groups of goods, still in the short run all products will be able to move duty-free from Polish-Belarusian to the Kazakh-Chinese border. Within the Customs

Union, the mutual deliveries of all goods (including oil and gas) are to be realized at internal prices of the producing countries.

Beginning from July 1, 2011, all types of control (border, customs and phytosanitary) are to be moved from the internal borders of the Union to its external circuit. The border control, in particular, of more closely integrated Belarus and Russia has been put already into effect since January 1, 2010. This very date became the start of the Customs Union, although the efforts have being made since 1995. Some of the objective reasons for failure in the past have already been mentioned. At the same time, the economic reality and the trade dynamics in the Eurasian space urged new conditions of trade.

In particular, the foreign trade volume between Russia and Belarus increased by 4 times, between Belarus and Kazakhstan – by 8.3 in 2000–2008. Belarusian exports to Russia grew by 2.5 times, to Kazakhstan – by 18 times.

In the crisis year of 2009, trade turnover of Belarus and Russia declined to 68.8% as compared to 2008, between Belarus and Kazakhstan – 72.3%.

Russia accounted for 47% of Belarusian foreign trade in 2009 (see Table 1). Belarus exported to Russia 31.5% of tractors, 77.7% of agricultural machines, 63.5% of trucks, 46.23% of truck tractors, 63.1% of parts and accessories for automotive engineering, 72.2% of refrigerators and freezers. The indicators for meat and meat products are even higher – 99.87%, for milk and dairy products – 83.1%. On the one side, these figures indicate the close economic relations of Belarus and Russia, yet such a tight linking to the market of only one country makes Belarus too much dependent on the Russian demand and trade policy.

Table 1. Indicators of the Belarusian foreign trade with the Customs Union partners

	Thousand US dollars, actual prices		2009 to 2008 share, %	Share of the total volume, %		Place	
	2008	2009		2008	2009	2008	2009
Russia							
turnover	34 059 252,1	23 431 091.7	68.8	47.3	47.0	1	1
export	10 551 896,1	6 713 941.9	63.6	32.4	31.5	1	1
import	23 507 356,0	16 717 149.8	71.1	59.7	58.5	1	1
balance	-12 955459,9	-10 003 207.9					

end table 1

<u>Казахстан</u>							
turnover	536 995,7	388 263.3	72.3	0.7	0.8	14	15
export	365 215,8	313 400.0	85.8	1.1	1.5	11	11
import	171 779,9	74 863.3	43.6	0.4	0.3	22	32
balance	193 435,9	238 536.7					

Russia is also the principal supplier to Belarus: in 2009, Russian share was USD 16.72 billion of the total USD 28.6 billion worth of Belarusian imports that made 58.5%. At the same time the balance of trade between Belarus and Russia was negative, making up minus USD 10 billion, that being USD 3.29 billion greater than total exports from Belarus to Russia. The main reason for that is the fuel and energy dependence on Russia. In 2009, Belarus imported from Russia USD 11.165 billion worth mineral fuel, oil and oil products, this making up 66.8% of all Belarusian fuel imports, at that the share of Russia is constantly increasing: in 2008, it was 58.9%. In 2009, Belarus had a black ink of USD 1.1 billion if disregarding the fuel and energy resources export in mutual trade. According to the annual total, Russia exported to Belarus 9 700 agricultural machines, including 799 tractors worth of USD 39 million, that being 16.5 times less than Belarusian exports to Russia [24].

Belarus is the sixth biggest foreign partner of Russia after Germany, Netherlands, Italy, China and Ukraine. It accounts for 5% of Russian total volume of exports and over 4% of imports. Russia is leading in the number of joint ventures and foreign enterprises in Belarus. Russian capital participates in 95% of the ready-made and preserved fish exports, 60% of the exported Belarusian furniture, 35% of oil products [25].

Table 2. Indicators of the Russian foreign trade with the Customs Union partners

Russia (information of the FSA)	Total in 2008, million USD	including		
		Belarus	Kazakhstan	other countries
Export	468 073.2	23 603.8	13 360.8	431 108.6
Import	266 918.4	10 585.1	6 370.2	249 963.1
Balance	201 154.8	13 018.7	6 990.6	181 145.5

%

Export	100.0%	5.0%	2.9%	92.1%
Import	100.0%	4.0%	2.4%	93.6%
Balance	100.0%	6.5%	3.5%	90.1%

Table 3. Indicators of the Kazakhstan foreign trade with the Customs Union partners

Kazakhstan (information of the CIS Committee on Statistics)	Total in 2008, million USD	including		
		Russia	Belarus	other countries
Export	71 183.0	6 370.2	171.8	64 641.0
Import	37 889.0	13 360.8	365.2	24 163.0
Balance	33 294.0	-6 990.6	-193.4	40 478.0

%

Export	100.0%	8.9%	0.2%	90.8%
Import	100.0%	35.3%	1.0%	63.8%
Balance	100.0%	-21.0%	-0.6%	121.6%

In 2009, Kazakhstan accounted for 1.1% of Belarusian exports and 0.4% of imports. Kazakhstan is the third trading partner of Belarus in the CIS, after Russia and Ukraine. Kazakhstan imports from Belarus tractors and truck tractors, milk and cream, tyres, trucks and sugar.

Kazakhstan has 3500 joint ventures with Russian capital and 70 – with Belarusian one. USD 2.3 billion of direct investments from Russia, and USD 6 million from Belarus have been attracted to Kazakhstan. Belarusian tractors, harvesters, baling machines, semitrailers, elevators and furniture are assembled in Kazakhstan. About thirty joint projects are in development, including joint exploitation of Kazakh potash salts and phosphate rock deposits (total project costs are USD 4 billion). Belarus has an agreement on a number of investment offers to be included in the Industrialization map of Kazakhstan. The Kazakh investments in Russia amount to USD 1.1 billion, USD 6.1 million are invested in Belarus.

The Customs Union: Improving the Functioning Mechanism

The principal instrument of the Customs Union trade policy is the common customs tariff (CCT), a set of flat fees for goods delivered from third countries to the common customs territory, classified in accordance with the Foreign Economic Activity Commodity Nomenclature.

The CCT was developed accounting for the customs tariffs unification level of the participating countries, volumes of imports of particular goods, import duties rate of sensitivity for particular industries, and the international obligations of the parties.

The customs tariff unification level of the Union members was different at the moment of the Union creation. Thus, for Belarus and Russia it was over 95%. Therefore, the Belarusian customs tariff regulation was to be changed at a minimal rate when the CCT came into force on January 1, 2010. Import customs duties for 8300 commodity items out of 11150 ten-digit items of the CCT remain at the level of the current Belarusian customs tariff. Run down in rates of duty for 2100 items (11.5% of imports) and rate increase for 800 items (5.3% of imports) was the outcome of this unification.

In Russia, lower tariffs will be applied to 1500 items, USD 22.5 billion of imports, or 10.5% of the total imports. Rates will be increased for 350 items. This is USD 6.4 billion of imports in 2008, or 3% of the total Russian imports.

The unification rate of the Kazakh and Russian customs tariff was estimated as of 38–40%. Lower tariff will be applied in Kazakhstan for 1100 items (3% of imports), it will be increased for 5100 items (55.7% of imports).

Naturally, due to the mentioned differences in economic structures and foreign trade flows of the participating countries the talks were not simple. Each party tried to ensure its interests at most. The leadership did their best to take the differences easy, yet they were firmly determined to come to agreement on their mutual interests.

When developing the Draft Common customs tariff, most difficult was to coordinate the import customs duties for motorcars and tractors including the agricultural machinery,

truck tractors, buses, cars and lorries. Each side tried to provide most protection to its producers against the competition, and to the consumers – against higher prices for machinery, i. e., to minimize the trade change-over effects. The Kazakh side stood for minimal levels of tariff protection for all cars and trucks. Russia was not ready for the increased import customs duties for truck tractors and lorries.

As a result of the work done, the heads of the governments made a very important decision at the meeting of the Customs Union supreme body – Intergovernmental Council of the EurAsEC in June 2009 which brought the issue to a head: import customs duties increase for all types of automotive vehicles (harvesters – 15%, but no less than 120 euro for 1 kW of engine power; new truck tractors (under 3 years in operation) of the Euro-4 class ecological level – 25%; used truck tractors, buses and lorries (medium-tonnage machinery, being in operation from 3 to 5 years) – 30%, not below 2.2 euro for 1 cubic cm of engine volume). This decision implied the increase of Belarusian and Kazakhstan duties for cars up to the Russian level (30–35%, but not below 1.2–2.8 euro for 1 cubic cm of engine volume, depending on type, volume and year of manufacturing).

Cars are the only product line with the import customs duties to be significantly increased (by 2.5–3.5 times). Were these norms applied to natural persons in Belarus, customs payment for the used car (over 5 years) imported from Germany will increase from 800 to 9600 euro. A moderately priced car at 4,000 euro with the customs clearance included will cost 13 600 euro instead of 4 800. The Nobel prize winner Paul Krugman said that according to the market critics, the customs protection measures, claimed to be motivated by the defects of the home market, mean in fact that free trade distinction is explained mostly not by the benefits exceeding the costs but by the general public being not aware of the true amount of these costs [26]. Moreover, the Agreement on the Common customs and tariff regulation provides for the settlement of this problem, when according to the Article 6, natural persons importing the commodities for noncommercial use may have preferences.

The key issue is tariffs for equipment. Two blocks of questions are on the agenda. First, there is zero rate of duty for high-tech

equipment, permitting to import 900 items from the USA, Japan, and other countries. This will give a fresh impetus to the innovation programmes of Russia, Belarus and Kazakhstan. Second, imports of equipment for investment contracts not in the list of 900, is also subjected to zero rate of duty.

It should be noted, that despite the importance of compromises on customs regulations, the customs tariff is a flexible instrument of state regulation, a kind of manual adjustment instrument with view of a particular situation and time. In 2008 alone, in Belarus, Kazakhstan and Russia duty rates were changed for 2000 items.

Of major importance is the duty rates setting authority transferred to the supranational body – the Customs Union Commission, formed on January 25, 2008, in accordance with Article 8 of Agreement on the Common customs and tariff regulation. The Commission received the unprecedented powers to regulate foreign trade in participating countries of the Customs Union. It is difficult to comment on this Commission work efficiency as yet, as it is not obvious. But principles of its membership formation may cause concern. If the backbone consists of officials, not experts, we shall get one more coordinating body that will slow down the foreign-trade operations. Up to now, there is no a clear working mechanism of the Commission, necessary to make and implement decisions in the territories of some countries. Serious attention should be paid to the problem of the distributed competence between national bodies of the customs and tariff regulation and the Commission, including the mutual control on the external borders.

The Commission makes decisions by two thirds of its members and consensus is required for sensitive goods, the list of which is approved by the supreme body of the Customs Union. Currently, the list of such sensitive goods includes 1200 items, 635 items were included at the initiative of Belarus (meat, dairy, butter and lard products, vegetables, grain, starch, sugar, woodwork, paper and cardboard, chemical fiber and filament, footwear, cargo-handling equipment, furniture). This provides for flexible tariff protection, accounting for the interests of not only the import-substituting produce manufacturers, but also the consumers of imports playing an important role in the economy.

Distribution of duty revenues is a problem of particular importance, yet it is not solved as now. As early as in 2007, in Dushanbe the leaders of the states approved the action plan for the common customs area creation, stating that the mechanism of passing and distribution of customs duties, taxes and fees should be elaborated by 2009. However, only in March 2010 the most general approaches have been developed. The paragraph on the restrictive economic measures phased removal in mutual trade following the uniform rules introduced in the economy regulation spheres, failed to be fulfilled by the target date of 2007 – 2009. These and some other problems – such as «the Customs Union formation completed (unification of the territory)» and the «registration procedure of the Uniform Certificate of goods originating from the Customs Union» – resulted in the Customs Code, uniform customs tariff (UCT) and other documents being approved in Belarus and to be enacted on January 1, 2010 only for procedures and the Customs Union structures formation. The rest will come into force on June 1, 2010 together with a package of other documents under the Treaty of 2007, provided the partners will pass all required internal procedures and deposit the documents.

With the UCT putting into practice, the concurrent conditions for the goods imported to the Customs Union member states are to be created (Fig. 1 and 2).

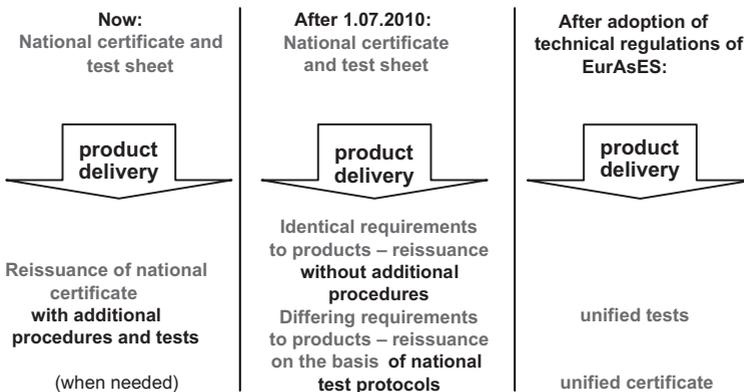


Fig. 1. Certification of products in the Customs Union

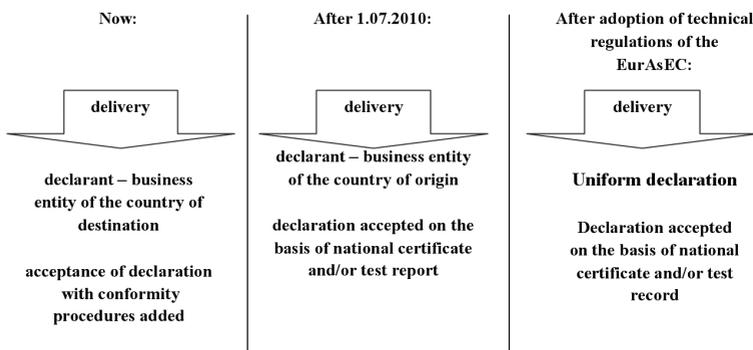


Fig. 2. Conformity declaration for produce in the Customs Union

Alongside with the Customs Code, this will provide additional economic advantages for the member states.

First, all goods control functions are transferred from the internal borders to the external circuit, that implying non-application of any customs duties in mutual trade from June 1, 2010 (from the moment of the common customs area of the Customs Union official creation in line with the stages and time-frame set, approved by the leadership of member states on June 9, 2009). Customs clearance will be done in the member state where the importer or the exporter is registered, i. e. according to the «national residency» principle. Deputies, business communities and interested citizens submitted over 150 amendments to be ratified by three Parliaments during the Customs Union Code preparation, signed on November 27. All these amendments were considered and 24 of 25 Belarusian propositions were taken into account.

Second, starting from July 1, 2010, all the producers get the duty-free access to the markets of participating countries disregarding the origin, volumes and share of raw materials used at the finished goods production. It contributes much to the scale and competitive effect, in the third countries markets included.

Most arguments were evoked by the final wording of the Customs code article on the common customs area formation. Belarus and Kazakhstan suggested this territory should be a comprehensive whole embracing the areas of three states. Russian partners insisted on the aggregate of three customs

areas. The final formulation was approved as it was suggested by Belarus and Kazakhstan.

Could all the problems of the member states economic cooperation be automatically solved when the Customs Union starts functioning? Hardly ever, and for this reason we regard this integration pattern as a ground for the next step in the integration processes.

Most sensitive for Belarus is the question of export customs duties for crude oil exported to Belarus.

According to the Article 3 of the Treaty on the common customs space and Customs Union creation, special protection, antidumping and compensation measures may be used in mutual trade between the Union partners (Article 3). And according to the Agreement of the customs duties calculation and payment procedure for the Customs Union member states (Article 9), the import customs duties are collected in compliance with the uniform customs tariff of the Customs Union; as for the export customs duties, the rates are established in accordance with the legislation of each of the participating states. This means that Russia will keep the oil export duties for Belarus as the duties compensation mechanism for oil products and exports to third countries, or will introduce world prices.

President of the Republic of Belarus expressed his principled stand on this problem in February, 2010: «If reservations are made and oil, oil products, gas, sugar, milk, butter, meat, grain, and so forth are excluded – I think neither Russia, nor Kazakhstan nor Belarus need such a customs union» [27].

The issue of compensation for the bilateral foreign trade agreements previously signed by Belarus, Russia and Kazakhstan is not yet settled. In accordance with Article 5 of the Treaty on the common customs space and Customs Union creation, the parties are not allowed to give greater trade preferences to third countries, as compared to those in action between themselves. At the same time, the status of previously signed treaties is not detailed. I think, the benefits and losses should be evaluated with consideration of bilateral obligations of the Customs Union members.

Problems of the uniform railway tariffs and coasting transportation should also be solved, as they pose significant

non-tariff restrictions in mutual trade; problems of the customs duties included and distributed, that being one of eight mandatory positions to be settled to accomplish the customs union formation (Article 2 of the Treaty on the common customs space and Customs Union creation).

In accordance with Article 3 of this Treaty, «from the moment of the common customs space creation the Parties will not use customs duties, qualitative restrictions and equivalent measures in mutual trade». Yet this article has a reservation:» Nothing in this article prevents the Parties from use of special protection, antidumping and compensation measures, as well as prohibition and limitation of exports and imports for to protect the morals, life and health of people, animals and plants, environment and cultural values, provided these prohibitions and limitations are not aimed at the unjustified discrimination and hidden limitation of trade».

Thereby this article may be used to justify any limitations for goods of the «allies» in the home market through certification, sanitary and veterinary control, antidumping duties, and other measures. There is still remains a question of the national policy pursued by the Union states justification to support their exporters accounting for such a wide range of non-tariff limitations.

According to the signed documents, the Customs Union participating state may be allowed to operate lower rates «in case of acute shortage of goods, if it is needed to satisfy the socially significant demands of the population or production development, *in case it is impossible to satisfy these demands through production of these goods or their analogues in other countries of the Customs Union*» (emphasis added). Higher tariff is considered as one of the requirements for to develop the economic branch of the member state.

At the same time, the italicized remark of the Protocol takes us to the economics' scales of the Union participants correlation. For such a small economy as Belarusian, there is no demand for goods produced in Russia, e. g., cars, that couldn't be satisfied by the «bigger» partner of the Union. Yet this rule has no retroactive force. However large Belarusian exports of meat and dairy products might be, it will not cover the demand of Russia ... and this is the pretext for introduction of special regimes

of customs protection by the partners, to say nothing about measures of non-tariff protectionism.

According to the Centre of Economic Policy Research (CEPR), in 2009 Russia became the world leader as for the number of protective measures – 20 (Germany is the second – 15, third place is shared by India and Indonesia – 10) [28]. To protect its home market, Russian government increased import duties for TV sets (from 10 to 15%), black pipes –from 10 to 15 and 20%). In the beginning of 2009, import duties for agricultural equipment grew from 5 to 15%. All these goods are Belarusian exports.

Most important is that existing limitations in trade between Belarus, Russia and Kazakhstan are the sphere of **non-tariff regulation**. These measures are in force, despite the current international treaties that preclude them.

Belarusian exporters are facing such restrictive measures in the Russian market as discrimination in access to Russian system of public purchases (15% pricing preferences for Russian suppliers); soft loans and leasing ban imposed in Russian banks; discriminated treatment of the Belarusian automobiles and agricultural machinery, including those produced in Russia as for the state purchases with subsidies is concerned; close laboratory control of Belarusian products of animal origin on the part of the Rosselkhoznadzor (Russian controlling unit for agricultural produce).

In 2009, Russia allocated funds to the OJSC «Rosagroleasing» for to increase its authorized capital and stimulate purchases of agricultural machinery and equipment, as well as to Rosselkhozbank for credits against the agricultural equipment. At that the Russian Ministry of Agriculture approved a special register of machines and equipment, mostly of Russian produce, for leasing to agricultural producers. Meanwhile the Rosselkhozbank having got the state support, was deprived the right for the foreign equipment crediting. Additional resources were allocated from the federal and regional budgets to buy the transport and special equipment for the Federation entities and municipal bodies. Most important, these programmes will be prolonged for 2010 [29].

At the same time, Russia has the complaints against Belarus, very often similar to those of Belarus, which are difficult not to be recognized.

So narrowing of differences of the Customs Union participants is an urgent problem, it should be taken into account the actual and probable losses and gains of all member states, that is particularly true for Belarus with its small-size economy and therefore extremely sensitive to any trade waivers and governmental preferences granted to national producers in the partner countries.

In this context, two major tasks to be solved in 2010 could be formulated for to create the common economic space: first, unobstructed access to the markets of the member states, and, second, equal conditions of trade and competition for all producers.

To address the first task, it would be appropriate to lodge the Customs Union Commission in the first half of 2010 with powers to settle the issues related to restrictive measures. For that purpose the Customs Union and national governments are to undertake actions to implement the Article 3 of the Treaty on the Common customs space and the Customs Union creation of October 6, 2007, which provide for a full removal of duties, quantitative restrictions and the like measures in mutual trade operations. To this end, Belarus has prepared and moved a draft resolution of the EurAsEC Interstate Council on providing the unobstructed mutual access of the Customs Union member states goods.

The second task being quite a painful problem for energy resources exporter is the uniform prices for hydrocarbons. As for the terms used in the academic framework, a clear definition should be given to the equal conditions of economic management: does this term mean the equal-income prices offered by energy resources exporters to any customer outside a producing country (a Russian suggestion, thus taking the hydrocarbons raw stock trade out of the Customs Union), or providing equal prices and access to energy resources for all Customs Union participants, according to the logic of equal competitive environment created within the Union? For the Customs Union and its member states to be a success, it is necessary to use every competitive advantage of each other to the utmost to raise the competitive capacity of Union members in the world market.

The documents similar to the EU Directives on the common energy market based on freedom of access, non-discrimination

and uniform pricing principles are to be quickly developed in the framework of the Customs Union.

It should also be taken into consideration that in recent years the Russian Federation had large-scale construction projects with major foreign investors participating (General Motors Auto, Toyota, Samsung, InvestTechMash) for tractors, cars, TV sets and other machinery production, which are the potential competitors mostly of the Belarusian exporters. For instance, under the Kama Automobile Plant projects there are being created the alliances with major international producers of commercial vehicles. The Daimler Trucks and KamAZ have announced on intention to establish the joint venture «Mercedes-Benz Trucks East». This JV is to get the exclusive rights for Mercedes-Benz and Setra trucks import. It will also sell the Japanese trucks Fuso in the Russian market.

One more claimant for its share of the Russian market is Mao Motors Group, the largest supplier of Chinese special machinery; the company is going to build the motor vehicles assembly plant and later on its basis – the construction machinery assembly plant in the town of Ussuriisk. It will produce 10 thousand vehicles per annum in the beginning, and 65 thousand when operating at full capacity.

As a result, Russia and Belarus appeared to enter a severe competition in a number of industries: petrochemical industry, food and light industry, heavy engineering industry, trucks and agricultural machinery. In this situation, of particular importance become the problems of non-discrimination, removal of non-tariff and technical barriers in trade within the Customs Union.

By now, some steps have already been made. According to the decision No 130 adopted by the Customs Union Commission (CUC) on November 27, 2009, in line with the investment projects being of great significance for national economies, the customs facilities are to be applied to follow the national legislation in the territories of three states. A necessary condition for that is a report of the CUC, which is to keep a register. The procedure of the duty-free import of goods for the statutory funds of the enterprises, which are being established with foreign investments has been specified.

However, the above is mostly related to the conditions for individual investors operation. Unfortunately, the issue of the development and realization of the common investment, industrial and agricultural policy, agreed upon at the inter-governmental level within the Customs Union, is not under consideration. This seems to make the Union an imperfect integration structure. These and other shortcomings should be removed while preparing materials on the common economic space.

The arrangements of three countries on the common customs area creation fulfilled by July 1, 2010 will be a Customs Union viability test. This includes a removal of duties on crude oil imported by Belarus from Russia since the date indicated. In case the common customs area fails to start functioning since July 1, 2010, the decision of the heads of the governments of June 9, 2009 will be considered as default. Accordingly, joint negotiations with the World Trade Organization (WTO) as part of this decision will have to be reevaluated from the point of view of the Belarusian interests.

Some Geopolitical Aspects of Eurasian Integration

From the geopolitical point of view, the Customs Union is the core of the integration cooperation within the EurAsEC. It may become a major element of the economic integration on the entire post-Soviet space. In case of the project success, the Customs Union attention value will become an important factor of the geopolitical influence in the Eurasian region.

It is common knowledge that after the Soviet Union collapse, the USA and European Union have been taking active steps in the integration blocks within CIS formation. Thus, early 1990s saw the Baltic – Black Sea – Caspian corridor strategy development through the efforts of the Baltic States, Georgia, Ukraine, Azerbaijan, Moldova and Belarus, and as early as in 1997 the Presidents of Georgia, Ukraine, Azerbaijan and Moldova signed the Communiqué on the regional alliance of GUAM formation during the EU countries summit in Strasbourg. Since 1999, after Uzbekistan joined this union, it came to be called GUUAM. This integration union was rather a political

alliance than an economic union that can be proved by the following: whereas in 1997 the share of the foreign trade turnover of the GUUAM partners in the CIS foreign trade turnover made up 10.1%, by year 2000 it had come down to 6.2% [30].

In 2003, the USA launched a new doctrine for the geopolitical development that was formulated in the *Project – 2020 as Mapping the Global Future*. The doctrine gave special attention to organization of the ‘third wave’ of democratization, which was expected to affect, in the first instance, the CIS countries; in this context, the GUUAM countries became a kind of a training ground for the Project-2020 realization. In 2003, Georgia experienced the Rose Revolution; in 2004 the Orange Revolution triumphed in Ukraine, the year 2005 saw an attempt of revolution in Uzbekistan. In May 2005, Uzbekistan notified the GUUAM member countries of its withdrawal from the union for the reason of «the substantial modification of the originally declared goals and objectives» of that regional structure.

The USA and EU have not expressed their official position on the issue of the Customs Union formation. It is obvious that the Customs Union formation and, in the future, the common economic space will significantly increase the political and economic power of Russia in the region and inevitably weaken the positions of West in the same territory.

In fact, if all the goals set in the framework of the common economic space be realized, with an extensive cooperation network of the major financial-and-industrial groups, integrated industrial and trade policies, effective innovation system, it can’t but bring about a new centre of economic and political influence in Eurasia and worldwide. Furthermore, the integrated military-industrial complex will receive additional tactical and strategic resources for development. It is significant that the single defense order is a proposition of the Treaty on the Union State of Belarus and Russia formation. If this proposition is extended to Kazakhstan and other countries of the Eurasian Economic Community, and, what is more important, be realized, it will make the advanced military cooperation between Russia and Belarus extended over the vast territory. Participation of Belarus, the only member of the Eastern Partnership (EP), in the Customs Union as party of the «three», should not be taken by the European partners

as something making the relations with the European Union of a secondary character. In practice, the free trade zone and the customs union are not incompatible with other integration models. It is supported by the fact of Russia currently working on the concept of the Tripartite Customs Union and the common European economic space (CEES) to be agreed upon with EU. The concept defines CEES as a means for a mutual «economic integration», «open and integrated market between EU and Russia, based on common or compatible rules and systems of regulation.»

It appears that deep involvement of Belarus in building up the CEES between Russia and EU may strengthen the positive effect of its participation in the Customs Union. Belarus may become a kind of a connecting link between the Customs Union of the ‘three’ and that of EU, as neither Russia nor Kazakhstan participate in the Eastern Partnership, and also as a link between Russia and EU in the context of facilitating the CEES creation.

Development of allied relations between Russia and Belarus is regarded as a special topic. Formation of the customs union is cutting down the prospects of the Union State project implementation, and may contribute to the «dilution» of the economic basis thereof. Actually, this is the result of «pragmatic and inventory» policies exercised by the current Russian leadership with respect to the Belarus – Russia relations. The problem of joining the WTO is of the same order. The decisions of the leadership of the Republic of Belarus, the Republic of Kazakhstan and the Russian Federation dated June 9, 2009, and of the Customs Union Commission dated September 25, 2009, resulted in Belarus, Russia and Kazakhstan making arrangements to negotiate on the trade regime, including the issue of the WTO joining as an integrated team.

To that end, the Customs Union Commission formed the joint delegation authorized with consultative power for to negotiate with key trading partners on the changing trade regime between the Customs Union and third countries in the context of the common customs tariff (CCT) and other regulatory instruments of the Customs Union adoption.

According to the Article 2 of the Treaty on the common customs space and the Customs Union creation, dated October 6,

2007, the common trade regime in relations with third countries is necessary for the national customs territories integration into the common customs space.

In the recent years the key WTO member countries (EU and USA) blocked the Belarus' efforts to join the WTO for certain political reasons. The decision of the leadership of Belarus, Kazakhstan, and Russia (dated June 9, 2009) makes impossible for Russia, Belarus and Kazakhstan to join WTO on the individual basis but provides for their accession as the common customs space. This position has been communicated to the WTO member countries, though some Russian politicians are still avowing on Russia's independent accession to the World Trade Organization.

Meanwhile, the Russian Federation has not yet joined the WTO; Belarus, as a member of the Customs Union, has an opportunity for a significant increase in exports of the machine-building, textiles and footwear, timber, pulp and paper products, hides and skins, furs and fur articles, and furniture. This is due to the fact that tariffs for these particular categories of goods will fall significantly in case of Russia's joining the WTO. Unlike the industrial sector, in the process of the WTO joining, Russia is planning to increase the tariff protection of the agricultural market, and this will substantially affect the interests of Belarus producers.

In accordance with the WTO rules, the procedure for admitting new WTO members is determined by acting WTO members; the Customs Union Commission adopted the decision to conduct the negotiations as a joint delegation, while commitments arising from these negotiations are to be carried out on individual basis, the Russian Federation, the Republic of Belarus and the Republic of Kazakhstan independently. Still to ensure the initial decision of the Heads of Governments dated June 9, 2009 implementation, the Customs Union Commission made a decision for the Customs Union countries getting the status of WTO member simultaneously. However, the suggested scenario makes access to the WTO rather problematic.

The customs tariffs control functions being delegated to the Customs Union Commission will deprive Russia, Kazakhstan and Belarus of this trade policy instrument independent use, including the independent obligations to third countries

and international organizations. As a consequence, the uniform customs tariff put into force on January 1, 2010, will become, in fact, the «rigid hitch», which can largely ensure the simultaneous access of all three countries to the WTO. In this context, the more real management functions will be delegated to the Customs Union Commission, the higher will be the degree of the parties interdependence and, consequently, and thus the probability of the common customs space becoming a reality within the planned period.

On relations with the European Union. It seems that the European Union, while building up its relations with the new integration formation, i. e. the Customs Union, will do its best to ensure the most favourable conditions for their products access to the markets of Russia, Belarus and Kazakhstan.

It would be appropriate that the EU put away its traditional double standards policy: not «seeing» its own restrictive measures that impede the products of the «three» access to the EU market (quotas on textiles imports from Belarus, quotas on imports of steel products from Russia and Kazakhstan); reproaches to the Customs Union for worsening the terms of trade (for example, when the rate of import duties for some specific goods within the common customs space is to be increased as against the duties applied earlier).

The Customs Union Commission should initiate the consultations with the EU to prevent the counter-moves of the European countries to restrict the export operations in response to the average import customs tariffs increase. For example, after changing-over to the common customs tariff, the average import customs tariff in Belarus will increase from 9.8% to 12.2%. The increase in tariff rates will affect 5.3% of the total imports of Belarus (including imports of textiles from the EU countries), or 12.9% of imports from third countries. At the same time, after the common customs tariff will come into force, Belarus will forfeit its right to apply preferential tariffs in respect of the EU goods and will apply the rates, provided by CCT, which will ensure a more efficient protection of the light industry of the Customs Union.

The common customs space regarded as a whole rather than as its individual constituents is thus more open for European products than in case of the national customs tariffs being used.

Therefore, it is logical for foreign investors to boost their investing activities in the Customs Union. As for transnational corporations, creation of the Customs Union is a historic chance for them to consolidate their industrial, commercial and financial presence in this immense and growing market.

Conclusion

The study of theoretical and practical aspects of the Customs Union of Belarus, Kazakhstan and Russia formation makes it possible to make the following conclusions.

1. In the periods of world economic crises, under the conditions of growing protectionist tendencies, the formation and development of various forms of integrated unions make an effective method of counteracting the crisis emergences. In this context, the creation of the Customs Union of Belarus, Kazakhstan and Russia may be characterized as a competent macroeconomic and daring political solution.

2. Theory proves and world practice verifies that the customs union appears to be one of the stages of the international economic integration, when the necessary conditions are created for the transition to the next stage with the greater opportunities – a common economic space.

3. For the Republic Belarus and Russian Federation, which had already, in fact, duty-free trade between them at the moment of the Customs Union establishing, the basic source to increase the trade and production efficiency is the creation of preconditions for the next stage of integration – a common economic space.

4. The most important of the these preconditions are seemed to be the following:

creation of equal economic conditions for all economic agents of the Customs Union, including uniform pricing, equal access to competitive tenders for state orders, state preferences, soft loans, etc.;

improved environment for free movement of labour and capital, information and other production factors in the Customs Union space, improving the mechanisms of the common foreign trade, taxation, industrial and price policy;

formation of mechanisms of joint strategic planning and target programme management, including coordinated development of the conceptual documents, the system of the production –

consumption balances for the Customs Union participants development, improved legislation for joint scientific-technical programmes and innovation projects arrangement and financing.

5. One of the most important conditions for the Customs Union effective functioning is the removal of non-tariff restrictions, still implied not only in their traditional forms as quotas or voluntary export restrictions, but the whole range of the specific, indirect tools: technical, medical and ecological standards, restricted access to the marketing networks and credits, public purchases terms, administrative barriers.

6. In the framework of the Customs Union, and later in the common economic space, it seems feasible to optimize all kinds of economic resources use in the participating countries by rejecting the practice of the new duplicate industries or infrastructure facilities creation. For this purpose, it would be reasonable to develop the mechanism of the member states investment decisions on the large-scale industrial and infrastructural projects (new industries, pipelines, etc.) coordination, irrespective of the form of property, at the level of the Heads of governments Council.

7. Of vital importance is the final adjustment of principles and mechanisms of the Customs Union Commission operation, which should be recruited from the higher-level professionals and should equally ensure the realization of economic interests of all the participating countries. Under the conditions when the Union participants have got quite a lot of differences and contradictions in their economic structures, socio-economic development mechanisms, etc., the Customs Union Commission is charged with enormous responsibility in the interests of all the countries harmonization and the objective contradictions overcoming. Actually, the Commission future work may be viewed as a prototype of some supranational authority in the common economic space.

8. If all the goals set in the framework of the common economic space creation come to be realized, with an extensive cooperation network of the major financial-and-industrial groups, integrated industrial and trade policy, effective innovation system, it would be a forcible argument for the Union enlargement involving other EurAsEC countries, that will result in the new centre of economic and political influence in Eurasia and in the world.

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Innovation

The Government Role in the Innovation Process

In the present context of the global competition the state's potential to satisfy the growing requirements of the society is defined first of all by the level of its scientific and technological development. Therefore one of the strategic objectives for the transition countries is their aiming at the innovation development. Only the aggressive innovation strategy raised to the level of the national policy may serve as a basis for the competitive economy [1].

The strategy of the innovation development has no alternative and it should subordinate the policy of reforms and transformations, the tactics of the specific acts in all spheres of public and social life. It is obvious that only countries with modern technological potential and flexible economic mechanism sensitive to the changing lines of scientific and technological development and changing pattern of demand can get substantial added value [2]. And on the other hand, the greater innovation activity of the national economic entities is one of the key factors of their dynamic development [3].

At present the long-range economic growth is not so much determined by the physical increase of labour and capital. The decisive role is played here by the factors of production general efficiency stipulated mostly by the scientific and technological progress [4]. Therefore of particular importance becomes the concept of the scientific and technological development system formed on the macroeconomic level and being a significant factor of the accelerated economic growth [5].

The innovations are usually realized at particular organizations, such as the enterprises, branches, institutions. And as far as an organization is a hierarchical structure, so the innovation process is being governed, planned and organized

within some administrative system. The market factors make only stimuli for innovations (these representing the greatest problem in Belarus) while the very process is mainly organized by governments, project managers, special foundations. That's why the economy can be transferred to the innovation basis only in the result of the joint system transformation encompassing all spheres of social life. Not only the scientific and technical sphere but all the socioeconomic processes should possess a vigorous innovative element and practically use the functional innovations being social, economic, political, administrative and cultural ones. Innovational processes in the spheres of engineering and technology, investment and structural reforms are to be combined with further market transformation of the production, with improved centralized methods of innovations management, to be initiated and recharged by them.

Like any complex system with a complicated structure of management this situation inevitably involves a lot of objective problems.

Disregarding the growth of incomes and effective demand of the people achieved in the last period of time, the enterprises as being the key customers of the innovative technologies haven't yet available enough resources for capital renewals. The household savings are not yet effectively used to be aimed at the investment purposes. A lack of fair competition also decreases the innovative demand. The production management system possesses an insignificant relationship between the managers well-being and status and the viability of the works and business managed by them, the main reason being the business owners (the government included) lacking the active instruments to influence the effective decision-making.

What can be suggested? The Academy of Sciences is concerned on the slowness the country is changing over to the innovation way of development and not once it suggested the system measures to improve the situation. Yet most of them are not realized up to now. By order of the President of the Republic of Belarus there has been developed and adopted the Innovation Development Programme of the Republic of Belarus for 2006–2010, including also the system approach to the national innovation system and economy modernization.

In the process of economic modernization the priority should be given to the improvement of the socioeconomic basis of production, social and production relations, all the socioeconomic institutions. Just these factors are a precondition for the progress in the technical and technological base formation and in the production dynamics.

On the macroeconomic level of primary importance is the subsystem of the strategic planning being included into the system of management. At the same time the national innovation development plans are to be supported by the strategic plans of the enterprises (of all forms of ownership), branches, joint programmes for the foreign trade expansion of the manufacturing, commercial and finance organizations. In turn the exportation of goods should be supported by Belarus positioned on the world market as an active player of the stock market and market of intellectual services and technologies.

The economic growth should be provided by higher efficiency of all resources use, national economic structure modernization and renewal of assortment. As an important system instrument there can be put forward the main indicators of the labour productivity efficiency and quality and the rate of products updating.

To achieve these goals it is necessary to expand the investment base of economy and to raise the return on capital investment, the foreign one included. Yet the foreign investment should be attracted as only accompanied by the imported post-industrial technologies, including the managerial ones. Still more important is to expand the domestic sources of capital investment, to encourage the savings and their effective use.

To realize the indicated goals it is necessary not only to use the direct state financial support but to help the enterprises with the right investment strategy of development selection. It demands that the governmental bodies could have been able to evaluate adequately the perspective lines of the world scientific and technological progress, competitive possibilities of certain national economic branches and necessary support measures. So the necessary formation of the regular national system of strategic planning can be stressed again.

A true scientific and technological strategy should integrate the innovation development experience of the world economy

leading countries, on the one hand, and the national features and historic goal of the national sovereign state building, on the other. It should be noted that a strategic purpose of the selected priorities is to determine the national industrial specialization in the system of the world economic relations.

At present the state is aimed to support all the entities. Yet the time for survival and even economic growth at the expense of the resources has passed already. The problem is related to the development as a higher and improved stage of growth.

Good examples can be cited: the strategic course of Belarus is to change over to the innovation development that has been initiated by the President and the government of the Republic of Belarus in 2005–2006. This transition may be based on the programme and target-oriented methods of the state economic government improvement.

First in the history of the Republic of Belarus the priority lines of the scientific and technological activity were approved by the Decree of the President (of 06.07.2005, N 315), and the priority lines of basic and applied researches – by the decision of the Council of Ministers (of 17.05.2005, N 512). These system documents having been adopted in advance resulted in the necessary conditions set up on a national level for the science potential of the country to be effectively used, new markets of the science-intensive products to be formed and the existing ones – to be kept operating.

The State Programme for Innovation Development of the Republic of Belarus for 2006–2010 has been developed to create the necessary conditions for the scientific and technological potential of the country development, to introduce the results of the R&D to the real sector of economy.

The strategic goal of this Programme is the knowledge-based economy creation being competitive in the world market, and first of all, socially oriented providing the living standard of the people growth. While the Programme of socioeconomic development of the Republic of Belarus for 2006–2010 has laid the key target parameters of our social development, the Programme for Innovation Development provided the instruments of these ambitious goals achievement.

According to the aims set up in the Programme, by 2010 the domestic expenditures for R&D are to be increased by 2.5–

3 times, number of researchers to be increased also, advanced industrial output to be increased by 18–20%, the share of progressive technologies to become greater, the rate of the certified according to the international standards industrial product to reach 70%. The share of the innovative active enterprises will become higher.

Significant is the fact that the production modernization will be based primarily on the developments of the Belarusian scientists. Thus, the rate of the Belarusian developments taken as a ground for 67 new enterprises and modern industries in cluster structures will be 67%. 12% of the projects will be grounded on foreign developments and for other 21% of the projects the technologies will be defined on a competitive basis. Of new industries with the new technologies mastered at the operating works (totally 315 ones are planned to be created) these figures will be accordingly 72.2% and 8%. Finally, in the process of about 500 operating works modernization, there will be introduced 713 advanced (new and high) technologies, 79% of which based on the domestic developments, 11% – on foreign technologies and 10% – on competitive selection basis.

This complex of measures enables the economy to develop 8–9% of GDP growth rate annually and to come close to the indicators of European states, including the GDP volume of production per capita.

The scientists expect the Programme to be realized on a full scale. It can be possible in case the actual development won't be substituted by the submitted reports and cosmetic reorganizations in economy and legislation.

Examples of the national programmes for scientific and technological development influence on the economy are numerous and manifold in the world practice. Often it had a decisive meaning in providing the significant progress in the industrial structure or product line group.

Thus, since early 1990s in the developed countries there were realized the innovation programmes of transition from analog to digital television. In 2001 in Finland, USA there was adopted a programme for the development of the biomass technology use, providing for the vegetal stuff used by

chemical industry. In Japan by 2002 there was accomplished the programme of the coal industry total curtailment.

Such programmes are very effective for further economic development of the country. Still rather significant is the cost of possible errors by taking the like measures. For instance, in post-war period in Japan an abortive attempt has been undertaken to develop the ship-building as one of the leading economic branches of the country. In future the country has found an alternative decision having staked on the electronics. However the global error was obvious.

The analysis shows the danger of both the state retreat from the strategy and system of priorities development process and unjustified economical and social intrusion of some concepts, and particularly those caused by corruption processes. To avoid these negative phenomena it is necessary to arrange the open for critical analysis interaction of science, government, business and public.

Today the industrial countries of the world have good practice of the state encouraging the innovation activity of enterprises through tax and rate of interest decrease, grants and privileges, that making the innovation process still more sustainable. Surely, for this purpose the state should have an appropriate financial base and could afford the risk of greater budgeted deficit.

The necessity to undertake the economy effort to debar the diversion of means from the improvement of the economy and social sphere support seems obvious. At the same time the state should henceforth retain the possibility to stimulate the major innovation projects, certain economic targets by point financing, as well as to cross some critical point in the sphere of welfare costs.

In domestic economy it is necessary to maintain the conditions of fair competition, to eliminate the events of monopolism, to get rid of paternalism and social dependence. At the same time of greater importance is the further development of the social protection system being adequate to new circumstances. Reasonable combination of all these activities is one of the most complicated tasks to be solved in the process of economic modernization.

Macroeconomic stabilization, resumption of production growth should not shade the problem of its quality and efficiency. The immediate task, that of improved quality and higher competitiveness, becomes a factor of economic security of Belarus taking into account that near all the neighbouring countries have already joined or are to join soon the WTO. The government has at its disposal a number of instruments to stimulate the innovation development beside the investment. Thus, should be mentioned the state insurance of the investment risks (venture activity). The state guarantees should contribute to the securities market development, that being a significant factor of the capital accumulation and movements. At the same time the business climate can be improved also through the debureaucratization of society, i. e. decreased licensing authority of the state, unjustified intrusion to the economic activities of enterprises abandoned.

Due to some reasons the economic entities are not yet able to ensure the innovation development by themselves. The problem is urgent not because of the scarce resources, but due to the fact that operating market institutions are not very much aimed at the economic growth and innovations, that impeding the investment process development and benefits got. Is there any possibility to solve this problem on a national level?

There is good reason to believe that state assistance in, for instance, efficient banking system formation would have been of greater importance than greater budget injections to the production sector. The banks having obtained a license to create the venture financing funds might contribute to the innovation development. And those funds that could be accumulated by the state budget are to be applied in accordance with rigid system of scientific, scientific and technological and economic priorities to strengthen the scientific sphere of the country, to create and develop the strategically important objects.

Still urgent is a problem of the innovation activity incentives system formation and related to it a motivation system, as the effective reproduction relations of science and engineering based on a well-defined legal ground and a developed innovation infrastructure are not debugged. The production is not well-informed and oriented at the latest trends of science

and technologies development, including the profitability and availability of their certain lines. Artificial obstacles have been made impeding the R&D market mechanisms to be assimilated by science.

Of greater importance for innovation development under globalization conditions are further international division of labour, specialization and co-operation of industries, and particularly their being included into the world system of financial flows and involved into the sphere of the transnational corporations activities.

The key role in these processes belongs to the financial and industrial groups. With good reason it is considered necessary for the economic problems solution to form the major integrated financial and industrial units with their potential being able to provide the investment support of the innovation processes. Yet the problem of the capital concentration in the innovation process is not so simple. The routine «agglomeration campaign» shouldn't be allowed, it being fraught with economically ill-founded amalgamation of industries (particularly in government sector) and market monopolization.

The notorious «opacity» of the financial and industrial groups may camouflage the negative phenomena. That's why they should be formed in the framework of the antimonopoly law, as at some successive stage the adequate antitrust law application with respect to them may be viewed as expedient. It won't be reasonable to concentrate the efforts of the government on exceptionally these groups support, as the problems of the innovation development may be well solved by the small and medium-sized enterprises also. Alongside with the highly-concentrated financial and industrial units there should be formed also the decentralized sector of the network structures.

A very important feature of the modern stage of the scientific and technological progress in the world is its humanitarian characteristic. The harmonization of the relations tasks in the classical triad «nature – human being – society» pass from the universe of discourse to the field of application. In Belarus it is realized through the national strategy of sustainable development and is revealed, first of all, in that the state had inevitably to perform the functions of the innovation process regulation

being guided by the social and ecological criteria; these problems can't be solved directly by the market, still occasionally they may have a decisive meaning.

Therefore the state shouldn't be dispensed from the obligation to prevent or temper somehow the impact of the innovation process which may have a negative effect on some social groups of population, bring to the irrational nature management and environmental pollution.

In the result of the transition to the sustainable development model the importance of the human factor in the innovation process has been raised considerably. And now it is obvious that the nearest future will bring about new forms of human relations and ties at work and at home, will reveal new needs and ways they can be satisfied, will shape new incentives for the economic and social activity of the people based on the humanistic principles of development.

In this respect should be mentioned the goal formulated by the President of the Republic of Belarus A. Lukashenko as being of extreme importance – to realize the principle «the state for the people» meaning that the main purpose and value of the public policy is a man, his development, well-being and protectability. It is a topical and timely issue. The Belarusian national policy of the last decades has been pursued in the interests of the people. Still to declare this goal and so to ensure its realization on the national level there should be accumulated sufficient potential – in the wide sense – meaning economic, political, organizational one.

The evolutional and forward movement of the national economy acquired recently the sustainable and dynamic character, that being a result of the successive economic reforms with the effective public institutions attracted, avoiding the breaking and abolishment of the formed economic foundations and traditional labour activity profile of the people.

To give a new impulse to the process of the higher living standard of the people and to improve their quality of life will greatly depend on the conditions created by the state for the people could be active in improving their own and their families well-being. In modern conditions it means, first of all, the creative character of people's activities stimulation, encouraging

the innovation way of thinking as being the most appropriate if not the only way to future private and social prosperity.

A famous Russian philosopher S. L. Frank wrote: «The most important social value of the middle classes is understanding of impossibility to get rich with the help of any mechanical state or revolutionary events (that being the way of the lower classes). The main point of their moral standard is the following: economic prosperity intrinsically depends upon their diligence, energy, enterprise and education» [6].

Of primary importance in this situation will become the effective owners and managers working under the conditions of market competitiveness and venture activity, and so entitled to initiative and risk. The attitude to the scientists will change as well. As a result of the creative estimation of their activity the work of the researchers will not only be demanded but estimated at its true worth. Because the future society is the society based on knowledge.

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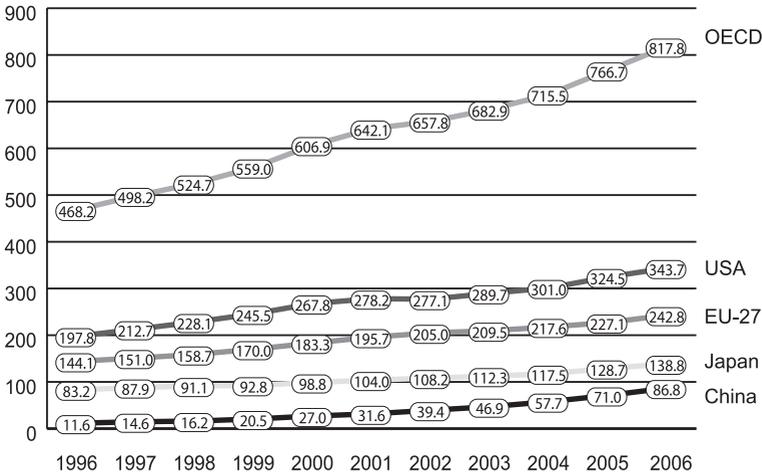
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Global Trends of the Science and Innovation Financing: A Case Study of Belarus

The growth rates of the science, technologies and innovation expenditures in the first decade of new millennium were several times as great as those of the GDP in all the regions of the world and reached the maximum meaning for the whole history of study. The Fig. 1 gives some data [1].

As shown by the Fig. 1, the R&D expenditures of the OECD countries in the 10-year-period, 1996–2006, in real terms increased by 1.75 times (from 468 billion USD to 818 billion USD). The expanding economies of BRICS (Brazil, Russia, India,



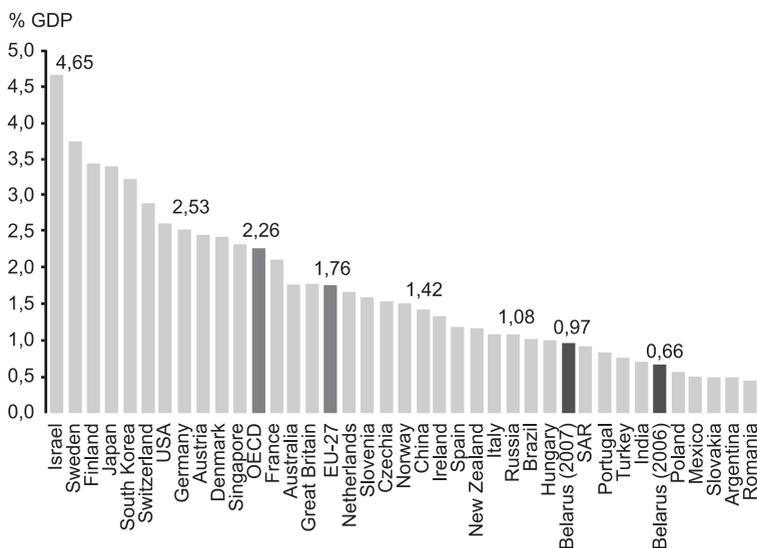
Source: authoring based on the OECD data, Eurostat.

Fig. 1. R&D expenditures in different countries of the world, billion USD, at the PPP prices

China, South African Republic) have considerably enlarged their science programmes, became conspicuous players on the market of technologies and innovations. Often are recited the enthusiastic judgements on the Chinese phenomenon. However China in 2006 alone spent for the R&D 86.8 billion USD in total (at the PPP prices) while all the R&D expenditures growth in the last decade in China was on average over 20% per year. To compare: Japan, EU and USA increased on average by 5% annually for these purposes in comparative prices.

In Belarus the R&D expenditures increased in 1997–2007 by 2.7 times [2]. In fixed prices of 2005 and measured at the PPP our expenditures for these purposes equaled in 2007 to 1 billion USD, at the rate in current prices it is about 450 million USD. Is it much or not? To estimate we'll pass on to the relative indices, the most recognized of which is the R&D/GDP intensity, i. e. relation of all R&D expenditures to the GDP (Fig. 2).

As shown by the Fig. 2, all the leading countries with a high standard of living have a high rate R&D/GDP intensity. Only new



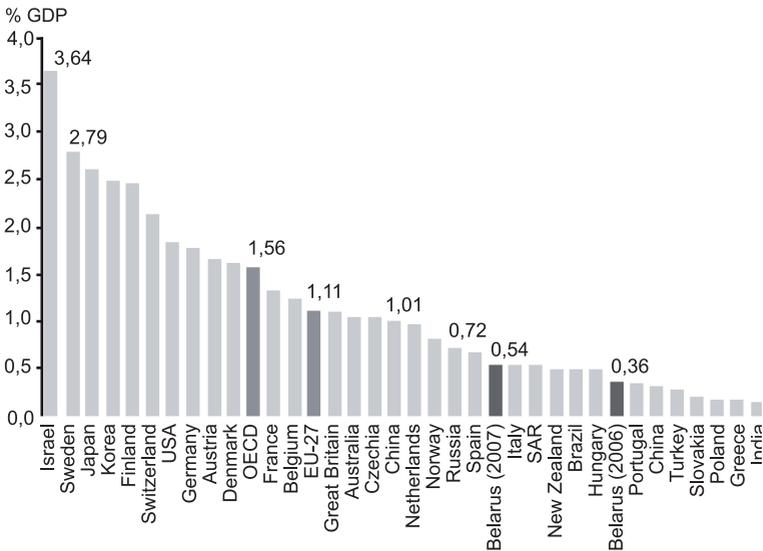
Source: authoring based on the OECD data, Eurostat.

Fig. 2. R&D/GDP intensity of different countries of the world in 2006

markets and innovation products can ensure profits and multiple return on contributed capital, strategic stock in the perspective market segments and technologies. For that purpose the national innovation systems are created to ensure the generation of science knowledge, its commercialization and bringing to the market, and all that requires the priority financing of the R&D.

The R&D intensity meaning of Belarusian GDP in 2007 in the Figure is emphasized – 0.97% (in 2006 – 0.66). By this indicator the Republic of Belarus passes ahead India, Slovakia, Portugal, Poland. Still unattainable remains the level of EU-27, with the R&D/GDP intensity of 1.76% and the average level of the OECD countries – 2.26%. The world leaders by the R&D/GDP intensity are as before 5 countries – Israel (4.65%), Sweden (3.73%), Japan (3.45%), Korea (3.39%), Finland (3.23%), with this indicator exceeding 3%. In Russia the R&D/GDP intensity is 1.08%, in China – 1.42%.

In the R&D expenditures under the market conditions the key role, naturally, should be played by business (Fig. 3).



Source: authoring based on the OECD data, Eurostat.

Fig. 3. Business expenditures on R&D to GDP of different countries of the world in 2006

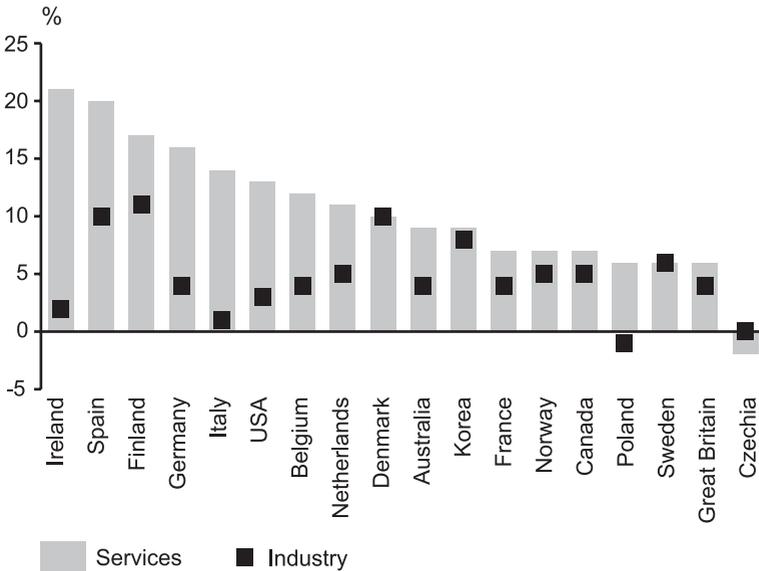
In the OECD countries near 70% of all R&D expenditures are provided by business (Fig. 3). Similar is the Chinese indicator. In Japan – it is 77%, in Russia – 67%, in Belarus – 61%. It means that the viable national programmes on R&D prove their efficiency in practice, while the national companies are accumulating strength for active competition on the global markets. Of course, it is not so simple to make fiscal and credit incentives for economic agents, raise their innovativeness as it is the most intricate problem. Not all the countries having the established and effective institutions, developed financial system are always successful. For instance, the EU put a goal of ensuring not less 2% of the GDP expenditures for science and innovation by 2010 at the expense of business. Even the European countries most likely will fail to reach this goal (at present this indicator in the EU is 1.11%). And this situation existed in the conditions of comparatively stable business environment, economic growth and cheap credit resources. In the conditions of financial turbulence in the world the state should take active measures to support science, increasing direct allocations and creating the incentives for the R&D to be financed by business.

It's very important to emphasize the key factors which explain the different business contribution to the R&D/GDP intensity in different countries. First, it is the specialization of the economy: those states which specialize in science intensive spheres (microelectronics, pharmacy, medicine) have naturally greater business contribution to the R&D. Second important factor is the economic scale of the major national companies. At the same time, significant is the fact that economic specialization of the country in technological sphere may be ensured by the small and medium-sized business. For instance, companies employing less than 250 workers ensure the prime costs of business for the R&D in such countries, as New Zealand (73%), Greece (53%), Norway (52%), Slovakia (51%). Moreover, in New Zealand, Australia, Norway and Ireland over 20% of all business expenditures for the R&D are covered by the companies enlisting 50 employees and less.

Significant is also the arising global trend of the services sector growth rate in the R&D costs (Fig. 4). Despite the fact that main share of R&D costs falls on industry, the services

sector displays the increasing demand for innovation. Practically in all the OECD countries, except Czechia, R&D investment in services sector succeeded the R&D investment in industry by the growth rates. In the CIS countries, unfortunately, the situation is different. Hence the services sector share in the GDP of all the CIS countries remains not high.

Business participation in the new projects financing under the financial crisis will evidently become low, still the trend of the business greater contribution to the R&D expenditures is expected to be maintained, as after the crisis those who got firmly established have to enter the new segments of global market. In the period of the financial instability the state role becomes of particular importance in the sphere of science and innovation as it has to ensure the incentives to keep the positive trend related to the business contribution to science financing, on the one hand, and on the other – to support the sphere

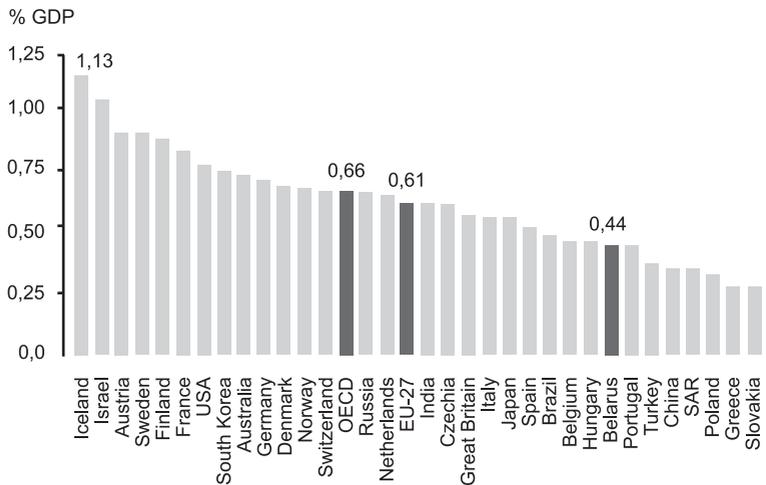


Source: authoring based on the OECD data, Eurostat.

Fig. 4. Business R&D growth rates in industry and services sector (1995–2004) in some countries of the world

of science and innovation through increased government funding. The Fig. 5 shows the data of the government R&D/GDP expenditures for different countries of the world in 2006. As evident, the average indicator for the OECD countries is 0.66% of the GDP, for the EU-27 – it is lower – 0.61%. The upper bounds of the state participation in the R&D financing are the following: in Iceland (1.13%), Israel (1.03%), Austria (0.9%). In the Republic of Belarus this indicator in 2006 was 0.44%, that exceeds Turkey, China, SAR, Poland, Greece.

A very important element in the state policy on science and technologies is the goal setting, including the quantitative objectives of the R&D/GDP intensity definition and the scientific and technological policy priorities formation. The table gives the objectives of the R&D/GDP intensity set forth by the developed countries: Austria – 3% of GDP by 2010, Sweden – 4% by 2010, Finland – 4% by 2010, Korea – 5% by 2012; China and Russia – 2% by 2010; Belarus – 1.2–1.4 % of GDP by 2010. The actual data are given in the 3rd column. Analyzing the data it is obvious, that Belarus and Russia are not reaching their goals. The similar



Source: authoring based on the OECD data, Eurostat.

Fig. 5. Government expenditures on R&D/GDP of different countries of the world in 2006

is the situation in a number of countries of EU. The expected slowdown of the science financing growth is related partly to the crisis. Yet the target quantitative indicator of state and business participation in the science financing is very important for at least to define the state policy and economic agents expectation vector. Of course, it is necessary not only to set the objectives of the R&D/GDP intensity but to suggest the effective programmes of business participation in these expenditures, create the tax and financial incentives, offer the private-state partnership and risk sharing mechanisms.

Target and actual values of the GDP science intensity

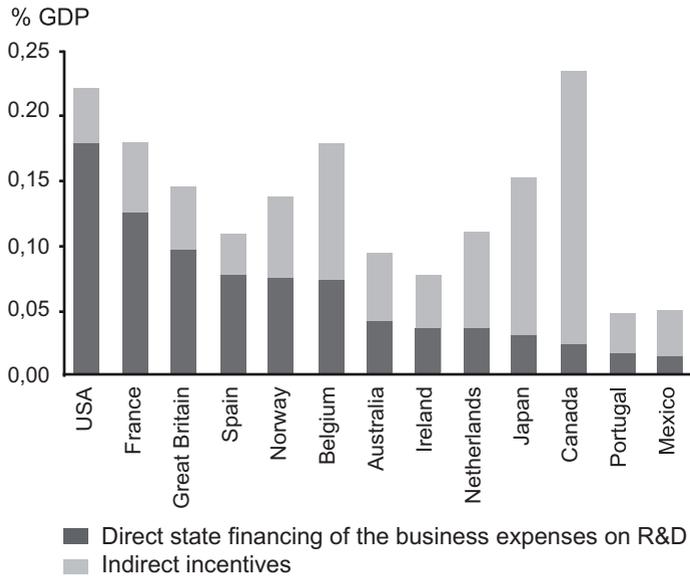
Country	Target, % to GDP	Actual (2006), % to GDP
Austria	3% by 2010	2.45%
Sweden	4% by 2010	3.73%
Finland	4% by 2011	3.45%
Korea	5% by 2012	3.23%
Germany	3% by 2010	2.53%
EU-27	3% by 2010	1.76%
Poland	2.2%-3% by 2010	0.56%
Belarus	1.2–1.4% by 2010	0.97 (2007)
China	2% by 2010	1.42%
Russia	2% by 2010	1.08%

Source: authoring based on the OECD data.

At present a global change of the science and innovation support instruments takes place in the world, that being a shift from the direct state support measures to the indirect ones. In 2008 21 OECD countries provided business with different tax remissions in the R&D sphere as compared to 12 countries in 1995. Today Germany, Iceland, Sweden included in this category are considering their application. Such countries as Brazil, China, India, Singapore having a developed system of fiscal incentives for business are contributing to science and innovations. Some estimations in money terms of the innovative active business support given through the available indirect incentives

are shown in the Fig. 6. The indirect support instruments are of particular significance in the period of the global competition for resources, location of science intensive industries in certain country, integration to the multinational corporations. For many CIS countries of interest is the Russian experience with its created state corporations becoming an important subject of innovation system. It seems obvious that Belarus should integrate to similar projects and build up the innovation productions in the framework of the common free market zone of the Union State and the European-Asian Economic Community.

Growth of the science state support should be in line with greater responsibility of the budgetary funds recipients, competitive mechanism of the state order for the R&D, well-defined indicators system reflecting the effectiveness and target use of the funds received. In the innovation policy becomes greater the role of the «microdata», review of the

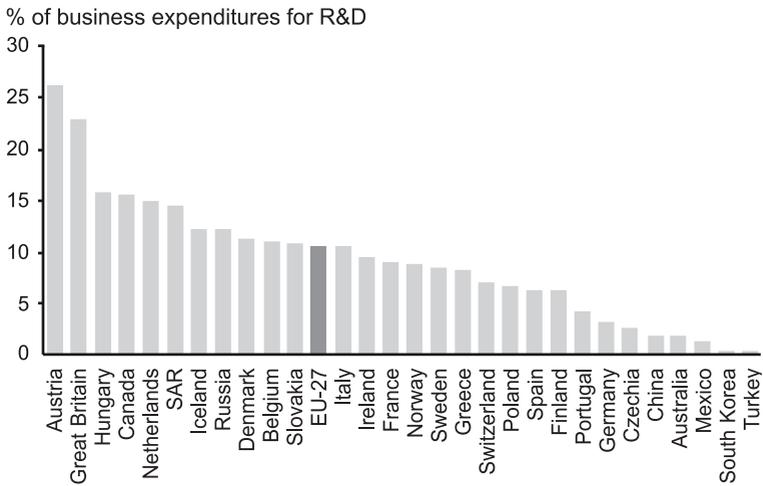


Source: authoring based on the OECD data, Eurostat.

Fig. 6. Direct and indirect state support for the R&D in different countries of the world (2005, 2006)

particular innovation entities and business units. Exactly this sort of the programme for the selective surveys to reveal the particular problems of real economy, innovation export, international co-operation should be created.

The global trend of the R&D internalization becomes more consolidated. Surely, the international co-operation in science is not something new, yet the fact of the matter is changing. If earlier research on the whole represented the works dealing with the current technologies and services adapting to the local conditions, so now, in the age of the knowledge-based economy many multinational corporations are looking for not only their technologies recipients but for a base for these technologies being expanded and form the proper science networks. In some countries – Austria and Great Britain – the R&D external financing amounts to a quarter of the total sum of business expenses for R&D. On average, in the EU-27 this indicator is 11% (Fig. 7). Taking into account the scale of business financing of the research programmes in Europe this R&D



Source: authoring based on the OECD data, Eurostat.

Fig. 7. R&D financing by nonresidents in different countries of the world (2005, 2006)

capital flow is evident of the R&D global market formation. During the last 5 years the SAR and Slovakia display a considerable growth of external financing – amounting to 10% of total government expenses for R&D. Impressive is the growth in Finland and Sweden running to 6%. For Belarus it is of particular importance that considerable growth of the R&D external financing in small countries happens after the national producers having been embedded into the multinational corporations and joint ventures having been organized in their countries.

The investors are to be attracted to not only production but science and high-technological spheres as well. The national policy should be aimed just at that. At the same time the Belarusian scientists should embed to the modern chains of value formation in science, innovation knowledge and technologies. And it should be admitted that Belarus hasn't got yet a sterling national legislation to regulate these issues.

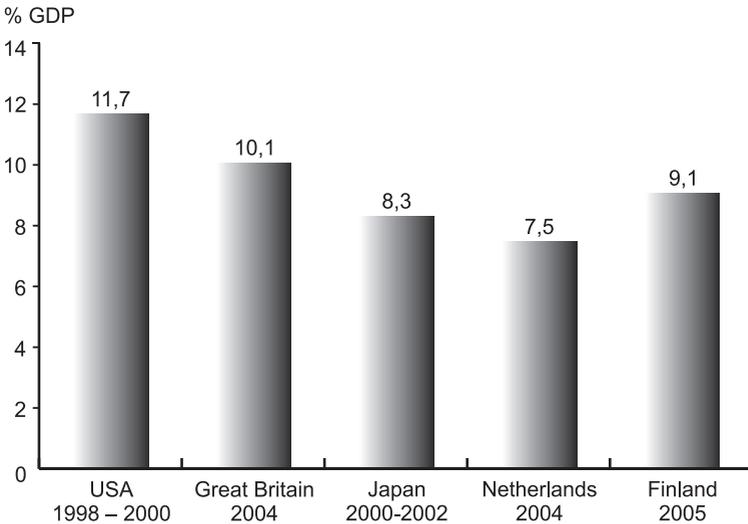
In Europe the new forms of international integration having been put forward, that being European research space. The CIS countries at a number of reasons, historical and mental ones included, stay self-contained and the integration process in science is too slow. Why in the CIS we are so lagging behind Europe in the science integration sphere if we have a common linguistic base and intertwined scientific schools? The matter is seemed to be related to not the financial situation but the organization of work. Our governments can offer not less than the leading CIS research teams are receiving on European grants within the Sixth and Seventh Framework Programmes. We need a political decision on the common research area of the Commonwealth real formation. The International Association of the Academies of Sciences can serve as a basis. There should be solved a problem of the CIS research financing fund formation, and one more significant decision is to be made – may be on a two-way basis – the researchers from other country participating on equal terms in the open national competitions.

A significant feature of the science globalization is patent growth in joint authorship with foreign colleagues as their share increased in the world from 4.6% in 1990s to 7.3% in 2003–2006. A number of international publications with foreign co-

authors is increasing also. In general the role of intellectual property in the world economy becomes greater. The world faces the burst of the patent and publication activity. Intellectual property (patents, know-how, technologies) has become a physical commodity, which can be sold and bought, can bring real money. In the CIS this sector of economy hasn't yet been developed.

Fig. 8 shows the data on investment in the intellectual property objects in the developed countries of the world. In the USA in 1998–2000 it averaged to 11.7% of GDP per annum, in Great Britain in 2004 – 10.1% of GDP per annum, etc.

Today the intangible assets are not only patents, know-how and trade marks. Here should be added also the backbone competences of the organization (databases, excellence networks) and sales networks (logistic schemes, sales systems). There is good reason to believe that such assets, as well as scientific ideas can be accepted as credit pledge, so there should be a system of the venture financing institutions.

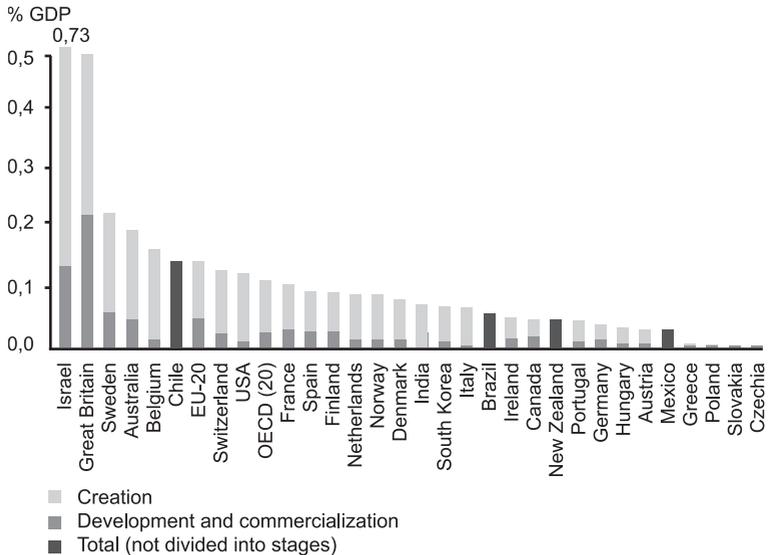


Source: authoring based on the OECD data, Eurostat.

Fig. 8. Investment to intangible assets in some countries of the world

As can be seen in Fig. 9, the countries with higher rates of the R&D/GDP intensity can afford to spend much on their ideas running in. In Israel the share of venture investment is 0.73% of GDP, in Great Britain – about 0.5%. On average the EU-20 countries have 0.15%, and many other countries are not seen on this diagram at all, the CIS ones included, unfortunately.

In general we can make a conclusion that role of the national states in the CIS in investment policy should be increased. But at the same time the emphasis should be moved from the direct participation to the indirect instruments of stimulation, from state order to the priorities determined and their support, to policy of clusters, innovation networks, small innovation companies support. The key instruments of state promotion may be the following: tax credit, differential taxation, simplified bookkeeping and administration, techno-parks and incubators, innovation technologies and markets exchanges.



Source: authoring based on the OECD data, Eurostat.

Fig. 9. Venture investment in 2006 in different countries of the world

Innovations should be considered in wide context, not only as technological but organizational, product ones in the framework of the global strategy aimed at the country's embedding in the international labour division. On the whole the supertask is to form an effective national innovation system. In Belarus it is accomplished in the framework of the State innovation programme. Its main point is to create institutional framework for innovation activity growth, i. e. legislation, infrastructure, financing mechanisms, stuff. It has to be done a lot in every direction to approach the most developed and successive states. The most complicated unit is the innovation legislation, system of incentives for the innovation enterprises development, national producers embedding to the multinational corporations mechanisms. The way these problems would be solved determines the future of every country.

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Adequate Responses to Global Challenges

The influence of the external market competition is felt every day by the national economy and economic agents in their daily operation. It is an objective phenomenon one has to take into account and make serious conclusions. In this regard innovative development should be considered keeping in mind the ability of economic subjects to counteract external challenges as well as the subjects' potential of adapting to the challenges and achieving maximum manufacturing and financial benefits, first of all, as part of economic security considerations.

External price shocks – the global increase in prices for raw materials, fuel and energy resources as well as food – are some of the main threats to economic security of Belarus. Certainly one has to take into account existing direct and inverse economic links. Growing feedstock prices are largely compensated with simultaneously growing prices for exports.

According to the trade balance statistics in January-April 2008, Belarus' export increased by 65.3% in comparison with the same period of last year in cost terms, Belarus' import – 57.6%. The increase in the cost value of the foreign trade is mostly attributed to an increase in average prices for exports and imports (40.4% up and 28.5% up respectively). In natural terms Belarus' export swelled by 17.7%, import – 22.6%. It means the favourable correlation of prices for Belarusian exports and imports enabled the cost value of exports to stay ahead of that of imports even while the volume of imports grew faster in natural terms.

However, one should not expect the state of things to continue in the future. Rising trends on raw stock markets inevitably lead to growing import costs, which in turn will provoke galloping costs inside the country. Actually inflation is actively imported and it is virtually impossible to handle the problem with instruments of the national monetary management policy alone. The innovation and investment cycles also require predictable

conditions for long-term investments as well as the implementation of strategies, which plan for dozens of years: high inflation is a serious threat to stable economic growth and investment attractiveness. Table 1 lists total inflation data for various regions and the world as a whole.

Table 1 indicates that in 2006–2007 the CIS states demonstrated some of the highest inflation indices in the world – 9.3% and 9.6% respectively. The share of food prices in the total price growth totalled 41.1% in 2007, the share of fuel – only 7.2%. In developed countries the figures are a bit different. In 2006 prices went up by 2.3%, with the food prices share as high as 12.4%, fuel prices share – 28%. In 2007 the figures totalled 19.5% and 12.1% respectively. Analysis indicates: the poorer a country is, the higher the share of food prices in the overall inflation is. In Africa the contribution steadily exceeds 40%.

In Belarus the figures are contrary to the worst: in 2006 and 2007 consumer prices grew by 8.0% and 7.0% respectively. But taking into account the strategy of our neighbours and key trade partners one should not rely on the eradication of prime causes of growing prices, and the overall level of inflation requires strict management, with major deviations from targeted parameters avoided. Otherwise expectations of economic agents, including foreign investors, will be formed taking into account conservative appraisal of macroeconomic risks, which will lead to more expensive loans for Belarusian economic entities, lower foreign direct investments and overall economic attractiveness of the country as a whole. Obviously with unstable raw stock markets the achievement of the goal requires not only monetary decisions but structural ones as well within the framework of the entire economic system of the country.

Energy factor. Between January 2005 and May 2008 the price index expanded by 60%. Prices went up even higher for several commodities critical for Belarus such as oil, natural gas, and iron ore.

Oil is the most expensive energy resource among exchange goods. It is explained by a low flexibility of the demand for oil caused by the lack of substitutes for the oil products that transport industry uses as well as essentially worse geological conditions of oil extraction in new promising fields. In 2004–

Table 1. Overall inflation in various regions and the world as a whole in 2006–2007, in % per annum

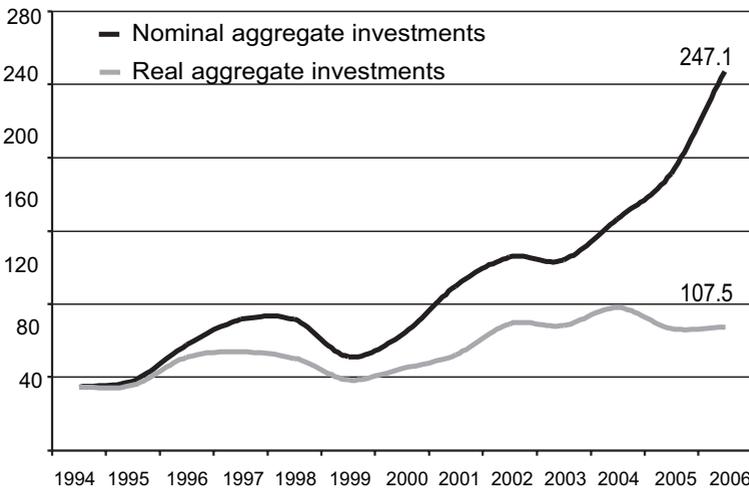
	2006					2007				
	Overall inflation	Food		Fuel		Overall inflation	Food		Fuel	
		Inflation	Share	Inflation	Share		Inflation	Share	Inflation	Share
World figures	3.4	3.4	27.0	11.2	19.9	3.9	6.2	44.3	4.1	8.0
Developed economy countries	2.3	2.0	12.4	11.1	28.0	2.2	3.0	19.5	3.8	12.1
Africa	7.2	8.5	46.6	8.7	22.3	7.4	8.7	43.6	6.7	6.5
CIS	9.3	8.5	40.0	17.1	7.6	9.6	9.2	41.1	11.7	7.2
Asia	3.7	4.4	37.7	12.3	19.4	4.9	10.0	67.5	3.1	3.4
Central and Eastern Europe	5.2	4.6	22.0	9.7	18.2	5.4	8.2	34.9	6.9	11.8
Middle East	3.4	5.1	57.0	1.9	5.3	10.1	13.6	42.3	10.1	24.4

Source: WEO – International Monetary Fund.

2006 oil industry investments grew by some 70% across the globe and approached USD 250 billion per annum. It means that oil companies respond to the favourable market situation and try to increase their output capacity. But taking into account corrections made by growing costs of oil well drilling, growing prices for oil field equipment, and several other factors an analysis of the same data produces a completely different and unexpected result.

Real investments in the oil industry went up insignificantly and it is vividly displayed by diagrams made using data of the International Monetary Fund and the World Bank (Fig. 1). Thus, the potential for higher oil prices has not been depleted and is supported by fundamental factors of supply and demand apart from the profiteering factor (raw commodity futures look more attractively when the dollar is weakening).

According to the IMC forecast model, USD 120 per barrel of oil as the average price lies within the 70% probability range expected in 2008 and 2009. Obviously, with the average prices that



Source: WEO – International Monetary Fund.

Fig. 1. Total investments of 53 national and international companies (in billions of US dollars)

high USD 150 per barrel of oil would not come unexpected for market participants. In view of the factors the government and economic entities should analyze and design their business strategies more thoroughly taking into account the fact that in the modern globalized economy there will be no primary products, prices for which would be reversed in relation to oil prices. The same considerations are applicable to other primary products and food.

Natural gas is a strategic primary product for Belarus in energy equivalent and costs less than oil. The latter is explained by prices set by long-term contracts, which are widely used for European Union countries. In May 2008 the prices for Russian natural gas at the German border reached new record high of USD 428.4 per 1,000 m³ (roughly USD 70 per barrel of oil equivalent while the average price for Brent oil reached USD 123.9 per barrel in May).

The last but not the least, coal is the cheapest exchange-traded energy resource, which is roughly twice as cheap as gas and three times as cheap as oil in coal equivalent. Over the last two years coal prices surged by 200%. The figures once again indicate the advisability of implementing an accelerated strategy for diversifying the fuel balance of the Republic of Belarus, introduction of nuclear fuel and probably coal.

Figure 2 demonstrates the structure of power generation costs for various power plants, indicating that fuel accounts for 20% of nuclear plant operation costs, stands at around 50% for coal-fired cogeneration plants and 81% for gas-fired cogeneration plants. On the other hand, specific capital investments (calculated as per kilowatt of installed capacity) are ranked in the reverse sequence for these types of power plants (Fig. 3).

The economic essence is obvious: one has to pay less for fuel during the power plant operation if one invested more in construction. Contrariwise, it is possible to choose a comparatively cheap steam-turbine power plant fired by natural gas and stay dependent on fluctuations of prices for hydrocarbon fuel. The decisions taken by Belarus' leadership are not only a way to avoid energy risks caused by growing oil and natural gas prices thanks to diversifying the energy budget. One-time capital investment in the nuclear power plant will secure a more stable power engineering industry of the country for the next

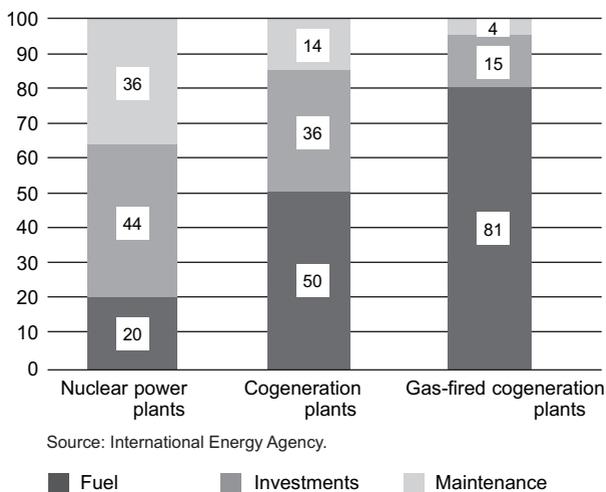


Fig. 2. Structure of production costs for various power plants

50–70 years. It is confirmed by assessments of the International Energy Agency: atomic power plants are more profitable for European countries than power plants, which use natural gas or coal, with the gas price over USD 180 per 1,000 cubic metres and the coal price over USD 70 per tonne.

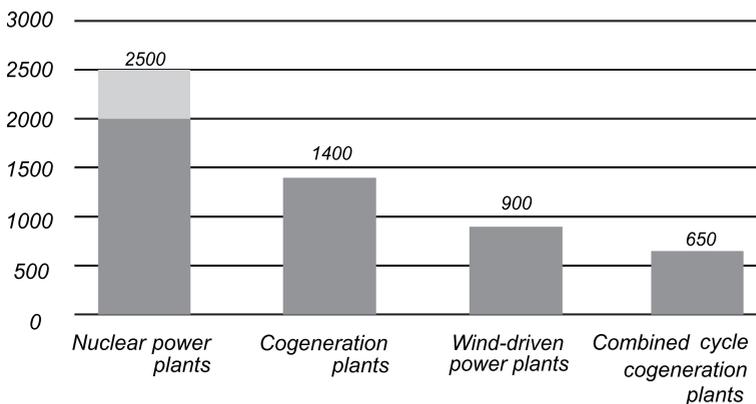


Fig. 3. Specific capital investments for various types of power plants (in US dollars per kilowatt of installed capacity)

In cooperation with science. The strategy of diversifying and concentrating resources is urgent not only for the power engineering industry. Scientists have proved that primarily large and economically solvent enterprises are capable of novelties and technological innovations. In this regard the Belarusian strategy for setting up large manufacturing corporations, which integrate consequent technological process stages and benefit from the scale of their operation, is justified. Certainly, the optimal balance should be found in this case as well. For example, it should be taken into account that only foreign markets, international competition, international manufacturing cooperation and integration can sufficiently stimulate technological advance of major companies.

Sometimes development process is equated to technological innovations. But organizational innovations should not be forgotten. Sometimes the correct organizational structure, well-tuned business processes and sales schemes, management of human resources produce effects comparable to the installation of new equipment and modernization of basic production facilities, which should use cutting-edge scientific advances. It is possible if tight cooperation between manufacturers and scientists is established.

Let's consider the organization of such cooperation using the example of cooperation between specialists of Belarusian Steel Works (BMZ) and NASB scientists. These relations advance not only as traditional research and development the company is interested in but through direct inclusion of innovative technologies into the manufacturing process and direct supplies of science-intensive products manufactured by the academic organizations.

The approach became possible five years ago when the Academy of Sciences expanded its operation with research and production. Actually the production of pilot batches and large batches of innovative products by academic institutions is a fact. In 2007 the output of such products and services amounted to around Br250 billion. The process is vigorously developing. For instance, in 2007 alone fixed-capital investments in the National Academy of Sciences of Belarus exceeded Br90 billion.

The NASB's Powder Metallurgy Institute has developed and supplies compressed air purifying filters to BMZ. The filters

boast simple handling and high performance thanks to an original design and highly effective triple-layer filtering material. Their technical parameters are listed in Table 2.

Every year the institute supplies up to 1,000 hard-alloy products for cord production to the BMZ. The institute has completed long-term development and is ready to manufacture the heavy-duty oil separators, which boast a high purification degree.

In order to improve the durability of BMZ-made components the Powder Metallurgy Institute has used anodic microarc oxidizing on oxidation coating for functional surfaces of aluminum rollers to strain the metal cord (750 rollers per annum). The technology increases the service life of rollers several times and considerably cuts down on foreign currency expenses thanks to import substitution.

Every year the Powder Metallurgy Institute supplies the BMZ with over 100 tonnes of hot-rolled zinc anodes of a proprietary design. It is important that up to 30% of the total is made using scrap metal and an innovative technology for manufacturing precise semi-finished anodes via no-pressure die casting. The economic effect of the technology has approached Br1 billion.

For several years the Institute of the Metal-Polymeric Systems Mechanics has been using its research and development to supply the BMZ with brake pads and friction plates (over 25,000 in 37 titles), which used to be imported. The products are innovative not only for Belarus. More than ten Russian patents were received for the technology of manufacturing environmentally friendly asbestos-free friction materials based on polymer matrix.

For the BMZ a special alloy (0.1% of the heat size) has been worked out and produced by the NASB scientists, which decreases ingot crystal grains by five times on the average, improving physical and mechanical properties of steel. It is comforting that the BMZ specialists have developed a technology for manufacturing and applying modifiers during ingot casting at steel continuous casting plants.

As part of the State scientific and technical programme «New Materials and Technologies» the Powder Metallurgy

Institute has designed a new composite ceramic material, technologies for its milling impulse pressing and baking.

The technology was used to manufacture a pilot industrial batch of rollers, which endurance proved to be high during tests in the BMZ steel wire workshop (hardness HRA – 86–90; ultimate compression strength – 620–624 MPa; ultimate bending strength – 150–156 MPa).

The USA, Japan, France, and China make infrared imaging equipment, but it operates in a wide temperature range, where the high temperature end is surveyed as a rule. As part of the Metallurgy programme the A. V. Lykov Heat and Mass Transfer Institute of the National Academy of Sciences of Belarus is designing a high-temperature infrared imaging solution and a hardware software complex for controlling the temperature and thermal fields in metallurgical production. Specialized high-temperature infrared imagers use components different from traditional ones but the cost of the two types is roughly equal (around USD 40,000). The project to develop the high-temperature infrared imager is supposed to produce a device, which price will be comparable to that of pyrometric control solutions. The new product is supposed to deliver more information than infrared imaging systems offer. It has been tested in lab conditions, software is being upgraded.

Long-term contractual relations. Although state scientific and technical programmes are important as well as other state scientific programmes, their mechanisms lack a sufficient amount of encouragement for those who develop new technologies as well as those who assimilate them. This is why the Academy of Sciences is dedicated to promoting long-term mutually beneficial contractual relations with companies. In particular, the most interesting projects the Academy and the BMZ are implementing include the assimilation of a technology for corrosion resistant and friction-proof coating for steel pipes, development of a technology for manufacturing semi-finished cast sections of rolling equipment using electroslag remelting process and other technology and product innovations.

At present the possibility is being discussed to develop solutions for nondestructive examination of coating thickness of precision molding copperplates and for defect control of

Table 2. Technical parameters of compressed air purifying filters designed by the NASB's Powder Metallurgy Institute

	BMO-60	BMO-120	BMO-300	BMO-1200	BMO-2000
Output, m ³ /h	60.0	120.0	300.0	1200.0	2000.0
Air purification degree according to GOST 17433–80	3 class min				
Output dew point, °C, max	–5				
Separation of water drops and steam, %, min	99.3				
Filtering material	bronze, copper				
Shell material	polymer-coated steel				
Size, mm: shell diameter	230	230	300	300	300
Height	650	800	1000	1400	1800

solidness and thickness of cast-iron casting rollers. The solution is supposed to increase quality, hence competitive ability and safety of the company products.

For example, the BMZ uses imported natural fluorite for metal smelting. The Academy of Sciences has developed an original technology for manufacturing more effective and less expensive synthesized fluorite. It is made using fluorine-containing waste left by fertilizer manufacturing processes of Gomel Chemical Plant and natural chalk. The new material will decrease energy consumption and smelting time, as the chemical activity of the synthesized material is higher than that of the natural one. The company will be able to decrease production waste and transportation costs, as the natural material is imported from Transbaikalia and other quite remote areas.

Scientific and manufacturing association «Centre» of the National Academy of Sciences designs and manufactures equipment for the BMZ (such as grinders, classifiers), which allows extracting free iron (8–12% content) out of slagheaps and making accompanying materials for civil engineering industry and road construction.

The list of the mentioned innovations for the BMZ demonstrates a cooperation of the Academy of Sciences with a leading Belarusian manufacturer. The list is incomplete. System efforts are exercised in virtually all branches of the economy as part of state research programmes, state scientific and technical

programmes and economic contracts. Complete products, which are more or less ready for assimilation in business practices, are presented in the electronic «Catalogue of innovative projects and developments of the National Academy of Sciences of Belarus» or on the website of the National Technology Transfer Centre.

Aiming for major system projects. Technological rearrange can entail not only falling competitive ability, but many decreasing macroeconomic indicators, lower living standards of individuals and primarily loss of prospects for the development of a sovereign state. That is why the assimilation of research is the main way to increase economic and technological security of a country nowadays. Scientific analysis of the establishment of the so-called new economy indicates that an increase in the integrity of economic security is a key prerequisite for reinforcing the economic security of a state. It is manifested as a stronger technical and economic cooperation of the enterprises, industry and science, formation of competitive clusters. International experience proves that science and innovations are the key force driving the process. A special term «hi-tech integration» was made up. Do these processes go on in the country? There are reasons to believe they do. Slowly but they do.

With an adequate legislative and organizational support of state administration bodies the unity of efforts of scientific and manufacturing institutions gives a new boost to the development of the national economy. The Academy of Sciences faces a range of issues that have to be addressed. First of all, the policy should be aimed at the major comprehensive projects realization, which provide for an entire bulk of work from research to the new technologies assimilation support. Scientific and technical services will be effective and in demand when they are comprehensive. It is the projects that the Belarusian industry needs to increase its competitive ability and hence to further enhance the economic security of the country.

The Academy of Sciences is the Leader in Research and Innovations

Our national economy acquires new quality – innovative development. It is governed by the powerful influence of technological progress converting science and knowledge into the global modernization factor.

During the last years the positive systemic changes occurred in the national science in general and in the National Academy of Sciences of Belarus in particular. The institutional and financial mechanisms of research activities have been improved. The innovation process became obvious due to the decisions taken by the President and the government of the Republic of Belarus on programme-targeted approach to the research planning, grouping and joining the projects into 11 State integrated targeted scientific and technical programmes (SITSTP), aimed at the perspective goals of modern economy achievement keeping in line with the world scientific agenda and scientific priorities of the leading foreign countries (see Table).

In 2007, the NASB completed its restructuring and became a powerful scientific production and research-and-educational complex centring its potential on the priorities of modern economy formation, with focus on the tasks of innovative development of the country. At present, there are 7 research and production centres (RPC) (5 agricultural RPCs, the RPC for material science and the RPC for biological resources) functioning in the Academy, as well as public research and production associations for chemical synthesis and biotechnologies, chemicals and technologies. A number of other structural reforms were undertaken.

These measures proved to be effective. We build our work with the national economy focusing on two directions. The first

one relates to scientific support of modernization of sectors of national economy, the second – aims at domestic manufacture of modern products, materials, equipment for home and export needs. The analysis of the qualitative indices dynamics of the NASB research and innovation activities speaks for the progress in both directions.

The input of science to the innovation development is increasingly vigorous, the volume of work performed by the institutions of the Academy has increased (Fig. 1). The progress is slower than one would wish, but lower subsidies for research from the government are obvious. Contracts, bidding for government contractual works – this is real competition to the benefit of our scientists. Research institutions identify their customers, offer them services, and compete for the right to sell their products. Besides, the burden on the state budget reduces. Most important is that self-financed R&D finds its practical application and is not wasted. The target use of public money is under a strict control. It is allocated for particular tasks solution, and this process should be transparent and easily traced in the structure of works performed, as basic research and future developments shall not be ignored.

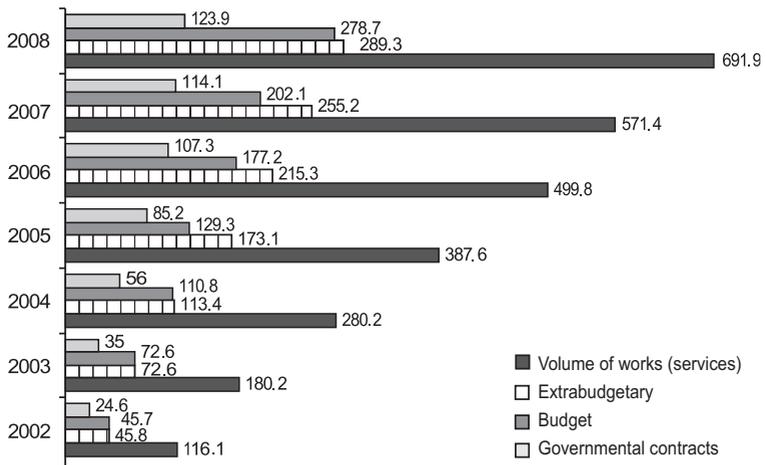


Fig. 1. Volume of works (services) performed by institutions of the NASB, from all financial sources, Br billion

Priority directions of scientific research in the Republic of Belarus and EU countries

Priority areas of research of the Republic of Belarus	Priority areas of research activities of EU
Power engineering	Stable energy systems in short-term, medium-term and long-term period. Management of radioactive wastes. Radiation safety
Machinery and mechanisms	Stable development of transport
New materials and substances	Nanotechnologies and nanoscience, science-intensive, multifunctional materials, innovation processes and equipment
Preventive, diagnostic, therapeutic and rehabilitation technologies and equipment, medical products	Genetics and biotechnologies for public health care system
Food safety and effectiveness of agricultural complex	Qualitative nutrition and safety
Mathematics, physics, IT	Public computerization technologies
Innovative devices, electronics, laser-optic technology	Aeronautics and space exploration
Nature management and ecology	Global ecosystem change
Socially oriented innovation economy	
Individual, society, culture, education	Civil society and government in knowledge-based environment
Defense capacity and national security	

Scientific support of projects of the National Innovation Development Programme performed by the NASB scientists, has been invigorated. As of today, there are 174 projects, 81 of them are developed by the Academy. In 2007, scientific and technical programmes yielded more than 490 new technological items, including 100 pieces of machinery, equipment and devices; more than 130 technological processes; 100 new materials, substances and tools; more than 50 software systems and complexes, 97 varieties of plants, breeds of livestock, preparations, etc. (Fig. 2). 124 innovative manufacturing technologies were developed by 37 institutions of the Academy of Sciences accounting for 33.1% of the total amount of developments performed in the country

and 61.7% of those created by “science and scientific support” branch. At the same time, in 2007, each sixth fundamentally new Belarusian technology was developed by the research institutions of the Academy. Starting from 2004, the NASB contribution to the development of advanced technologies in the country ranges within 30–38%, proving the fact of the work done being purposeful and systemic. In 2007, the research institutions of the Academy developed 14 new technologies (18.4%) out of 76 (world level) created in Belarus.

There has been developed the innovation-production complex of the NASB: within the framework of the National innovation development programme, the Academy is a contractor of 23 innovation projects of its own design. In 2008 the programme-technical complexes for the support of product life cycle of RUE “MTZ”, RUPE “BelAZ”, RUPE “Vityaz” were put into operation. Complexes based on SKIF cluster and super-computer technologies are ready to be applied in the banking system in 2009. They are planned to be used also for Earth remote sensing image processing and filing, for accomplishing science intensive tasks while designing new products. An innovation project of reproductive farm for 500 basic sows in RSUE “Zarechie” of Smolevichy district will become a breakthrough in the agrarian science.

For 5 years, since 2002, the number of submitted patent applications has increased by 2.2 times, the quantity of patents and certificates obtained increased by 3 times.

The number of patents received by the specialists of the Academy has increased by 3 times – from 5 to 15.4% of the total number of patents and certificates in the country. In the first half of 2008, 280 industrial property patent applications were submitted and 269 patents were issued (Fig. 3).

We are to learn to sell patents, intellectual property in general, to make a practice of getting part of benefits obtained from the application of scientific achievements in production by research institutions and scientists.

In 2008 the NASB exported over USD 18 million worth-intellectual products (Fig. 4). In 2007 218 contracts of this type were signed. In comparison with 2004 (75 contracts), this indicator increased by 2.9 times and accounted for 19.5% of the

total for the country (1 119 contracts for export of technologies and technical services – patents and patent licenses of invention, know-how, designs, effective models, engineering services, research and development works, etc.). The value of NASB intellectual product export contracts is USD 5.4 million, and it exceeds the respective achievement of the Ministry of Industry by 1.4 times and the Ministry of Education – by 3.9.

No doubt, volume of export is insufficient. It should increase by stronger positioning on foreign markets, by formulating modern export strategy and scrupulously studying potential markets. At this point, there are institutional, infrastructural and legal problems.

Belarusian science is known in the world. Citation index of our scientists is rather high. In 1993–2006, more than 16 thousand

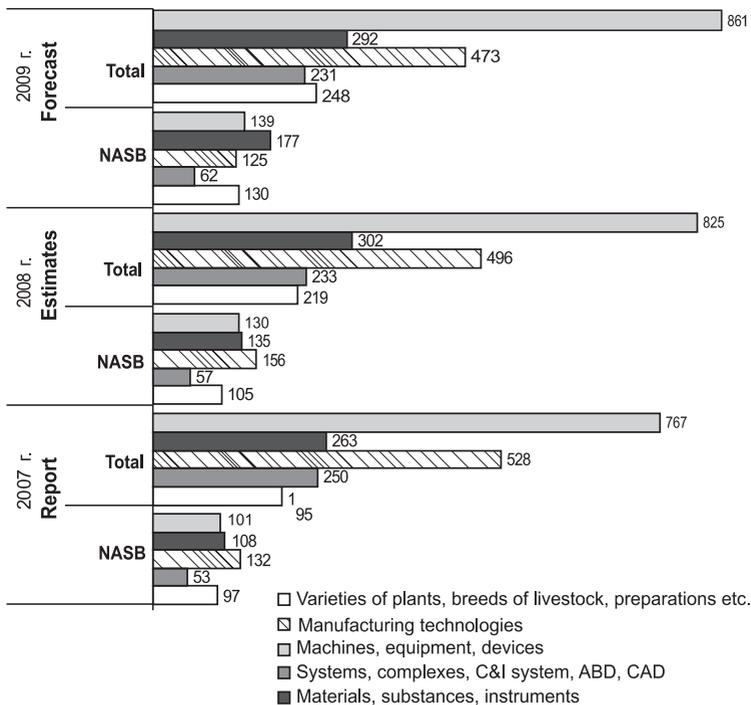


Fig. 2. Results of implementation of branch and regional research and development programmes and investment projects

Belarusian publications were included in one of the most authoritative database – Web of Science (Philadelphia, USA), 3 articles a day, about 55% of them originating from the researchers of the Academy of Sciences. The list of journals in which the above articles were published comprises 1 700 titles. Every year foreign scientists refer to the works of our researches 3.8 thousand times – more than 10 times a day.

Targeted human development measures changed the tendency of “brain drain” and low interest of young people in science. For the first time since the Soviet epoch they have shown interest in this sphere. In 2007, the share of young researchers (below 29) rose to 20.9%. Modern motivation approaches – scholarships and research grants of the President for postgraduate students and gifted young people, special competitive bonus system – played a decisive role in solving this problem. This mechanism works and creates competitive environment conducive for effective creative work. Differential remuneration in science should be further developed and cover all levels of researchers. Alongside with the system of bonuses and grants, we need a comprehensive approach: payment of royalties for effective developments to all researchers; wage plus-bonus system for research institutions implementing innovation projects, working under direct contractual agreements as general contractors, etc. The NASB addressed the government with these proposals.

The achieved results prove the process of the Academy of Sciences transforming into a large-scale research and production corporation as irreversible.

According to the key task of the NASB becoming an all-important element of the national innovation infrastructure, it is targeted at the major long-term systemic projects development and implementation through new branches established advancing our economy to the setup IV. It means the realization of the national programmes on biotechnology, development of micro- and optoelectronics, LED, laser-optic equipment, nanotechnology, updating thermal processes and energy conservation, wide use of CALS-technology, solar power engineering, public space exploration. These tasks are beyond the scope of the National programme of innovation development for 2010, they are set for medium- and long-term perspective.

Biotechnology. Today, our scientists cooperate in this area with industrial enterprises of 11 ministries and departments of the country. By 2010, it is planned to build 2 new production facilities, to develop 39 technologies, 253 new technical units, 38 preparations, 29 varieties of crops. The results of this research will cover 70% of the demand for domestic diagnostic preparations to treat the most common infections (now 30–40%), reduce imports, lay the basis for biological security system of Belarus. The project of the National programme “Innovative biotechnologies” aimed at this sector cardinal modernization using the developments of Belarusian scientists and world best practice sets this as a target.

New quality of development of agricultural sector. The scientists lay down the foundation of the Belarusian agriculture competitive power for the long-term perspective. 18 new production facilities, 14 innovation technologies, 590 types of machines and equipment, materials, breeds of livestock, new plant varieties, foodstuff, veterinary preparations will be created during the next 5 years. The NASB will provide for the plant breeding of original seeds and supply of elite (5.5 thousand tons per year) and high reproductions of cereal and grass seeds. Four centres for hybrid selection are there in the Academy of Sciences. It is just the new R&D facilities that will accelerate the development of new varieties and breeds. The available potential

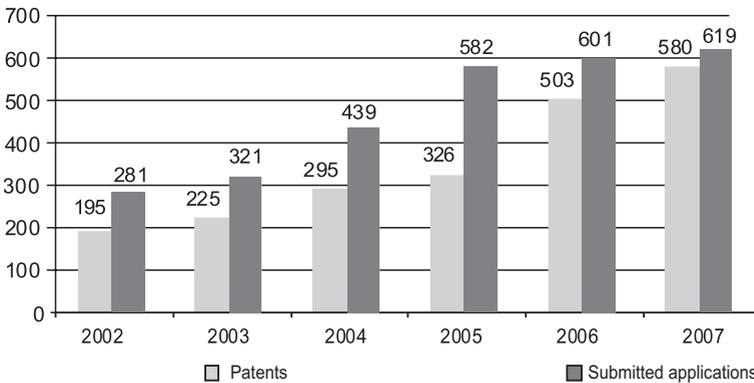


Fig. 3. NASB patent applications and industrial patents in 2002–2007

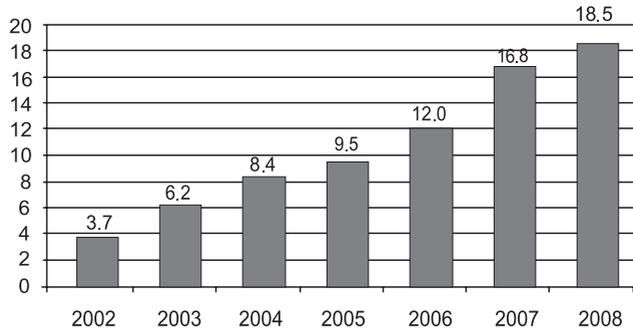


Fig. 4. Export of works (services) under foreign contracts in 2002–2007, grants, million US dollars

will cover 50% of the country’s demand in stores, the dairy herd of Belarusian breeds with productive capacity of 12–15 thousand kg of milk annually against present 7–8 thousand kg. The Vitebsk biological factory and the NASB will cover 70% of the demand in veterinary preparations and drugs. More than a half of them have been developed by the scientists of the Academy. The similar situation is with pesticides. These two projects will help save USD 200 million of import annually.

Innovation technologies in power engineering sector. The Academy of Sciences focuses on scientific support of tasks set by the Directive No. 3 of the President and the Concept of energy security and energy independence of the Republic of Belarus. Scientific support of nuclear power engineering is increasing with every year. A comprehensive scientific programme has been developed. Its target is to find and introduce scientific and technical solutions for the optimization of technological processes ensuring the higher nuclear, radiation and environmental safety, physical protection as well as effectiveness of nuclear-power engineering installations. Technologies and equipment for handling radioactive waste as well as other directions are followed.

There is a potential for upgrading thermal and electrical power generation. Technological problems of furnace, foundry

and electroplating plants are worked out. There are plans for design and manufacture of 80–90 new kinds of unique heat- and mass transfer equipment and software tools for power consumption control.

The power engineering sector development requires much efforts to be applied to meet the challenges of the future. In the area of hydrogen power engineering the new hydrogen storing technologies are being gradually introduced, local production of synthetic gas, domestic nanocatalysts for fuel elements are also of paramount importance. The scientists of the Academy develop industrial processes of semi-conducting solid solution films for solar energy conversion in visible and infra-red spectrum. Works on solar cells are performed within the framework of the Concept of energy security of the Republic of Belarus. Thin-film solar cell technologies compatible with silicon integrated circuit technologies are very promising. The concepts of the respective national programmes are worked out by the Academy of Sciences and submitted to the Council of Minister for consideration.

New chemicals and chemical technologies. There are plans for construction of four new and modernization of 30 existing production facilities. Fifty six new technologies and materials for the needs of enterprises of 5 ministries and departments are to be developed. Every ruble invested in the introduction of inventions yields annually Br 6–7. This rate of return is achieved at technological set-ups V and VI. Enterprises of the “Belneftekhim” concern are the leaders of the economy, they are major consumers of intellectual products of the NASB. Scientists and specialists of the branch develop new granular potash fertilizers with improved physical-mechanical and agrochemical properties; potassium mineral enrichment technologies have been introduced, manufacturing of mix diesel biofuel based on products of rapeseed oil processing has been started, production of chemicals for plant protection has been organized. New types of foaming agents for porous concrete production, raw material hardening agents for cement and concrete production have been developed for the Ministry of Construction and Architecture’s enterprises; for the Ministry of Transport the inhibited anti-icing materials have been developed.

Research activities of the Academy of Sciences are focused on manufacturing and technologies of small-scale production of chemicals to substitute the imported polymeric construction materials and household chemicals on the consumer market.

Laser and optoelectronic systems, radioelectronic instrument making. The programme “Electronics and optics” provides for the construction of 8 new production facilities for the national economic needs, 26 existing productions will be modernized, 43 innovative technologies, 210 units of innovative equipment are being developed. Development of epitaxial heterostructures for SHF, laser and LED technology, as well as the radar of super-high and ultra-high frequencies are the major projects. A wide range of technologies and equipment has been created for industrial sector, new laser apparatuses passed clinical trials for medicine. Innovation offers include manufacturing of chips for RFID-tags, GIS and GPS.

LED technology. Modern LED devices for new market demands are among strategic priorities. Science in this case should support technological set-up IV. Fundamental developments providing for the design of heterostructures, personnel potential and manufacturing capacities are available. Jointly with Philips, the NASB works on terms of reference for the relevant business project. There are plans for construction of lighting and information LED systems. This area is very promising for energy saving, and in fact, a new industrial sector will be built in the country.

State-of-the-art materials. The material science is of paramount importance for Belarus. It is planned to build 42 new production facilities, to develop 63 technologies and more than 500 new models of machinery. Export of new products will exceed USD 150 million a year. Nanomaterials and nanotechnologies are widely used in industry. Development of extra-hard plates, cutting tools and grinding materials for Ministry of Industry, Ministry of Construction and Architecture, Ministry of Health and “Belneftekhim” enabled to implement more than 300 items of tools, 200 more will be introduced in 2009. In 2007, 70% of domestic demand was satisfied by local production, amounting to Br 5 billion annually. Production of rubber ferrites from waste of the Belarusian steel works is one

of the top priorities. This production will cater for 90% of the demand for ferrite materials in the local market.

Mass production of exhaust gas neutralizers for diesel engines using nanostructural materials developed at the Academy of Sciences will increase the competitive power of Belarusian carriers. They ensure the gas toxicity reduction to Euro-3 and Euro-4 standards.

New techniques of creating high-qualitative membranes for surface sources water treatment are 6 times cheaper in capital investment and 2.5 times cheaper in production. Only few companies in Germany, Japan and USA possess these nanotechnologies.

IT and CALS technology. Fresh impetus in quality and quantity is needed for production and public life informatization. Our age is an epoch of scientific knowledge and information technologies. Without their accelerated application no rise in the competitiveness and labor productivity can be expected. Introduction of these technologies are beneficial for both industrial and public sectors. Our goal is to reduce by 2010 by one third the time and cost of document preparation and development of innovation products manufacturing by 30 percent due to the IT introduction. In the near future, it will be practically impossible to export many products without electronic documents according to the international CALS standard. About 80 percent of goods are to be supplied with them, besides, the information support of the commodity distribution network based on CALS technology should be ensured for all major productions. All these problems are being solved by the NASB scientists in close cooperation with the practical sector of the economy specialists.

Space exploration and Earth remote sensing. In the fourth quarter of 2008, the National programme for space exploration and peaceful use for the period of 2008–2012 was approved by the Council of Ministers and has been put into effect. This significant systemic project implemented under the aegis of the Academy includes such scientific and technical activities as creation of space vehicles, their basic elements and technologies, development of ground infrastructure to analyze the information received, development of satellite navigation systems.

Several foreign policy actions on Belarus joining the international organizations in the area of space exploration were worked out. Moreover, the measures on legal regulation and personnel availability to ensure the new branch formation were envisaged.

As a whole, information technologies are developed by the scientists of the NASB in the interests of hundreds of enterprises and organizations subordinate to 8 ministries.

Innovations in machine building industry. We plan to build 6 new production facilities, introduce 30 innovation technologies, 600 items of new machinery. Import substitution will make up not less than USD 50 million per year. For the first time in Belarus there will be developed 5 new models of trailing and arctic trains, latest generation buses, new models of tractors “Belarus”, 7 new models of agricultural machinery, 5 models of dump-trucks, 2 new models of tractor and automobile diesel engines of Euro-3 and Euro-4 standard, 612 machine-tools, machines, presses, machining centres, 2.5 thousand tools.

Public health and innovation technologies in medicine. Science intensity of this branch is comparable only to space exploration, and has always been in the centre of attention of Belarusian science. The SITSTP “Zdorovie” is directed to obtain new knowledge about the pathogenesis of the most widespread human diseases, to develop their diagnostics, treatment and prevention technologies. The scientists are to assist in the building of two new and modernization of three existing medical equipment and pharmaceutical facilities; besides, there will be developed more than 100 new technologies of treatment and diagnostics of cardiovascular, oncological, hematological, endocrine, immunodeficiency and other diseases including surgical methods and transplantation. The NASB researchers collaborate with the Ministry of Health in solution of the problems which will define the future and competitive ability of our medicine.

Contemporary methods. Equipment and monitoring facilities for accident, fire and disaster prevention. Among the programmes being realized by the scientists, one should note “Technologies of emergency prevention and liquidation” SITSTP. Inter-sectoral problems of software and software tools

for simulation of blasting dynamics and explosion effects, chemical-engineering production risk assessment, model of impurities transport on the territory of Belarus and bordering countries have been solved. Based on the research of local minerals structure and properties, superdispersed filling agent for dry powder fire extinguishers, a system of minimization of fire effects in the forests and peat bogs have been developed, domestic equipment for Belarusian rescuers has been designed.

Environmental imperative of social and economic development. Within the framework of the SITSTP “Nature management”, for the needs of 8 ministries and branch departments, geological study of Earth interior aimed at developing mineral and raw materials base of the country is performed. There are also worked out the scientific problems related to forestry, including radioactive contamination of forests, geochemical land geophysical control of underground storage facility maintenance, the technologies of fuel and energy plantations of rapid-growing woody species, as a source of raw materials are developed. By 2010 more than 20 innovation technologies, about 50 new machinery items will be created.

Hence, the realization of 11 SITSTPs will enable us to establish 84 new production facilities, to develop 389 innovation technologies and more than 2 600 new pieces of machinery by 2010. The Academy of Sciences worked out proposals for another 16 innovation manufacturing facilities to be submitted for consideration to the Council of Ministers. They include pilot production of genetically engineered biological preparations for the diseases of farm animals and poultry prevention and diagnostics; solar cells and photovoltaic systems production, LED and LED-based production, large hot galvanizing plant for steel structure protection, integrated circuits production for RFID-tags, equipment for their processing as well as creation of intellectual documents and commodity flow monitoring systems on their basis; production of surgical sutures, woven and knitted articles for medical purposes, feed tryptophan and threonine amino acids for the domestic and foreign market needs, etc.

The innovation production of advanced industrial structures is characterized by the highest added cost; the goals set are very

complex and require much efforts to be achieved. The scientific community of the Academy is faced with a serious task: to create the effective national innovation system with all the scientific institutions contributing to the major strategic goals of the country achievement, both current and future ones. The National Academy of Sciences of Belarus works to meet the challenges, to find new forms of science and production integration, and to coordinate all R&D activities in the country.

Science and Innovation Underpin Belarus' Long-Term Competitiveness

The world financial crisis has heralded a shift in the global technological paradigm and showed that no nation, however powerful, is now in position to ensure a long-term sustainable growth of welfare for its people by sticking to orthodox business techniques and technology. The prospects are rather bleak for the nations whose exports are poorly diversified and mostly destined for traditional markets. It is therefore vital for Belarus to speed up the work on modernizing its economy, making it increasingly *laissez-faire*, and investing in innovation.

Global economy after the crisis

Belarusian experts are now working on the fundamental documents that will steer the country in its socio-economic development in the next five years and underpin the nation's competitive power. These documents are the national socio-economic development program, the innovative development program, and the rural territories development program for 2011–2015. In pursuance of the presidential orders, experts are also preparing a new draft of the national security concept of Belarus. These as well as other documents take into account the post-crisis global trends in economy and technology, the new economic configuration in the world: a transition from the unipolar to the multipolar system of economic relations, fiercer competition for natural resources, new financial architecture, wider use of technical barriers to trade, which is becoming an increasingly effective tool of hampering international commerce. Within the scope of just one year following the G20 summit when participants declared their commitment to avoiding protectionist measures, these countries have imposed 184 protectionist measures. The unquestioned leader was the European Union which members imposed a total of 90 such measures.

This is a clear signal telling us that the manufacturers who stay out of the orbit of transnational companies will be the first

to suffer from discrimination and economic restrictions. In this respect, specialists at the National Academy of Sciences of Belarus believe that integrating Belarusian businesses with the world's leading companies into translational corporations should be a priority while moving along the way of economic modernization.

Having studied the current global trends in economy and technology, the Academy designed a Scientific Research Strategy for the period ending in 2015, which got a vote of approval at the General Meeting of the National Academy of Sciences. Working in collaboration with the State Committee for Science and Technology, the Academy has identified the near-term research priorities which will be submitted to the President of the Republic of Belarus for approval and will underpin national research programs in the next five years. The most promising lines of business today are biotechnology, space exploration and research, pharmacy, information and communications. The main objective now is to create an institutional framework, infrastructure, a system of economic incentives to promote a rapid growth of innovation and innovation-based business.

Organizationally, the Academy is well prepared for this work. Nearly every research institution has the appropriate infrastructure to run experimental production projects to test innovations and produce batches of goods for sale. In 2009 our institutions produced a total of nearly Br300 billion worth of innovation products, including Br80 billion equipment and production lines and Br60 billion bio- and medical products.

In 2009 we established seven research and production centers focused on LED research, pharmacology and biochemistry, microbiology, DNA testing, food research and control, animal breeding centre and permanent grasses seed growing centre. All of these institutions have been fitted out with the latest equipment.

This year we are planning to start more than a dozen of new innovation-oriented projects. Unique substances and biological components based on the products of research conducted at the institutes of bioorganic chemistry and meat and dairy industry will be put in mass production by using the institutes' own production facilities for both domestic consumption and export. We are talking here about that long missing link – innovation link – between science and production, which we are now recreating.

Yet, there are many areas of research where there is no need in reinventing the wheel. In such things as scientific research, design, testing and production we should cooperate closely with our European colleagues. It is this combination of creating something on our own and localizing what has already been achieved that we will use in our Scientific Research Strategy.

The application of the management-by-objectives method has proved extremely effective in science. It suggests shifting the emphasis towards comprehensive interdisciplinary applied research which products could be used in the national economy. As of now, 85% of funds allocated for science are channeled into applied research carried out under comprehensive scientific research projects with the aim of creating a single innovation cycle. We have achieved very good results that will underpin the progress of science and economy in the next five years.

Power industry and energy efficiency

Experts of several ministries together with scientists of the National Academy of Sciences of Belarus have found solutions to the fundamental issues of the Belarusian nuclear power

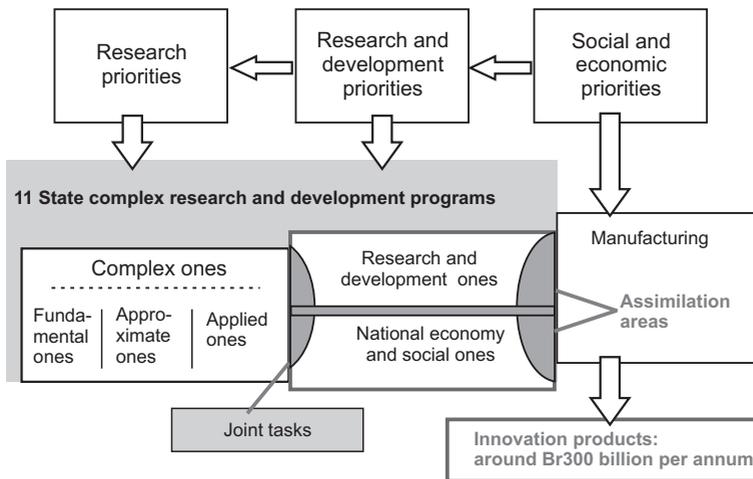


Fig. 1. Through organization of the research to innovation process

plant construction, such as the selection of the site, reactor, and development of the legal framework of nuclear power engineering. Energy efficiency is one of the main priorities of the Belarusian science and real production sector. For example, BelAZ, MAZ and Atlant have designed Belarus' first samples of automated thermal furnaces which efficiency ratio reaches up to 50% hence enabling to reduce natural gas consumption from four to five times. The new solutions offered by Belarusian scientists allow upgrading up to 80% of thermal furnaces in Belarus. The Vodorod (Hydrogen) program is very promising too. After the nuclear plant is constructed in Belarus there will be excess of cheap energy. These groundbreaking technologies will greatly benefit the power industry.

In the long-term perspective, we are aiming to halve the GDP energy intensity by 2015 as against 2005, to reduce the worn out capacities of the power industry to 50%, and increase the share of local and renewable fuel in the boiler and furnace fuels consumption mix to 25%. We also plan to provide scientific support to the launch of the 2-million kW nuclear plant. When the plant operates at its full capacity, it will be possible to annually replace 4.65 billion of cubic meters of natural gas with nuclear power. By 2020, the plant will satisfy about 27% of the power demand in Belarus, hence bringing the share of now predominant natural gas to 58–64%.

One of the key goals of the power industry for the next five years is the promotion of energy saving photodiode equipment, setting up production of photodiode goods, meeting the domestic demand and boosting exports. This avenue became very promising after the European Union had introduced restrictions on the sale of incandescent bulbs. Photodiode equipment is expected to help save 1.1 billion kWh in 2010–2015 which in turn will alleviate generating capacities of the Belarusian power industry. The main goal of the five-year period is to reach the same energy consumption rates as in Central Europe.

Chemical technologies

The Chemical Products and Technologies program has been bringing the greatest economic benefits in Belarus. In three years new solutions in this area have generated Br35 billion worth of revenues. Technologies of selective extraction of low

vein potassium salts allowed significantly boosting mineral extraction and introducing domestic reagents. In 2010, a new technology of granulated fertilizers production will be launched to raise competitiveness of Belaruskali in the global market.

Meanwhile some issues still require solutions. First of all, it pertains to launching the production of science-intensive chemical reagents, materials for road and housing construction, vanishes and paint industry, woodworking, documents and securities protection. Another promising area is production of various goods of low-tonnage chemistry provided that the main intermediate products and raw materials are made in Belarus. We also aim at strengthening scientific and production cooperation with producers of commodities with high value added (polymers, compound materials, polymer fabrics, etc).

Biotechnologies and pharmaceuticals

In 2009, two new state programs were launched. They are the Innovation Biotechnologies and Import-Substituting Pharmaceuticals (Fig. 2) which envisage establishment of five companies,

	2009	2012	2015
Vegetable protein rich fodder	80	90	100
Bacterial concentrates for the dairy industry	3	30	100
Biological pesticides	1	40	80
Plant raw materials for herbal medicine	65	85	95
Herbal medicines	24	50	70
Testing systems based on DNA technologies	0	10	60
Veterinary products: testing systems, diagnostic preparations, vaccines, sera	20	30	85
Feed supplements:			
– adsorbents	0	0	100
– probiotics	0	0	100
– milk powder	10	100	100
Blood plasma drugs	0	20	100
Streptokinase	0	80	100
Bone marrow transplants	0	5	25
Biofuel:			
– composite biodiesel fuel made from fatty acid methyl esters	0	3	12*
– pellet fuels from plant raw materials	5	20	100

* On the level of the EU target.

Fig. 2. Domestic demand satisfaction rate for biotechnological products according to the innovation Biotechnologies master plan

39 production facilities and over 150 technologies by 2014. The programs are expected to result in the production of over \$200 million worth of import substituting products and over \$190 million worth of exports. They will also lay the foundation for entering markets that will be the most rapidly growing in the post-crisis period and generating the most value added. Suffice it to say that revenues of the pharmaceutical production are similar to those of petrochemical industry (Fig. 3).

The Experimental Veterinary Institute of the Academy of Sciences transferred 15 and 18 new original veterinary preparations to Vitebsk Biofactory in 2009 and 2010 respectively. In Western countries it takes decades and huge funds to develop and launch production of new preparations. Our scientists managed to do it in three years with quite limited funding. In the next three to four years about 30 new veterinary preparations will be developed. This will help meet 70% of the domestic demand and start exporting some of the new products.

Information, communication and space technologies

Winning new markets and retaining old customers is impossible without cutting-edge technologies. Within the frames of the Innovation Technologies Program MTZ, BelAZ, Vityas and other companies have introduced CALS technologies which

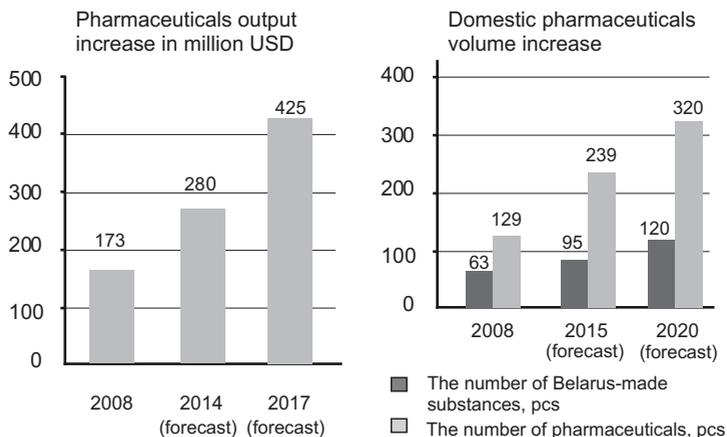


Fig. 3. Overall figures of import-substituting pharmaceuticals

allowed a 20% reduction of cost and time spent on paperwork when launching the manufacture of new products. Our goal is to introduce CALS technologies in all the major manufactures of Belarus. At the same time it has to be noted that IT, planning and management methods are still underused in Belarus, which is one of the main reasons for low productivity. Import monitoring shows that Belarus imports tens of millions US dollar worth of software which can be designed by Belarusian software engineers.

As for information and communication technologies, the Academy of Sciences focuses on systemic projects determining the national security, competitiveness of products and living standards of Belarusians. For example, the United Institute of Informatics Problems has developed telemedicine technologies that are now used for distant consultations in over one half of Minsk hospitals. The e-declaration system developed for the State Customs Committee is indeed a project of the international scale. The project was piloted in 2009. E-declarations for the export of goods now account for over 50% of all export declarations; some 500 companies now use this form of customs declarations. This attests to the real progress on the way to the information economy.

The year 2010 is a landmark year for the development of Belarusian space technologies. We are completing the creation of a satellite, a flight control centre and other ground control infrastructure facilities. The space industry of Belarus has set a task to reach its designed capacity by 2015. This pertains to the ground infrastructure facilities to operate the new Belarusian space vehicle as part of a group of Russian satellites, and a separate ground control of the Belarusian space system of the earth remote sensing which will receive, process, distribute and sell (export) space information.

We might get an opportunity to use the Russian global navigation satellite system (GLONASS), and develop space communications which will allow us to introduce cutting-edge digital television and telemedicine technologies. Space technologies should get into our daily routine helping us make commercial and managerial decisions in agriculture, forestry, water management and melioration, emergencies prevention and response, exploration works, upgrading of surface contour maps.

Innovative technologies in industry

In 2009 alone USD 7 million worth of electronic and optical products were produced using the know-how of scientists and R&D specialists of industrial enterprises. Domestically produced telecommunications devices were installed at the State Border Committee, Ministry of Defense, and the Beltransgaz company. New laser medical apparatuses have been certified, while the existing production capacities can fully meet the country's needs for such devices. In 2009, the organizations affiliated with the Academy of Sciences churned out laser medical apparatuses worth Br3 billion, a third of them were exported.

By 2015, we are to establish a competitive state-of-the-art economic sector based on submicron technologies of solid-state electronics. This sector is expected to push the export of high technology products by 1.5–2 times compared with 2010, enhance the competitiveness of electronic devices and systems on the international market by means of improving their operational parameters. These are high-tech low-energy and low-material-intensive products; their global (export) market is growing extremely fast. The microelectronics industry is a priority, if not to say the face of the new Belarusian economy. We believe that the establishment of another high-tech park will provide a considerable boost to the advancement of this industry, as well as to the laser and optical production. This park will develop know-how for the organizations affiliated with the Ministry of Industry and State Military and Industrial Committee.

The Machine Building Program exemplifies fruitful collaboration between R&D specialists of industrial enterprises and scholars who make the major contribution to the implementation of this program. This collaboration resulted in the production of a lineup of MAZ buses, Belarus 3022 tractors, logging machines, grain harvesters and other machinery. Today the Institute of Metal Technology uses its own design solutions and premises to produce import-substituting products worth about Br3 billion per annum for Belarusian Steel Works, Mogilevliftmash, Mogilevkhimvolokno, Borisov Aggregates Plant and other enterprises.

The plan for the forthcoming five-year period envisages the total renovation of the lineup and improvement of the operational

properties of mechanical transport, including the production of Euro-4 and Tier-3a level engines, switching from the development of individual models of agricultural machines to complete complexes for the plant growing and cattle breeding industries.

New materials

An important area of work is the development of new compositions and technologies of obtaining hard alloys with enhanced physical and mechanical properties. Last year we launched the production of forming tools for Belarussian Steel Works and Minsk Engine Works which completely solved the issues of the import of these instruments. We have designed and introduced sophisticated plasma cutting equipment to fully satisfy the country's needs. This equipment is of top quality and more reasonably priced than its foreign analogues.

The challenge the national science faces in the next five-year period is the development and production of materials that will enhance the strength of connection joints and aggregates by 20–25%, operational properties by 10–30%, service life by 10–15%, and substitute of the import of glass materials, biocompatible, composite and polymer materials by 50%.

Other promising projects include the development and production of construction materials and structures with enhanced (by 15–20%) physical and mechanical properties to erect relocatable buildings and other facilities; heat insulating materials based on mineral and polymer raw materials, polystyrol foam concrete, foam glass, chemical production waste that helps extend the service life of the construction materials and structures by 10–20%; extraction of granite, dolomite and other mineral resources to produce construction materials using industrial emulsion explosives. The scientific support for these projects is stipulated in the research promotion strategy to run until 2015.

Innovative technologies in agriculture

The Academy of Sciences applies a complex and system-based approach to addressing a variety of issues. For instance, in line with the rural development program, machines are designed for each individual crop and operation, not separately but in complex for the whole technological cycle. By now, we have developed over 65% of the list of agricultural machines. Of course, a number of machines have some flaws, we have

to increase the localization ratio and address other problems. But we have chosen the right way. Our managers want to get comprehensive services and domestically produced machinery.

Another example: ten years ago there was virtually no such crop as rape in Belarus. Today we produce around 600.000 tonnes of rapeseeds and fully satisfy the domestic demand for this vegetable oil. We have also managed to reduce the import of protein meal. We also meet 100% of domestic needs for brewer's barley. For the first time in Belarus' history we have bred a cold-resistant early-season variety of corn hybrids which are half as expensive as imported varieties. Now 50% of Belarus' needs for seeds of this crop are met.

Scientists suggest feasible scenarios of transition to the economic management methods in agriculture. Relevant research has been made. We believe it is time we explored the advantages of the public-private partnership. Export growth targets should be emphasized as we create new agricultural capacities.

In the next five-year period we suggest creating efficient cattle-breeding complexes with the use of home-grown and adjusted technologies and increasing the technological level of agricultural production (see table). We believe that this will help cut down on unit costs of farm production, make it more efficient by dint of reducing the prime costs and improving the quality. In this way we will be able to wipe out the deficit of foreign trade in farm produce which we are having now and reach a \$1 billion surplus.

The Academy of Sciences has proposed a draft program of

Innovative objects of the agriculture industry, 2011–2015

Description	Quantity, units
Dairy complexes	476
Pig-breeding complexes	38
Poultry factories	6
Modernization of agricultural machines depots	1000
New grain cleaning and drying facilities	600
Modernization of the existing grain cleaning and drying facilities	250

rural territories development for 2011–2015, which will complete the formation of the innovation-receptive efficient agricultural sector of Belarus.

Forging a National Innovation System

To implement big system-based projects we need not only scientific and technological achievements. We need finances, infrastructure, legislation, human resources, in other words, an effective national innovation system. Unfortunately, the issues of laying the legal groundwork for the innovation development have not been tackled fully.

Yet, I would like to note that quite a few legislative initiatives were introduced last year. Decree No 441 of the President of the Republic of Belarus of 4 August 2009 enforced a multi-level flexible system of research incentives. For example, scholars engaged in most important research and development can expect their base rate to go up 2.5 times and bonuses as high as five monthly wages. These are the wages of the European level. Amendments have been introduced to the existing by-laws on scientific, sci-tech and innovation activities (Decree No. 9 of the President of the Republic of Belarus of 4 August, 2009). The draft law “On amendments and additions to some laws of the Republic of Belarus governing scientific, sci-tech and innovation activities” has been prepared for the second reading.

Meanwhile we need to enforce the legislation governing the turnover of the intellectual property rights. R&D achievements have not yet become a marketable product in Belarus. The

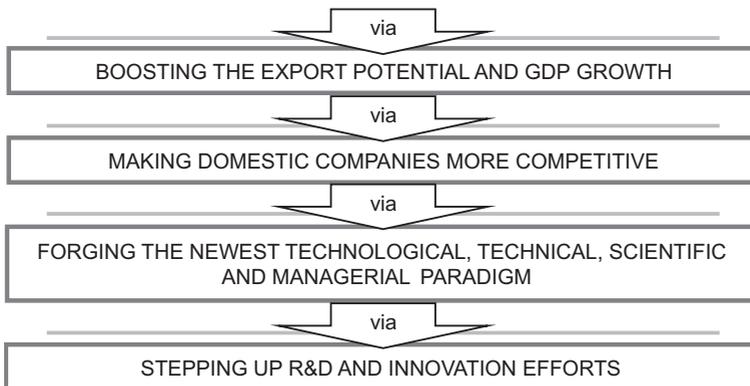


Fig. 4. Belarus' priority goal is to improve the quality of life

problems here are numerous. For example, who is the owner of the R&D product or a patent? On what terms and at what price do we sell an intellectual property object and related technologies, especially abroad? Due to the drawbacks in legislation our R&D institutions sometimes prefer to sit back showing the lack of international cooperation initiatives. When looking into the priority areas that need to be regulated by law we have identified three blocks of issues.

1. The innovative-technological block. Being the biggest proprietor, the state needs to forecast the technological development of the economy taking into account the existing manufactures as well as the promising economic sectors which will generate added value in the 21st century. For that, the priorities are identified in social and economic development, R&D and management.

2. The organizational and economic block. It deals with the innovative infrastructure, a system of market transactions in intellectual property objects and rights. The issues of intellectual property rights are closely interrelated with the issues of price formation. We need brand new laws here. As these issues are addressed successfully we will be able to tackle the human resources problems in science more efficiently.

3. The financial block. The key goal is to create the legal environment governing the flow of foreign and national capital into innovative projects. This is a priority task today. We believe the emphasis should be made not only on direct support in the form of state subsidies or subventions but also on indirect instruments. This is an internationally recognized practice.

We need to formalize venture investment, the role of expert analysis, the responsibility of contractors and executing agencies of promising programs, mechanisms of their financing.

The Republic of Belarus was the first among the former Soviet republics to declare the innovative development policy as its main development strategy (Fig. 4). Our neighbors have chosen the same path which shows that we have made the right choice. Today the most important thing is to further the advancement. What is needed today are progressive decisions, efficient consistent work on implementing the instructions of the President of the Republic of Belarus to liberalize the economy and diversify

exports, to prioritize economy and thrift, strengthen public security and discipline.

Our priority goals are to enhance the responsibility and discipline. We also need to concentrate on system-based solutions that will put us on a pathway of growth. On the whole the main strategic goals should be development and economic growth. This is how Belarus will be able to come out of the global crisis stronger, with more efficient industry and higher living standards. This is how we can lay down the solid foundation for the economic growth driven by innovations in the next five years.

Economic security

Economic Security and the Macroeconomic Stability of the Republic of Belarus under Present-Day Conditions

The macromarkets, including those of labour, capital, domestic and foreign markets of goods and services, traditionally serve as a subject of macroeconomic theory study. To evaluate the macroeconomic dynamics we should consider them in interaction taking into account the external factors influence – those of energy resources, state of the world financial system, foreign trade. The task of the national economic policy is to reach the economic balance on these markets with target parameters of employment and factorial efficiency, which, according to the economic theory, determines the balanced level of the factorial income, including wages [1]. Effective macroeconomic policy is much more complex than the classic recommendations of the international finance institutions, and as is obvious in our situation, under the world financial crisis none of the governments can afford to rely on the market forces of self-regulation alone. Moreover, the concerted action of the leading states aimed at the financial markets regulation are considered as one of the key mechanisms to meet the crisis. Under consideration are the problems of the complex transformation of the entire world financial system [2].

Despite its comparatively low weight in the world economy (0.15% of the world GDP at PPP) the Republic of Belarus is not aside of the world economic processes. The Belarusian economic development is exposed now to the world financial market tension and greater external threats. They include rise in the cost of resources on the world capital market, restricted access to the long-range foreign markets, non-tariff measures forcing the Belarusian producers to withdraw from the market segments of high value-added production being traditional for them. Still actual are also the internal threats related to the ill-developed

national innovation system, high resource intensity of industrial technologies, ineffective allocation of the labour, financial and material resources used in real sector and in national economy in general, not to mention the high institutional risks.

In the course of the economic integration of the country to the world economic system the number and possible negative effects of the existing and new threats will increase. Therefore the economic security system and the macroeconomic policy of the Republic of Belarus should become more effective, update, should acquire the built-in elements of stabilization and economic self-organization, potential of inner resistance to threats (Fig. 1).

Such a system can only be created and institutionally consolidated on the basis of new methodology considering the economic security and economic development in the context of

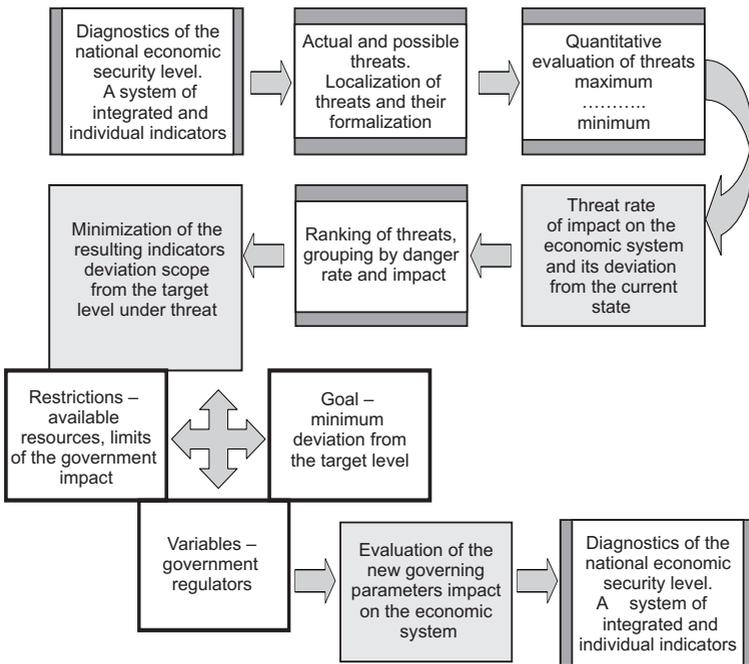


Fig. 1. Reflexive system of the economic security running monitoring of the Republic of Belarus

the innovation breakthrough strategy that is very topical for the Republic of Belarus at present. This methodology main point is related to the fact that economic security and macroeconomic policy of the state should be aimed not to maintain the present industrial structure, not to create the greenhouse conditions and not to protect the national producers from the foreign economic influence (a negative one included), but should be aimed at the structural adjustment of industry related to the world market future requirements and industrial development trends of the 5th and 6th set-ups.

An economic security system should be a reflexive one able not only to prevent the current threats, but to launch timely the self-development mechanisms to oppose future threats typical of the globalized information mega-economics. For this purpose each macromarket should be regulated on the assumption of the innovation goals, target economic system objectives which the Republic of Belarus faces in the 21st century. We are going to consider the state of the macromarkets and future trends of their development from these very positions.

Labour market. Under present-day conditions when the notion “labour resources” is getting out of use by economists and is substituted by “human capital”, the labour market acquired the most important meaning for innovation economic development. A man becomes a key productive force of the postindustrial society, and so to good purpose is the essence of the Belarusian model of development briefly formulated as “the state for the people”. At present we, like many other CIS states, face the acute manpower problem.

The case in point is, first of all, related to the high-skilled personnel required by the innovation economy, disregarding whether it is a good programmer, a good constructor or a good engineer. By now the economy faces the shortage of personnel in construction, agriculture, designing, medicine. There has appeared a new phenomenon of virtual migration related mostly to the high-skilled workers – programmers, designers, scientists. Staying in Belarus they work according to the individual foreign orders, when the financial flows can not be easily traced. One of the main reasons for this situation is Belarus lagging behind the CIS countries by nominal and real wages, real incomes of people

growth rates, and still more – by incomes growth of the people in currency equivalent [3]. When the EU and Russia display greater activity in attracting the manpower from abroad, of potential threat is the wage differentiation gap as for the education and skills features is concerned: the wage level in health care, education, culture, science (for exception of the branch engineering institutes) is 1.5–2 times lower than, for example, in construction and transportation [4]. This situation can be explained by low wage/GDP ratio, that being approximately 1/3, or two times less than that of the developed countries. The lag in income growth is closely related to the rapprochement rates deceleration of the GDP per capita indicator in Belarus and in developed countries. It seems obvious that by setting the planned indicators of the GDP growth there should be taken into account not only its previous dynamics, but rates of economic growth of other countries of the world for to ensure the rapprochement with economically developed countries in the near future.

Preventing the decrease of the Belarusian population income growth target indicators should be recognized as a high priority task. Otherwise the most skilled professionals can drop out of the domestic economy. At the same time it would be reasonable to reconsider the wages funds formation and bonuses awarding mechanisms, to remove the restrictions on payment for work done, to take easy the increased differential payment, particularly in the framework of one branch. The growth of the remuneration of labour share in the aggregate costs of production with simultaneous decrease of material capacity and power intensity should be put forward as one of the priority tasks for the production managers.

Capital market. Republic of Belarus is not a capital-redundant country. The main sources of investment in Belarus today are the own funds of enterprises and bank credits (Fig. 2). In future the international capital markets and foreign direct investment are to become the main channels to finance the national economy modernization [5].

The world economic crisis, unfortunately, won't make foreign loans more available for us. Moreover, due to the crisis in the world finance system our country faces a number of risks

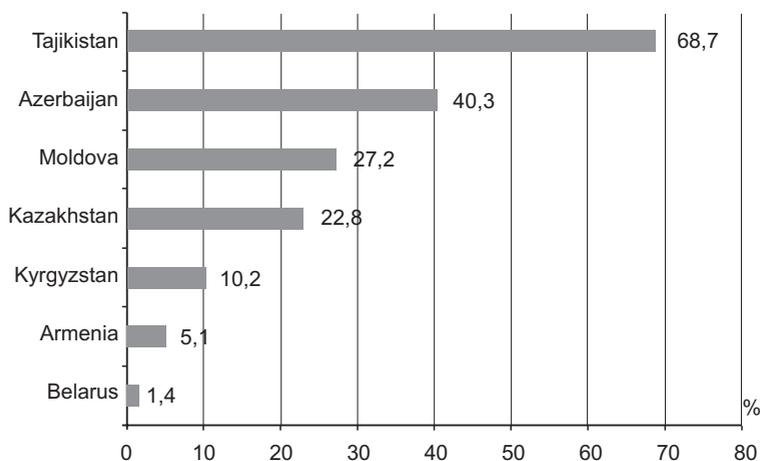


Fig. 2. Foreign investment share in total volume of investments in some countries of the CIS, %

which could have been minimized through the sustainable policy of the own finance system development, expansion of the bank resource base, by encouraging the people for saving, as well as by attracting the foreign bank capital on a mutually beneficial basis. Belarus should do its best to benefit from the sustainable macroeconomic policy which is being realized since 1994 and has enabled to keep the financial system manageable.

A new impetus should be given to the strategy of the Belarusian economic potential presentation to the world business elite as it was done at the London investment forum in November 2008. The results make it obvious, that the competitive advantages of the Republic of Belarus should be demonstrated and advertised, as nobody else will do this work.

Among the most important system measures aimed at the further development of the capital market are the government guarantees of the natural persons' deposits in national and foreign currencies preservation in the Belarusian banks, as well as the liberalization of the deposit transactions [6]. This makes the national bank system very attractive among the CIS countries, makes possible to develop the resource base of Belarusian banks. But on the other hand, it obviously will result in more complicated

tasks facing the monetary regulation and bank supervision bodies. The requirements to the own capital of banks which work with the natural persons' deposits have grown by 2.5 times, it will be followed by the Belarusian banks liquidity flexible regulation system development, particularly under possible speculative attacks at the Belarusian bank system.

Ensuring the positive interest rates of the natural persons' deposits will remain an important tactical goal. It is a prime consideration against the present inflation background.

On a strategic level the further capitalization of the bank sector should be recognized as necessary, also through the foreign capital (Russian and Chinese ones included) attracted. By 1.09.2008 a foreign capital share in the joint authorized fund of the Belarusian banks amounted to 22.2%, in Ukraine – 35%, in Russia – 25.7% [7]. The bank capital diversification by countries is very important on the Belarusian market; the banks of one country should not dominate here. It decreases the Belarusian capital market dependence on the capital markets of other countries.

Foreign market. The credit balance increase remains the key problem. It is a structural and complex problem, that hasn't been solved yet. Despite the fact that the rise in average export prices (48.1%) during 8 months of 2008 surpassed the rise in import prices (33.0%), the trade surplus, in particular trade of goods, kept on going down (Fig. 3). It means that real sector of the Belarusian economy is not so active as to reduce the resource intensity and to increase the production efficiency.

The credit balance of the trade in commodities was partly compensated by means of the debit balance of the trade in services and foreign capital attracted. Still here also can be observed critical trends: the greater part of these funds attracted without any control and effectiveness are short-term credits assigned for payment of import or replenishment of circulating assets.

At present the foreign and capital markets dynamics interrelation in the Republic of Belarus is expressed through a partial compensation of the foreign trade negative results by the short-term debt financing. It is a high-risk strategy which can have a negative effect on the financial system of the country stability in case of the increased foreign resources cost.

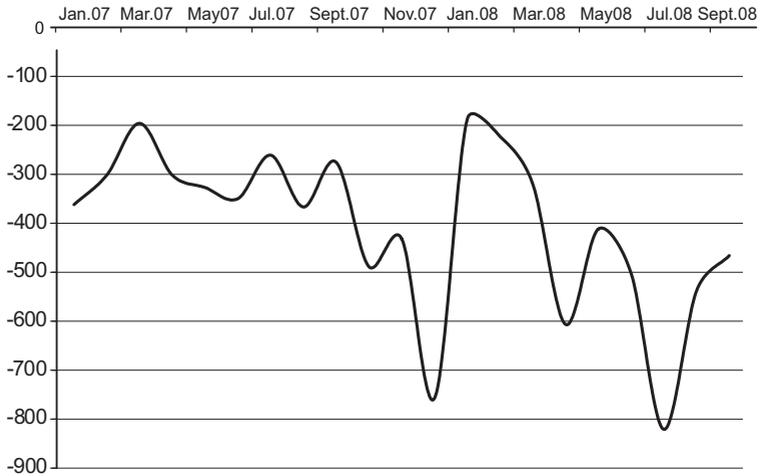


Fig. 3. Dynamics of the export commodities surplus, million USD

The feedback should be also taken into account: the world finance market instability may bring about certain alterations as for the main foreign partners of the Republic of Belarus on the commodities and services markets. Thus, on the Russian market due to the bank system liquidity fall, the shipped product payments could be delayed and sales of the Belarusian investment goods could be reduced. The old problems of mutual trade didn't dropped out, remain to be urgent. In practice it is necessary to confirm the VAT paid, foreign contracts completed, that being a burden to both Belarusian and Russian parts and finally brings down the foreign relations intensity, particularly in the consumer goods sector where small and medium-sized enterprises are operating. A Russian wholesale buyer is not eager to visit the revenue service, he tries to step aside, and it is the Belarusian manufacturer who suffers.

On the European area the unstable world prices for oil products are a risk factor for the Belarusian economy. In the result of this price-cutting which is to follow the oil price cutting, reduced will be not only the foreign exchange earnings, but the oil products export duties budget receipts also, as their size being tied to the world prices for oil. Besides, under the crisis on the world financial markets there has appeared a trend of the nitrogen

and phosphate fertilizers prices landslide. The same may touch also the potassium chloride which is a significant article of Belarusian export. It may result in the slowdown of the budget receipts of the foreign trade earnings growth rates, which showed a considerable increase in recent years.

The strategic priorities of the export development are well known [8]. Apropos, they are defined in the programme of the same name which has passed unnoticed disregarding the goals set to develop the sphere of services, labour migration issues legalization, effective export of capital. There should be opened up absolutely new developing segments providing the operation leasing services, computer, information and outsourcing services. A problem of the tourist services credit balance needs a complex solution, ecotourism should also get an additional incitement.

The domestic market situation in the open economy is much determined by the macromarket dynamics considered above. The interrelation of the foreign trade results and the national production systems scale was clearly proved by the Nobel prize laureate in economic sciences (2008) Paul Krugman [9]. Indeed, the modern customers need various brands, their demand is very sensitive to the nonprice characteristics, and just for that reason the comparative advantage in foreign trade theory doesn't follow a classical scheme. The countries are engaged in commerce selling similar goods, that at the first glance doesn't agree with the classical theory, still by their consume properties these goods are very different. And in the long run the winner is that who taking into account the scale effect bends every effort not to the domestic market but creates the export-oriented production.

The Belarusian consumer market is a very good empirical argument for that theory. Along with the customers' income growth the demand changes for more expensive and high-quality goods. This trend has already been realized by Russia and China, and using the scale effect and having price competitive advantage, they had changed their priorities for the quality competition. And this process will be further intensified, as the demand will move to the market segments with goods of higher quality and consumer properties.

All the items (except for the automobiles) which provided the highest increase of consumer goods import are produced

in Belarus, but by the price/quality ratio they yield to the import ones. As a result, with the own production available, we import every second bar of soap, every second bottle of juice and every fourth bottle of beer, every third refrigerator and every fifth meter of wall-paper. There are 2 carpet factories, yet near 45% of all the carpets sold are import, the shirts import has increased by 2 times and within a half-year over 200 thousand pieces have been imported accounting for the fact of 2 manufactories specialized for that purpose production. This is only the officially registered consumer import not considering the goods imported by the so-called “shuttles” and through the like “grey” routes.

The consumer credits also contribute to the import growth; their active increase against the wage-push background not only encourages the import but comes as an additional source of inflation.

The domestic producers facing the increased purchasing capacity of the population fail to increase sufficiently the production of highly demanded goods and to give a timely response to consumers’ preference change, besides, they lack the initiative in the new perspective and high quality goods manufacturing (Fig. 4).

As a result, the consumer goods become substituted by the cheaper and diverse Chinese and Russian import, while the Belarusian goods of sound quality being cheaper than the import analogues still yield to them by quality. An average consumer who was the main user of everything produced by the Soviet economy, takes progressively less interest of the domestic commodities, as he prefers those of Russian and Chinese production, besides, he can afford also the goods of higher quality. Yet these are the goods made in Russia or China under the world brands.

The existing situation occurred due to the enterprises and citizens lacking the real economic motivation for the consumer goods production. To the major enterprises it will bring only a very low percentage of the production volume increase and a lot of trouble, and as for the small production business – unfortunately, it is not developing at all. Many goods which are not produced in Belarus are imported from Russia, as the producers having felt the changing customer demand, began

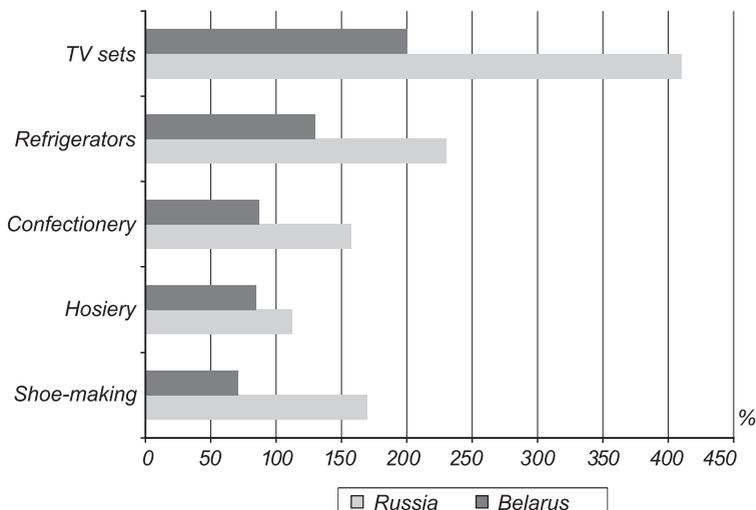


Fig. 4. Some consumer goods production in Russia and Belarus (2006 to 2000, %)

to increase the exports for consumption in Belarus under the trade marks of the famous world brands.

Yet there is one more important problem: the existing commodity distribution system (beside that of the companies) – “producer – wholesaler – retail” is weakly interested in the home market saturated with the domestic commodities. Distributive trade takes the goods that can be easily sold, the role of wholesale trade is minimized and is being substituted by various active agents in import, adding the commission charges and importing the inflation.

To improve the economic dynamics in the markets of labour, capital, goods and services, to reduce the macroeconomic risks, it is necessary to develop a new policy aimed at the national economy competitive capacity rise (a complex of system measures) which should be realized according to the following:

Intersectoral principle, but not a sum of the ministerial plans;

To be aimed at the growth of the qualitative, not only gross, macroeconomic indicators;

Through deep legal-organizational and structural reforms in economy aimed at the national economy modernization for the purpose of the innovative development of the country.

The chief system measures obviously should include the following:

1. There should be made a transition to the system of the republican, branch and regional balances, mathematic prediction and strategic planning of the material sector development accounting for the future external and home demands and economic structure changed.

The role of the effective use of resource indicators with their value compared to the world average meanings should increase.

2. The principles of the price regulation should be corrected, as they often come as a deterrent factor of the production; the enterprises should be granted the right to determine by themselves the production output and its prices depending on the demand during the period of new technologies application and import-substituted goods introduction. It would be advisable that the manufacturers themselves allow the bulk discounts while delivering the goods to the wholesale trade organizations to provide the return on sales, to remove restrictions at this product promotion by the wholesale trade organizations.

Keeping and developing the system of state orders and state purchases the economic levers should be used more active, including borrowings against security of the government, tax holidays, other incentives, with a particular worker and manager certainly borne in mind. Meanwhile these systems are not active and first of all because of the indifference of the personnel working at both state and private enterprises. Business banks should take an active part in the production of commodities through the low rate of interest credits.

3. Sustainable development at the world prices for energy resources can be maintained merely provided the world level of competitive capacity and deeper processing of raw materials. According to the world prices for the energy resources dynamics, their drastic growth in the world market can hardly be expected [10]. The situation for the Republic of Belarus will be different: a delta between the home and external costs kept up by the lower prices for the energy resources will decrease. It should be taken

into consideration also that since 2006 Russia has sharply accelerated the rates of the petroleum and gas-and-oil producing industry modernization by means of the deeper carbohydrates processing and increasing the range of goods with high value added, including those made of polymeric materials.

Beginning from 1999 the Russian petroleum industry provided the active dynamics of the annual oil production growth – from 0.9% in 1999 to 11% in 2003. In the follow-up years there was observed a decline (2004 – 8.9%, 2005 – 2.6%, 2006 – 2.2%). To the point is also the fact that since 2006 Russia has started to invest great funds in oil refining and chemical industry. The depth of oil processing was brought to average 71.6% (2006), and at several petroleum refineries – to over 80%. At the same time the oil processing complexes of the “Lukoil”, “Slavneft”, transnational corporations, etc. are being actively constructed to produce caoutchouc, man-made fiber, caprolactam, polystyrene, other products and constructional materials made of them. These trends may pose problems related to the large amounts of Russian oil import and result in the active intervention of new goods to the Belarusian market.

4. As a key strategy there should be suggested to change the national economy global specialization through absolutely new sectors and industries of the 5th – 6th set-ups creation aimed at the goods with the highest value added and low energy intensity and material capacity production.

A network of small and medium-sized enterprises with a moderate stuff and flexible processing lines should get an accelerated development. They should be aimed at the final product output based on the domestic and imported raw materials and inters as their manufacturing at the large-scale enterprises is not economically and organizationally reasonable. Such facilities should be organized first of all in small towns.

5. Particular technological competence ranked as a specialization co-operated with science and technological activity and integrated with transnational corporations – that being an objective trend of the world economic development – are to become an important line of the national economic development.

The success gained in several branches development and the macroeconomic stability ensured in general allow and require,

in the judgment of some scientists, a revised attitude towards the Belarusian enterprises participating in the international labour division. According to the scientific analysis, the existing enterprises may be included to the transnational corporations. No doubt that our share in capital of the international companies is important but not determinative. The main thing here is a partnership, i. e. access to information, experience, resources, markets. For that reason it would be expedient to lift the restrictions and simplify the procedures of the Belarusian enterprises joining the transnational corporations. It should be noted, however, that leaders of the weak enterprises are not eager to enter the international integration, first because of the possible loss of prestige and state support.

The advantages of the domestic economy which are still available may be lost in the near future due to the lack of investment. In the world during the last 10–15 years active are the processes of agglomeration and globalization, and we are to participate in them. This will result in the overcoming the gap between our country and the leading developed countries' level of economic development, that having a positive effect on the competitive strength of economy and reducing the labour resources migration.

6. To increase the nomenclature of domestic goods there should be a system development of the intersectoral cooperation that can ensure the goal production of goods with high added value. Suggestions on the nomenclature of goods and organization of the production are to be made at close interaction of several industries.

It would have been reasonable to make the process of the integrated productive structures establishing more active. The experience of the major industrial associations argues in favour of integration. This approach should also be spread to the agricultural sector. It is very important to organize the multi-activity and /or focused agrarian enterprises including the industrial processing, ecologically clean product manufacturing (profitable and quick-growing market), to exempt these companies from the circulating assets taxation for the taxes to be paid only at final stage of the production realization.

The innovation firms and pilot production, major centres for business R&D should become the affiliated companies of the

integrated structures established according to the pattern of the practical-scientific centres of the NASB.

7. As the National Programme for Innovation Development is to be accomplished by 2010, it would be reasonable to have the national innovation system formed by that time intended to create the innovation environment: legislation, infrastructure, financing mechanisms. At present the most serious disadvantage is a weak innovation legislation, which is represented by a slightly updated Soviet one, but in no way by a modern market one. The branch industrial funds also don't operate on a full scale and often turn into the instrument of the cross financing from the successful producers in favour of the ineffective enterprises which are not capable to attract the investment resources. The recipients lose all incentives to raise the efficiency while the donor companies lose their competitive power. Innovation funds mean billions rubles a year. It seems necessary to analyze their effectiveness more thoroughly.

The considered system measures can be assumed as a basis for macropolitics of the Belarusian economy modernization, that enabling to oppose the outer global challenges in the economic sphere and furthering the socioeconomic development of the Republic of Belarus.

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Energy Security of the Republic of Belarus: A State and Ways of the Problem Solution

Introduction

The idea of the energy security appeared for the first time in early 1970s during the fuel and energy crisis as a result of the embargo put by some petroleum-exported countries on the oil supply to a considerable number of industrially developed European countries. To decrease the negative effects of this step these countries, the members of the Organization for Economic Cooperation and Development (OECD), established the International Energy Agency (IEA). Its main lines of activity were to build-up the strategic oil reserves and to reduce the economy energy intensity aimed at the energy security level of the OECD countries rise.

A decade later all the sanctions restricting the oil supply were lifted, world market demand was practically satisfied, still the energy security problem remained no less urgent both for the countries with limited fuel and energy resources and financial potential to buy them abroad and for the developed countries having the excess fuel and energy resources of their own. The greatest significance was attached to such a state of power industry when it failed to accumulate the electric power and needed to ensure the balance between its production and consumption at every moment of time. A large-scale power emergency outage in USA, Great Britain, Italy, Russia having petrified the activity of millions of people aggravated this problem with new aspects, first of all, those of the energy supply reliability. It is estimated that the reliable operation of the US power grid expenses amount to no less 5 billion USD per year [1]. However the blackout in the power grid in August 2003

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in the North – East of the USA and Canada caused damage of 7 million USA [2].

Of the same importance is the observed lately unprecedented increase in oil prices in the world market.

Energy security definition

The concept of the energy security can be considered on different levels – global, regional, national, district, local ones.

On a global level the energy security is a balance between the fuel and energy resources and a demand for them. According to the sustainable development conception admitted at the World summit in Rio (1992), the energy resources production and energy consumption are not to decrease the world explored reserves of the fuel and energy resources. It means that any reserve depletion of oil, gas, coal and other nonrenewable energy resources should be compensated by the new deposits exploration, as well as by new technologies application related to the so-called non-traditional energy resources use, such as heavy oil, shale oil, uranium-238, etc., not upsetting at the same time the ecological balance.

Theoretically this approach should be expanded also to the regions and individual countries, taking into consideration a number of other factors which are very significant for the energy security.

The World Energy Council defined in 1992 the energy security in the following way: “Energy security (or security of energy supplies) is expressed in the assurance that energy will be available in the quantities and qualities required under given economic conditions” [3]. Such an interpretation of energy security still doesn’t reflect in full the entire political, economical, social, ecological problems related to it on the national, regional, and global scale.

“The Russian energy strategy for the period to 2020” adopted in August 2003 gives the following definition: “*Energy security is a state of the country, citizens, society, government, economy being protected from the threats to their reliable fuel and energy supply*” [4]. These threats are determined by both the external (geopolitical, macroeconomic, market) factors

and by the state and operation proper of the fuel and energy complex and of the entire power sector of the country.

The draft “Concept of energy security and greater energy independence of the Republic of Belarus” approved by the government and National Security Council gives a more complete and precise definition: “Energy security of the Republic of Belarus is a state of the fuel and energy complex providing the sufficient and reliable energy supply of the country for sustainable development of economy in standard conditions and minimization of damage in urgent situations”.

So the energy security deals with many aspects, viz. lesser vulnerability caused by short- and long-term energy disrupt service; a need for local and imported energy resources to meet the growing energy demands at reasonable prices, etc. The energy security violation, or in other words, the energy disrupt service even for a short time accompanied with sharp jump in prices for energy resources may result in grave financial, economic and social consequences.

The energy security, no matter whether a country is importing or exporting energy resources, is one of the most important elements of the economic and as a whole national security.

National security is an ability of a state to oppose the internal and external destructive actions [5].

Economic security – it is a complex of economic, geopolitical, ecological, legal, etc. conditions providing the following:

- prerequisites for its survival under crisis and further development;
- protection of the vital interests of the state related to the resource potential, balance and dynamics of development and growth;
- internal and external protectability against the destabilizing action;
- competitive power of the country in the world markets and stable financial situation;
- adequate living conditions for people.

The key problem of the countries having limited fuel and energy resources is considerable currency funds spent to buy them abroad. Those countries with sufficient power resource base are seriously concerned on the investment funding of the fuel

seriously concerned on the investment funding of the fuel and power industries to the rate enabling them to ensure both the power supply of the economy and people and the export deliveries of the energy resources at a proper level, as the deductions from their proceeds are important items of the budget receipts.

Methods of the energy security estimation

The issues of the economic and energy security of the state analysis represent the goals of the large social-technical-economic systems having various properties, parameters and states, complex inner and outer relations, uncertain terms of development, etc. Therefore the known methods of technical systems analysis are of little use here. In this case there can be effectively applied an absolutely new approach to the economic and energy security analysis, that of the *indicative analysis* based on the methods of mathematical statistics. This approach was used to evaluate the state of energy security of the Russian Federation and its regions [6–8] and of the Republic of Moldova.

The indicative analysis is based on the system of the situation quantitative assessments – *indicators* which characterize the degree of the energy security threats. Conditionally these threats by their origin and nature can be classified into 4 groups: economic, sociopolitical, man-caused and natural. Its specific character lies in that economic and energy security is expressed through the system of indicative indicators, as by their values we can judge about these systems by their security levels comparing the indicator meanings with the previously defined *threshold levels*. The threshold levels proper divide the situations depending on different critical levels.

Classification of the economic and energy security state levels according to the degree of gravity includes three main qualitative states of security by each indicator: *normal (N)*, *pre-critical (PC)*, *critical*.

Normal is such a state when acceptable values of all or near all indicative indicators are ensured.

Pre-critical zone is characterized by a state when the security threats acquire such measure of significance which is to be considered. If necessary arrangements on the threat

neutralization and elimination are not taken then appears the danger of the destabilizing factors development that may result in the security deterioration. The pre-critical state proper doesn't imply the irreversible deterioration on the whole, yet it may bring about the significant degradation of certain spheres. However this deterioration can be overcome with the help of the due corrective measures. The pre-critical zone is necessary as it allows to notice the arising dangerous trends in time and to prevent them. Therefore at this stage the preventive measures are of primary importance.

The critical stage is characterized by considerable negative trends and dynamics of development which threaten the sustainable development at the beginning of the critical stage. When falling into it, the preventive measures won't be enough as the structural adjustment will be needed. The measures of that kind entail considerable expense and recovery will demand sacrifice, and until the system reaches sustainable development the quality of life may come down.

The main stages of the energy security analysis are the following:

- definition and classification of the energy security threats;
- forming the body of the indicative indicators to monitor the energy security;
- determination of the indicators threshold level;
- working out of measures to eliminate, neutralize and weaken the energy security threats.

The threshold levels of the indicator values definition is usually made by means of expert judgments. In the paper for that purpose has been used a new approach, that of the functional correlation method involving the macroeconomic indices being assigned (through the mentioned expert judgment method), for instance, the GDP per capita.

Evaluation of the energy security state

At present the main factors deteriorating the national energy security are the following:

- low rate of own fuel and energy resources procurement;
- high rate of the energy intensity of economy;

- high natural gas ratio in the energy balance of the country;
- high rate of wear and tear in the fuel and energy complex;
- fuel and energy resources imported primarily from a single country (Russia);
- high costs for the imported energy resources;
- shortage of investment in the fuel and energy complex of the country.

In 1990 own energy resources ratio in the gross consumption of basic energy resources in Belarus amounted to 8.3%. At present this indicator reached the level of 14.5% mostly because of the energy overall consumption reduced in the Republic of Belarus by over 1.5 times as compared to 1990 [10].

A share of natural gas in the boiler-furnace fuel consumption exceeded the rate of 75%, in the Belarusian energy system – 95%. Despite the clear advantages against other fuels the gas has certain disadvantages in the view of energy security related to the impossible storage of the considerable gas resources at its consumption points. For that reason, in Russia, for example, where one third of the world gas resources is concentrated it is considered that the mentioned indicators should not exceed 50% and 60% accordingly.

About 99% of the imported energy resources are purchased in one country – Russia, their cost at present is over 1.5billion USD per year. In case of the transition to the world prices this sum may increase twice and even more.

The installed capacity of all thermoelectric power stations of the “Belenergo” concern by 1 January, 2005 was 7656 MW, and of all energy sources of the republic – 7798 MW, length of all energy networks is 265 thousand km, of thermal-transmission networks – 4.95 thousand km according to the single-pipe scheme.

In 2004 the overall energy consumption by the country was 34.2 billion kW/h, including that produced by the “Belenergo” power stations – 30.37 billion kW/h, import – 4.05 billion kW/h, export – 0.797 billion kW/h, thermal energy consumption – 73 million Gcal. Energy loss in the networks was 11.14%, thermal energy – 10.09%. By 1 January 2005 the capital consumption

was 60.2%, including that of the generative sources – 61.4%, of substations – 64.5%, of electric mains – 54.2%, heat networks – 77.5%.

At present the lifetime of the 53% generative sources primary equipment and of the 66% power grid is over 30 years.

The weakest link in the power-supply system is a network 0.4 – 10 kW, that is particularly obvious during the natural disasters when happens the electrical failure disconnecting the customers. The electrotechnical equipment is also subject to both depreciation and obsolescence as its technological and economic properties are inferior to those of the state-of-the-art one.

The problem of the reliable and steady heat supply of the customers, population in the first line, during the autumn and winter period has a pronounced social effect, as the heat supply quality determines the comfort standard of living of the people, and the problems of the heat supply efficiency and reliability continue to be the key ones in the power policy of the state.

Early in 2005 in account of the “Belenergo” organizations there were kept 4985 km of various diameter heating single-pipe systems. During the last several years period there has been observed the negative dynamics of the heating system aging. During this period the share of the heating systems built 15 years ago slightly decreased from 50.5% to 50.1% with simultaneous increase of the share been in service for 15–25 years – from 29.2% to 31.9%.

For the Republic of Belarus the most significant are the following indicators of the energy security:

1. A share of the own energy resources in the government balance of the boiler-furnace fuel, %.

2. A share of own production in total volume of the energy consumption, %.

3. A share of the motor fuel consumption provided by the oil produced in the country, %.

4. A share of the dominating energy resource (gas) in the power industry of the country, %.

5. A share of the dominating energy resource (gas) in boiler-furnace fuel consumption, %.

6. A share of the dominating energy supplier, %.

7. A share of the heating and power stations working at two and more interchangeable fuels, %.

8. Capital consumption of the fuel and energy complex, %.
9. The boiler-furnace fuel supply (gas and fuel oil), 24 hours.
10. The power stations total installed capacity to the maximal actual load in the power system ratio (reservation).
11. A ratio of the investment in the fuel and energy complex to the fixed capital stock cost, %..

Out of 11 indicators four of them (4, 6, 9, 11) are in the critical zone, next four (1, 2, 5, 8) – in the pre-critical one, and only three (3, 7, 10) – in a normal one.

Energy security: goals and tasks

According to the investigation results, an actual goal of the considered problem is the energy security indicators uprating. For that purpose by year 2020 the indicators with values of the critical zone should reach the values of the pre-critical zone, those of the pre-critical zone – reach the values of the normal one. To achieve this goal the following tasks are to be solved:

- modernization and reconstruction of the power-supplier facilities, including modern steam-to-gas technologies with capacity 2800–3000 MW introduction;
 - introduction of new generating facilities using the power-suppliers alternative to the gas-oil fuel, including the hydroelectric power station – over 200 MW, heat stations using firewood and local fuels – up to 265 MW. To ensure the energy security and diversify the energy resources there were considered two possible variants of the power stations construction – coal and nuclear and the last proved its advantage;
 - increased volume of the fuel and energy resources strategic reserves, including greater volumes of gas storage in the underground storage facility of the country;
 - development of bulk oil and gas supply providing the alternative energy resources;
 - reconstruction of the operating and construction of new power lines, international ones included;
 - introduction of new power effective technologies and use of the energy saving potential (not less 5.5 million tce by 2010);
 - drawing of own fuel resources (oil, associated gas, firewood, wood waste, renewable energies, waste energy) into fuel and energy balance at maximum rate in the view of the

economic and ecological expediency – from 4.2 million tce in 2003 to 8.1 million tce by 2020, including 6.75 million tce by 2012 (25% of total boiler-furnace fuel consumption);

- development in partnership of joint programmes on the collective energy security;
- working out of the energy security monitoring system and making medium- and long-term projections of the national energy complex development.

In the R&D sphere there was formed a certain research backlog related to the technologies of the hydrogen, geothermal waters, brown coals, biomass and other local fuels use intending to develop by 2010 the pilot plants. Besides it included the new effective technologies for the gas and fuel oil popping, evaluation units of wind- and solar power engineering and their trial operation for to define the scale of their further application by 2020, and reasoning of the investment in the nuclear station construction.

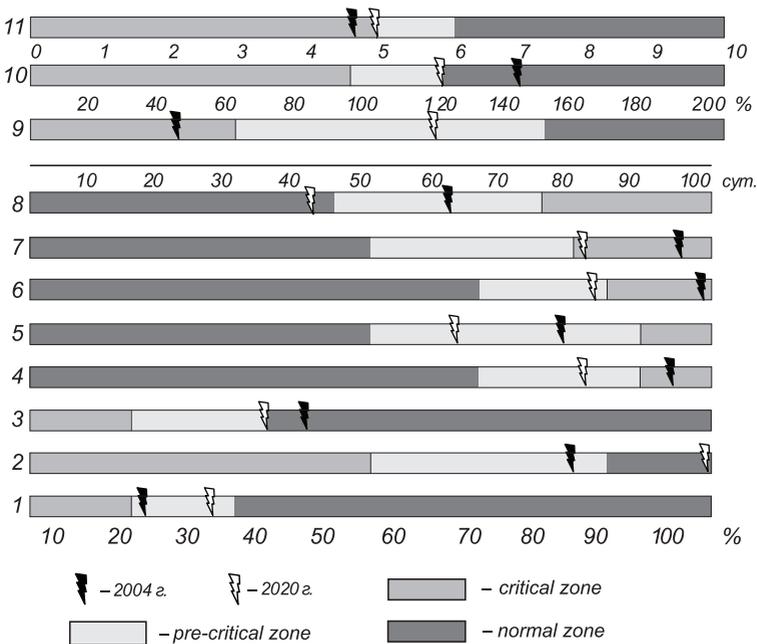


Fig. 1. Values of the energy security indicators

Energy security implies the vital national interests being protected from the threat of the resource shortage both under a standard situation and in the result of the interior or exterior technological, economic or political cataclysms. To oppose these threats in Belarus it is necessary to solve the following problems (including those mentioned above):

- basic production assets of the fuel and energy complex modernization to decrease their wear, including power industry from 60.2 to 40.1% by 2010;
- higher level of the energy independence – providing not less 25% of own energy resources in the boiler-furnace fuel balance of the country;
- nuclear power station construction: feasibility study and other preparatory work; construction and putting into operation of the first bloc of the station with capacity 650–1000 MW by 2016;
- increase the energy efficiency through the energy saving potential coming to 30% of the current consumption level;
- development of small and unconventional power sources (in case of failure and damage of the energy system);
- electrogenerating facilities based on the industrial and housing heating sources building with generator capacity reaching 400 MW;
- making the international contracts and agreements to ensure the diversification of the energy supply;
- own finance sources available to strengthen the energy security of the country.

**Basic means of the energy security enhancing.
Energy facilities modernization**

Along with the new energy sources building with the new modern technologies used, the modernization of the present energy sources is a significant factor of the energy security improvement. It is related to the fact that despite the installed capacity exceeding the maximum loading the Belarusian energy system has insufficient economical flexing generating capacities, that being of particular importance during the heating season. Hence it seems reasonable to do the following:

- to complete the construction of the Minsk heat station-5: to overbuild the gas turbine with capacity 110MW on the first energy bloc and construct the second steam-to-gas bloc with capacity 450 MW, station capacity brought to 880MW;
- completion of the Bereza hydroelectric power station reconstruction through the gas turbines with general capacity 150 MW overbuilt on the blocs N 3, 5 and 6;
- overbuilding the gas turbines with capacity 110 and 70 MW on the modern heat stations (Minsk heat station-4 and Gomel heat station-2) to raise their cyclic load capability and efficiency;
- replacement of the life-expired equipment of the power stations being in service over 40 years and having over 250 thousand running hours with modern equipment based on steam-to-gas and gas turbine technologies with capacity 1750 MW; in some cases it may be a complete replacement of the worn-out equipment by the modern one with improved performance characteristics, and if it is economically justified – to install the turbines on the boiler houses operating.

Development of the transmission facilities and energy resources transportation systems

To reduce the dependence rate of the natural gas import it is necessary to work over the problems of the energy resources diversification and suppliers. The diversification contributes to the energy security when some energy resource withdrawal or supplier repudiation are not irreversible, don't reduce the power supply reliability for a long time and can be compensated by some other energy resource or supplier.

To provide the alternative energy supplies to the country there should be considered first of all the supplies from the neighboring states. Through the available interstate transmission facilities the following power can be transferred: from Lithuania – up to 2200 MW, from Russia – 1200 MW, from Ukraine – 500 MW. Yet accounting for the Ignalina nuclear power station shutdown the Baltic energy system becomes scarce. As the most probable and technically available variants in the nearest future there can be considered those of the energy import from Russia, Ukraine and Poland.

The power delivered by the Russian energy system. Due to the changed energy balance in the power ring of Belarus – Russia – Baltic states caused by the first nuclear reactor of the Ignalina nuclear power station shutdown and the planned shutdown of the second one in 2010, the power import in the current volumes of 5.5 billion kW/h per annum can't be supplied through the existing transmission facilities.

At present there are being considered the variants of the third autotransformer of 500/330 kW installation at the Smolensk nuclear power station or one of its power blocks transfer from 500 kW voltage to 330 kW voltage. These measures may result in considerable increase of the carrying capacity of the Smolensk line.

The power delivered by the Ukrainian energy system. At present the Ukrainian power system has a number of nuclear power stations (Khmelnitsk, Rovno) located close to the Belarusian border and quite an extensive network of 330 and 750 kW voltage. The existing interstate power lines between the Ukrainian and Belarusian power systems being engaged will allow to make energy supplies up to 3.8 billion kW/h per annum provided a regular schedule of delivery during a year. In case of need the new power line of the Rovno nuclear power station – Belarus construction will enable to increase these supplies to 6 billion kW/h.

The power delivered by the Polish energy system. In view of the Polish power system development concept, in particular of the interconnection ties based on two chain transmission lines of 400 kW to import the energy to the Republic of Belarus, there can be considered the transmission line of 400 kW voltage Ross – Bialostok erection with the direct current insertion providing the reverse connection of the Polish and Belarusian power systems affording both the energy export and import. The optimal carrying capacity of this line will come to 1000 MW, annual import volume may reach 6 billion kW/h.

The power delivered from the Middle and Central Asian regions. Taking into account large water resources and fuels available in the Middle and Central Asia enabling to get the power at low rates that can be supplied to the Republic of Belarus on a substitution basis according to the trilateral

agreement with the Russian Federation participated as it owns the power lines.

Possible oil supplies variants. For Belarus situated in the centre of the East-European region and lacking the outlet to the sea, there can be considered the following ways of oil supplies:

- from Russia through the oil-trunk pipeline system;
- from Kazakhstan through the oil-trunk pipeline system;
- over the territories of the neighbouring states (Ukraine, Lithuania, Latvia, Poland) which have available and build up the offshore oil terminals to receive the oil from tanks. In that case the combined pipeline-sea or railway-sea transportation network for oil delivery is used.

The oil-trunk pipelines connect the Belarusian oil-refinery works with oil-producing regions of Western Siberia. There is a pipeline network to transport the oil products to the customers of the Republic of Belarus and abroad.

Based on the operating pipeline system analysis and accounting for the explored reserves and transportation distance, there can be made a conclusion of the most probable oil field supplies from the Middle East (region of the Persian Gulf).

For the Republic of Belarus there can be considered two ways of oil supplies from this region as the main alternative:

- Southern – through the Black Sea ports (Odessa);
- Northern – through Rotterdam and Baltic Sea ports (Ventspils, Butinge).

Possible ways of the natural gas supplies. At present the Belarusian customers are supplied by gas from Russia through the oil-trunk pipeline and pipe-offsets system with total extension about 7 thousand km.

Taking into consideration the explored reserves, main cargo traffic and transportation systems available, the gas supplies from Turkmenistan can be viewed as the most reasonable alternative.

The best transit pattern is that of Turkmenistan – Kazakhstan – Russian Federation – Ukraine on terms of the Russian gas being replaced by the Turkmenian one for Ukraine and similarly the greater extraction of the Russian gas for Belarus.

The existing fuel storage modernization and construction of the new ones

The underground storage facilities come out as one of the necessary conditions ensuring the energy security, higher reliability of the gas-transport system and smoothing the seasonal variation in gas consumption. According to the world practice, to ensure the energy security the gas storage facilities volume is to average to 30% of the annual gas consumption; for Belarus it is to be 5 bcm by 2020 provided the energy resources diversification.

The existing underground storage facilities capacity is not sufficient to ensure the energy security and smooth the seasonal variation in gas consumption. In this connection the active storage capacity of the Bug regional storage is to be increased by 2011 and new additional storage facilities with active storage capacity about 2.5 bcm are to be built by 2015 – 2020. As an alternative to own gas storage facilities may serve when needed the pumping of the natural gas excessive amounts accumulated during the summer period to the storage facilities of Ukraine and Poland.

Nuclear-power engineering

The nuclear fuel being drawn into the energy balance will raise the economic and energy security of the Republic of Belarus by following indicators:

- Substitution of a considerable part of the imported organic energy resources (4.1–4.2 million tce);
- Nuclear fuel is cheaper than the organic one in several times (at present 16 USD per 1 tce) and may be purchased not only in Russia but in some other countries as well;
- The nuclear fuel can be purchased in advance for the period of 5–10 and more years with a partial reloading every 1.5–2 years;
- The nuclear power station being drawn into the energy balance will result in the produced electrical energy cost saving as compared to other variants due to the reduced fuel costs despite the higher capital input.

The optimal variant of the Belarusian nuclear power engineering development is the nuclear power unit put into operation in 2015–2020 with total power of 2000 MW, that resulting in the cost saving of the produced power by 20 pct.

Besides, to ensure the reliable power supply of the Belarusian consumers and stable work of the power system, we need such a spinning reserve of capacities at every moment of time that could provide the restored balance of capacity after the largest operating unit of the generating equipment emergency breakdown. In keeping with these conditions, the preferred capacity of each nuclear power reactor should be at 600 MW.

Increase of the fuel and energy resources efficiency

One of the ways to overcome the energy crisis of early 1970s was announced to be the energy saving. Indeed, having decreased the energy consumption for a particular activity, thereby we reduce its energy resources dependence.

Yet it should be noted that the idea of *energy saving* by itself fits only to reduce the unproductive expenses or power waste. It's rather to say of the *energy efficiency*, i. e. to be aimed at the reduction of energy consumption not on the whole but per a unit of the goods or services produced, and on a national scale – per a unit of the GDP production. In this case the energy consumption growth is justified only if it is less than the gain in production.

The best progress in the energy efficiency rise aimed at the higher energy security was achieved by the developed countries. Thus, for a 15-year period, 1980–1994, the GDP energy intensity (a value reciprocal to the energy efficiency) in Japan reduced by 3.1 times (a certain leader by this indicator), in Switzerland, Denmark, USA, Italy, Austria – by 2.1–2.3 times, in Spain, Portugal, Ireland – by 1.6–1.9 times.

Great reserves for energy efficiency growth are there in the developing and transition countries. In 1999 the GDP energy intensity at the PPP was in 2.8 times less in the former USSR countries than that of the OECD countries.

In the Republic of Belarus the energy efficiency growth potential is estimated through the energy saving potential. According to the research results, the overall energy saving potential in the country is about 9.3 million tce per annum, that being 27% of the fuel and energy resources gross consumption. The distribution of the potential is shown in the Table 1. About 40% of the power inputs potential cut is in the very fuel and energy sector and petrochemical complex, about 11% fall to agriculture

and foodstuffs production, 9.6% – to housing and communal services, 8% – to enterprises of the Ministry of Industry.

This potential can be realized through the following measures:

- 20% – improved managerial and economic mechanisms of the energy saving stimulation;
- 30% – structural reform of the economy aimed at the development of the less energy intensive industries, considerable expansion of the services sphere, etc;
- 50% – advanced R&D achievements application.

Use of the local, renewable and alternative energies

Gross consumption of the fuel and energy resources in the country in 2008 was 39.3 million tce.

**Distribution of the energy saving potential by industries and establishments
(thousand tce)**

Establishment	Volume of saving
Ministry of construction and architecture	375
Ministry of industry	620
Ministry of agriculture and food*	538
Ministry of housing and communal services*	884
Ministry of health*	108
Ministry of defense	50
Ministry of education*	260
Ministry of communication	29
Ministry of transport	168
Institutions subject to the Ministry of energy:	
«Belenergo»	1150
«Beltopgaz»	61
Beltransgas»	49
Concern «Bellegprom»	92
Concern «Bellesbumprom»	165
Concern «Belneftekhim»	1530
Concern «Belbiofarm»	31
Concern «Belgospishcheprom»	163
Belkoopsoyuz»	59
Others	1218

*Accounting for the subjects being in municipal property.

According to the programme for the power generation ensured by local fuels it is necessary in the forthcoming years to increase sharply their production and consumption. The undertaken technical and economic analysis showed that this goal can be achieved not early as 2012.

According to the forecasts, the volume of the boiler-furnace fuel used (without raw materials) by 2012 will come to 27.0 million tce. The increase of the local fuels share up to 25% in the boiler-furnace fuel consumption pattern with its volume changed by 2012 to 27.0 million tce corresponds to the local fuels consumption growth as compared to 2003 by 2.55 million tce, i. e. up to 6.75 million tce.

The highest increase of the local fuels utilized can be achieved by means of the fire-wood and peat. To have the volume of the local fuels consumption ensuring the set task fulfillment it is necessary to carry out the following:

- reconstruction and additional development of the operating fuel enterprises;
- transportation and fuel prepared for burning infrastructure setting up;
- transfer of the greater part of the fuel using equipment to local fuels or its substitute.

State support for the energy security enhancement

To be a success in the mentioned arrangements realization it is necessary, first of all, to adopt the laws “On the power industry”, “On the renewable and unconventional power sources and local fuels”. The indicated laws determine the legal, economic, ecological and managerial principles of the electrical and thermal power production, their sources modernization and development, use of the renewable and unconventional power sources and local fuels, small power engineering development and, furthermore, it will contribute to the energy security of the country.

Besides, there should be determined on a legal basis the procedure of the independent examination of the projects and programmes for the renewable power sources development; abolished some taxes at the local fuels production and use;

simplified the allotment of land, sales of shares of the projects procedures and reduced the investors expenditures for the capital assets of the renewable power sources acquisition; simplified the order of the unconventional and small power engineering equipment importation with customs duties exempted (reduced).

The nuclear power engineering development requires a special basic act to be adopted which could regulate the interrelations in this sphere. This act should regulate the issues of the nuclear plants disposal, designing, construction, operation and withdrawal, of the nuclear fuel used for peace purposes transportation, storage and utilization, should ensure security at the nuclear power use and control of the nuclear, radiation, technical and fire security, export and import of the equipment, technologies, nuclear materials and services, specialists training, government control and other issues in the sphere of the nuclear power utilization.

Estimation of the required investment

According to the estimates, the required investment to improve the power security and develop the fuel and energy complex for the period to 2020 make up the following:

- gas supply system development, including the gas mains and distribution networks – USD 2.8 billion;
- power industry development – about 7.5 billion USD, including
 - fresh capacities put into operation, including the nuclear, firewood, peat and waste power sources, substitution and modernization of the operational capacities – USD 5.7 billion (for nuclear power station construction – USD 2.8 billion);
 - network construction – USD 2 billion;
- heating mains construction and reconstruction – USD 1.4 billion;
- oil supply systems development (production, oil processing, transportation) – USD 1.2 billion;
- local solid fuel system development (firewood, peat, biomass, waste, etc.) – USD 180 million.

The given estimates of the investments are approximate. They are to be corrected in the process of the raw materials

and equipment prices adjustment, retirement of the equipment and expenses necessary for their replacement, definite information on the productive capacities put into operation.

These results were taken as a basis for the Concept of the energy security of the Republic of Belarus approved by the Decree of the President of the Republic of Belarus A. G. Lukashenko of 19 September 2007 N 433, and the principal mechanism of its realization is the State complex programme for the basic production assets of the Belarusian energy system modernization, energy saving and higher rate of the own fuel and energy resources use in 2006–2010.

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Economic security of the Republic of Belarus under present-day conditions

In the Republic of Belarus there has been formed one of the best on the post-Soviet area systems for monitoring and national security ensuring. It is based on the experience gained in the process of the Concepts of national security of 1999 and 2001 development and realization that facilitated the progress in the country's development, enabled to overcome the urgent political and social problems of the transition period, to come about as a sovereign state and general partner in the world economic and political processes. At present our country faces no problem of survival. Modern challenges are much more difficult meaning the development, new markets and niches of specialization winning under the globalization and crisis of the world financial and economic system. Because of the economic activity slowdown in the world the open economy of the Republic of Belarus faced both the new threats, mostly in the foreign economic sphere, and increased danger of the internal ones. These challenges were not a surprise for the scientists and experts. In a number of scientific papers [1–3] and programme documents [4, 5] most of the threats to the economic security of the country were revealed, the threshold values were calculated, a system of measures to render these threats harmless was developed.

The table gives actual and threshold values of the most important indicators of the economic security of the Republic of Belarus in years 2006–2008, as well as a target level envisaged by the Programme of the socioeconomic development of the Republic of Belarus for the period of 2005–2010. The actual values compared to the threshold and predicted ones vividly show that in 2006–2008 the economic security of the country has been enhanced. According to the most of indicators, there has been achieved a significant progress enabling to create the stability margin of the national economy against the outer

shocks, and to ensure the positive GDP growth rates, employment and macroeconomic stability under the global economic crisis despite the adverse economic situation in the first quarter of 2009.

Table. Important indicators of the economic security of the Republic of Belarus

N	Indicator	Threshold value of the indicator	Actual value			2010 Forecast
			2006	2007	2008	
1	Degree of wear of the basic production assets active part by the end of the year, %	Not more 60	80	75	70	57.5
2	The GDP share of the investment in the capital assets, %	Not less 20	25.7	26.8	27.85	30.0
3	R&D costs, % to GDP	Not less 1	0.6	0.7	0.8	1.2–1.4
4	A share of the product innovation in the total volume of the industrial output developed during the financial year, %	<i>Not less 20</i>	3.1	2.3	3.0	18–20
5	A share of the own energy resources in the balance of the boiler-furnace fuel of the country, %	<i>Not less 30</i>	18	17	18	22.7
6	Grain output per capita, tons	Not less 0.6	0.609	0.744	0.936	0.84–0.87
7	A share of the food commodities in the total volume of the retail turnover, %	Not more 25	17.5	17.4	17.7	10–15
8	Consolidated budget deficit, surplus to GDP, %	Not more (-3)	+1.4	+0.4	+1.4	-1.5
9	Internal debt to GDP ratio, %	Not more 20	6.3	6.3	6.7	4.5
10	Foreign national debt to GDP ¹ ratio, %	Not more 20	2.3	5.2	6.4	10–15
11	Gross external debt to GDP ratio, %	Not more 25 ²	18.5	27.6	25.3	-/-

¹ A debt of the central government and a debt ensured by the central government.

² According to the world practice.

table continued

12	Gold and exchange currency reserves ratio in months of import	Not less 3	0.85	1.97	1.05	1.4
13	Unemployment rate to the active part of population, %	Not more 8	1.2	1.0	0.8	1.5–2.0
14	A share of population with income below the minimum subsistence budget, %	Not more 10	11.1	7.7	7.3	10.0
15	Export surplus including services (according to balance of payment) to GDP, %	Not more (–5)	–4.1	–6.3	–7.4	+1.8

Based on the analysis of the Table we can single out three groups of the economic security of the Republic of Belarus indicators depending on their value dynamics and relation to the threshold value.

First group includes the indicators which don't exceed the threshold values and their variation dynamics in 2006–2008 didn't go down. They include the following:

1. A share of investments in the capital assets to the GDP ratio (%). In 2006–2008 there was observed a stable increase in investments resulting in their share in the GDP in 2008 amounting to 27.8%, that being by 1.4 times higher than the threshold value. According to the results of the January – April 2009 the growth of the investment in the capital assets was 116.3%. The modernization of the economy shouldn't be phased down despite the greater external threats caused by the world economic crisis. It would be advisable to change the financing of investment sources: in the first line, the direct foreign investment and long-term credits for the manufacturing equipment should be counted on;

2. The grain production per capita amounted in 2008 to 0.936 tons and exceeded the target indicator of 2010 – 0.87 tons. Investment in the agriculture of the Republic of Belarus on the whole made possible the task of the food security solution. Yet despite the fact that there isn't any economic dependence on the foodstuff import, the reserves for the economic security enhancement in this sphere are still at hand. It particularly refers to the biotechnologies for domestic agriculture development and

reduced import dependence on the veterinary preparations. The Academy of Sciences has submitted a number of proposals on these issues to the government;

3. A rate of foodstuff import in the total volume of their retail turnover is below a threshold level of 25%. In 2008 this value was 17.7%. The target indicator of 2010 is 10–15%. So, on the food market there is a stable situation, still the share of the domestic foodstuff can be increased. The strategy of the domestic foodstuff share increase being realized through all sales channels is of particular importance under the world economic crisis and pressing current account of the balance of payments of Belarus.

4. The consolidated budget deficit was not over 3% of GDP during the period under consideration, moreover there was observed a budget surplus within all this period. From the economic theory point of view, the budget surplus means the funds drawn away from the economy, thus being a deterrent. In 2008 the consolidated budget surplus was 1.4% of the GDP. In 2009 the budget of the Republic of Belarus was adopted as a deficit-free one that is fully justified under the global crisis.

5. A relation of the internal debt to the GDP does not also threaten the economic security of the country. In 2008 with the threshold level not exceeding 20%, the actual value of the indicator was 6.7%. The greater part of the debt is a long-term one.

6. The unemployment rate in 2008 in Belarus was 10 times less than the threshold value and amounted to 0.8%. The policy of the labour collectives and social protection maintaining still holds valid in the Republic of Belarus even under the world crisis.

7. A share of population with incomes below subsistence minimum budget in 2006 – 2008 was gradually decreasing and in 2008 amounted to 7.3% that being 2.7% less than the threshold level.

Second group includes the indicators of the risk zone (exceeding the threshold values), yet their variation dynamics in 2006–2008 is a positive one and to maintain this trend now is very important. These indicators include the following:

1. A rate of the capital assets active part wear which decreased in 2006–2008 by 10% (up to 70%) due to the increased share of investments in the GDP, yet being still higher than

the threshold value, not exceeding 60%. The price of the domestic and foreign borrowed resources having been raised, it is very important to invest the funds available in the most perspective and profitable projects;

2. The R&D costs despite the growth from 0.6% of GDP in 2006 to 0.8% of GDP in 2008 are still below the threshold value – not less 1% of GDP. The goal of the Programme for Socio-Economic Development of the Republic of Belarus is to attain 1.2–1.4% of the GDP by 2010. The R&D costs are the investment in the future. The current crisis is a result of the old technologies and old methods. New investments, both the foreign and domestic ones, are to be made in the new projects;

3. A relation of the foreign debt to the GDP. In 2008 we had a value of 6.4% with the threshold value not higher than 20%. At the same time the Programme for the Socio-Economic Development of the Republic of Belarus allows the given indicator value by 2010 within the 10–15% of the GDP range. The actual value of the national debt as at 01.05.2009 to the estimated value of the GDP in 2009 amounts to 9.6%. So, from the economic security point of view there is a considerable margin up to the threshold value by the indicator of the national debt to the GDP ratio.

Third group includes the indicators of the risk zone (exceeding the threshold values) tending to no improvement. Under global economic crisis their further decrease are most threatening. The macroeconomic policy task is to prevent this and to realize a complex of the efficient and long-term measures to neutralize their negative effect. The problem indicators include the following:

1. A share of new products developed within a year in the total volume of industrial output. Its value didn't exceed 3.5% in 2006–2008, while in practice to win and to hold the high-technological segments of the market 20% of the production need to be renovated annually, and this level being a threshold one is implied by some important indicators of the economic security of the Republic of Belarus for the period of 2005–2010. Such a situation is mostly caused by a low rate of the science intensity /GDP, and is in fact a resulting indicator of low innovative activity. To enter the new and perspective markets

the strategy for the product lines renovation and the flexible market policy is to become the key one;

2. A share of the own energy resources in the boiler-furnace fuel balance of the country still remains twice as less than the threshold level of the economic security. It makes our country vulnerable to the energy shocks and dictate of the transnational energy producing companies. On this account the fuel balance diversification should proceed quicker and be based on the local and renewable energy sources. The increased energy efficiency of the economy will also result in the higher relative share of the local fuels in the energy balance;

3. The ratio of the gross foreign debt to the GDP as of the end of 2008 amounted to 25.3%, that being close to the threshold level. About one third of the gross debt fall to the corporate sector. At the same time the target loans obtained for the production modernization projects or the current activity ensuring are of particular importance. In the first case the corporate sector liabilities growth shouldn't be considered as clearly negative phenomenon. At the stage of the foreign debt indicators coming close to the threshold ones, it would be reasonable to alter the policy of the external borrowings by the economic entities. This problem has been emphasized by the Commission for economic security under the Council of Security of the Republic of Belarus as early as in 2008. Now the Programme for the foreign debt management is to be developed;

4. The rate of the gold and foreign exchange reserves is equivalent to the volume of monthly import, that being less than the required threshold level for three months (the actual value of the international reserve assets of the RB in national definition as at 01.05.2009 in relation to the estimated average monthly value of the goods and services import of 2009 makes up 1.66 month). The tension on the Belarusian currency market caused by the world economic crisis is not beneficial for this indicator growth. The changed rates of the gold and foreign exchange reserves cleared of the attracted foreign credits are to be the main indicator of the effectiveness of the state programme to oppose the negative effects of the global economic crisis. All the rest predictive economic indicators are to be interrelated

with the economic potential to earn currency required for the resources purchase, production and consumption of the investment and consumer commodities;

5. The export surplus including the services (according to the balance of payment) to the GDP ratio higher than the threshold value (minus 5% of the GDP). A small share of the added value in the gross output results in the fact that as it grows the volume of the imported energy resources, raw materials and component parts increases. According to the import capacity calculated as a share of import in the release price of the product the Republic of Belarus is among four most import-dependent countries of 22 European states. In this connection the strategy aimed at the import substitution is quite reasonable; still it doesn't mean that we are to substitute everything. Of importance are the major projects and technological innovations. The import substitution should be carried out on the basis of the finished goods not produced in the Republic before manufacturing application, the increased share of the domestic products in the production output by means of replacing the imported component parts and the greater effectiveness of the imported raw materials and stuffs. The Academy of Sciences has developed and submitted to the government a package of proposals which have been supported by the President and the Council of Ministers. However, the measures undertaken are not yet a success.

We agree with S. Yu. Glaziev [6] that on a strategic level the current economic crisis is a beginning of the world economy transformation based on the next 6th technological set-up. It's formation and expansion will determine the global development for the coming two or three decades. According to the theory and world practice, the technological set-ups substitution results usually in certain alterations of the social and institutional systems. Therefore the strategic goal of the Republic of Belarus is the accelerated formation of the effective innovation system which could prevent the danger of the engineering and technological lagging and maintain the competitive positions of the country on the world market.

The worst institutional threat is a weak innovation legislation of the Republic of Belarus, which in fact is rather an updated

Soviet, but not a modern market one. As early as in 2005 the government gave a commission to the authorities to develop a package of the standard legal acts which could define the notion and forms of the innovations, stimulating methods for their application, regulate the intellectual property rights and their introduction procedure.

There should be adopted the maximum favourable and ambitious standard legal acts on the key problems of innovation development. They should include the effective fiscal incentives, royalties paid to the research institutions or scientists, the R&D (on a budget funding basis included as well) pricing principles change, the standard on the minimal profit introduced, sectoral remuneration of labour system, etc.

To stimulate the demand of the R&D products it is necessary to exempt the enterprise assets assigned for the R&D and the innovation-based factories from profit and value-added taxes right up to the full recoument of the inputs. The research institutions could have the wages fund taxing reduced by several times to have the necessary prerequisites for their accelerated development. To expand the R&D financing base and to create the favourable conditions for the international cooperation there should be considered an issue of the foreign investments attraction to the scientific and technical sphere.

To raise the innovation potential of the regions it is necessary to make arrangements and create economic conditions for the territorial research and productive clusters aimed at the regional socioeconomic priorities formation. The industrial parks organized around the large cities will also contribute to the small and medium-sized enterprises development.

As the programme for innovation development is to be accomplish by 2010, it would be reasonable to work out new approaches to the innovation programme for the next 5-year and up to 2020 period development, to complete the national innovation system formation and create the necessary conditions for innovative activity, i. e. legislation, infrastructure, financing mechanisms, personnel training. All that will lay a stable foundation for economic security and global competitive capacity of the Republic of Belarus.

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Independence of Belarus is Energy Security Coupled with Sustainable Innovation-Based Development

Belarus happens to be the only country in the world, which, without having its own gas fields, has considerably increased the share of natural gas in its primary energy consumption. The share of this hydrocarbon resource accounts for more than 70 percent in Belarus' energy demand. Accounting for the fact that natural gas is the main resource utilised by the Belarusian electricity and fuel industry (its share equals 95 to 96 percent in the industry demand) and that the capacity of underground gas storage facilities in Belarus fails to match the threshold reserve requirements (25 percent of annual consumption), it could be easily figured out how sensitive and vulnerable the Belarusian energy system, as well as the whole national economy, is to erratic energy prices and especially to interruptions in energy supplies. To respond adequately to today's challenges, we must have a modern-day fuel industry, which would be financially stable, economically efficient and dynamic, environmentally friendly, with cutting-edge equipment and highly competent and skilled personnel.

Energy saving is fundamental. Almost total dependence on one energy supplier, which is Russia, is the main problem for Belarusian energy security. Belarus can improve its energy independence through a set of interconnected measures – economic, political, organizational, social and ecological (as envisaged by the Directive No 3 of the President of the Republic of Belarus “Economy and Thrift are the Main Factors of the Economic Security of the State”).

Our main goal in stepping up the efficiency of fuel utilization is to approach, as closely as possible, the developed countries in terms of the GDP energy intensity, which in Belarus is now 2,5–3 times higher than there.

Here, to enhance energy efficiency, energy saving and promote energy efficient technologies is as critical as to produce fuel resources and stimulate GDP growth.

The global energy demand, along with energy prices, will keep growing in the future, according to all international projections. The total fuel consumption in the world in 2005 was estimated at 15.8 billion toe (11 billion tonnes of oil equivalent). In 2006, British Petroleum reported that the proved fossil fuel reserves amounted to 1100 billion toe: coal – 680, natural gas – 200, oil – 220 billion toe. Given today’s global consumption the proved reserves will last 70 years (this is without allowing for nuclear fuel, renewable and untraditional energy sources). The world energy consumption mix in 1990–2020 looks like this.

Table 1. Energy intensity per dollar of the GDP at the PPP

Belarus	0,43	Sweden	0,21
Russia	0,49	Hungary	0,18
Ukraine	0,50	Germany	0,16
Lithuania	0,22	France	0,16
Poland	0,21	Austria	0,14

Source: World Energy Outlook 2004: The International Energy Agency (IEA).

Our study of world fuel consumption trends has showed that we should expect an increase in the demand for solid fuels, natural gas and untraditional resources in the future and a reduction in oil demand.

Of special interest is the comparison of GDP growth with fuel consumption trends. By 2010, a growth in fuel consumption in the USA will be 12.5 percent, that in China 25.7 percent, in Russia 4.3 percent, in the EU 6.1 percent. Belarus plans to increase GDP by 35.5 percent and raise fuel consumption by 6.1 percent. So, Belarus has quite ambitious energy efficiency targets, but to meet them, the country will have to modernize production facilities and introduce structural changes to its economy. The main assessment criterion at the macroeconomic level is GDP energy intensity.

On March 26, 2007, the President signed into action Decree No 136, by which he approved the national innovation-based development programme for 2007–2010. The rationale behind that step was to create the proper environment for realizing this country's scientific and technological potential and to introduce the R&D results to material production. The concept and structure of the programme suggest that a comprehensive and system-based approach should be taken to its realization. This approach envisages improving the domestic innovation legislation, state support measures, the financing procedures, setting up innovation-based manufactures, a multi-level chain of management and control, and others.

About 80 percent of all technologies and equipment to be used in the large-scale modernisation of Belarusian economy will be manufactured in Belarus. This fact demonstrates a considerable shift in scientific activities to the field of applied research.

The total cost of the programme is estimated at Br17 trillion, of which 33 percent will be taken from the national budget; this includes the money from various innovation promotion funds operating under ministries.

Man shall not live by bread..., oil and gas alone. The concept of energy security and energy independence of Belarus provides for a set of measures for diversifying the fuels consumed in this country. It has been recognized as proper from the economic point of view to step up the utilization of local fuels to 3 million tonnes of coal equivalent by 2020 (5.7 percent of the total energy consumption) for the cement and power generation industries.

There are plans to build a 660 MW coal-fired cogeneration plant in the Grodno region and two 100 MW plants, one in Brest and the other one in Svetlogorsk; to revamp all three cement factories (the Belorussky factory, the factories in Krichev and Krasnoselsk) and shift them to using coal instead of natural gas as a fuel for burning clinker.

As for local fuels, we believe we can boost considerably the use of peat and fire-wood. The share of peat in total energy consumption mix may grow 2,5–3,5 times by 2020 (to 2–2.5 million tonnes of fuel equivalent). The peat reserves

in Belarus are estimated at 600 to 800 million tonnes. Experts are now working on the national programme “Peat” which is expected to run in 2008–2012 and may be extended until 2020. Under Decree No 3, this programme is aimed at promoting more efficient use of this fuel in the power engineering and agriculture industries and at encouraging nature protection activities. The programme is intended to help increase the share of peat in the national fuel consumption mix by various measures including through boosting the capacities of the domestic peat industry. The share of fire-wood used as a local fuel may surge as the country is creating a modern-day fuel distribution network. By utilizing peat and fire-wood, which are the main local resources in Belarus, the country can meet 25 percent of its total energy needs.

Table 2. Economic development and energy saving assumptions for Belarus

Energy saving index	2006–2010	2011–2015	2016–2020
GDP growth, %*	156	229	319
Energy intensity reduction, % **	31	50	60
Energy saving, million tce **	7,6	7,0	5,2

*Assumptions by Ministry of Economy.

**Assumptions by the interdepartmental commission on the energy security and energy independence concept of the Republic of Belarus development.

According to preliminary estimates, the total supplies of brown coal in Belarus approach 1.5 billion tonnes; the proven reserves, their development being economically reasonable, are around 151 million tonnes; the thoroughly studied reserves equal 100 million tonnes. However, Belarusian brown coal has low properties: the moisture level is 56 to 60 percent; the ash level is 17 to 23 percent; the sulphur level is 0.6 percent; the combustion value ranges between 1,500 to 1,700 kcal per kg; these properties are 2–3 times worse than those of peat. After drying, the coal is suitable for direct burning, for being processed into coal bricks and for producing high-calorific solid, liquid and gas fuels as well as non-fuels (various products improving

agricultural fertility, sorption materials for purifying water and gas emissions, products for reclaiming soil, fertilizers and other things).

Besides from peat and firewood, there are also geothermal waters, which potential Belarus has not yet fully realized either. In this respect, the most promising sites for development are the Pripyat and Podlaska-Brest depressions, according to the geological exploration results. The National Academy of Sciences has proposed efficient biogas-related technologies for the cattle-breeding industry and for waste disposal in big towns. Scientists have recently begun working on a new biodiesel technology based on rape oil and bioethanol.

With a view to developing hydrogen-based energy industry, Belarusian experts have developed high-efficiency systems for producing hydric synthesis gas from natural gas by using plasma-chemical generators, high-pressure high-voltage electric discharge and a partial methane oxidation reactor. “Azot”, a state-run production association, is expected to start using these systems in 2007–2008.

Today, relying heavily on the import of energy resources, Belarus has virtually no other choice but to develop its own nuclear power industry as a safeguard of its national security.

There are 442 nuclear power stations in the world, and another 60 are coming soon. It is in Europe that nuclear power industry has been growing at the fastest pace. 30 per cent of all energy produced in Europe is generated by nuclear power stations. For France, for instance, nuclear energy is an indispensable energy resource since nearly 80 percent of the domestic energy demand is satisfied by means of nuclear energy there.

However, it is impossible to develop nuclear energy industry without substantial support from the state since the relevant projects are resource-intensive and long-term. But what is meant is not just financial assistance. It is necessary to take decisions with respect to personnel training; appropriate amendments are to be introduced in the effective legislation; the relevant systems of management need to be restructured; relevant watchdog and regulating bodies need being set up.

The development of nuclear power industry in Belarus is prompted not only by the planned construction of a nuclear power station, but also by the plans to treat malignant tumour with neutron therapy by using a neutron generator. The history of exploiting nuclear installations and special devices in Belarus, which were designed and produced on the orders of the President, shows that these plans are quite feasible.

World knowledge put to good use at home. Along with developing new energy production sectors (nuclear, coal industries, new energy resources), Belarus is intent on continuing with energy saving activities, following the relevant governmental guidelines. In this work, Belarus draws on the experience of other countries and attracts foreign investments. For instance, in 2001 the Belarusian government teamed up with the World Bank to modernize a series of production facilities in order to make them more energy-efficient. For that purpose, the World Bank issued a USD 22.6 million loan on favourable terms. Under that programme, 20 boiler houses have been shifted to local fuels; 430 heat generating facilities have been revamped. As a result, the relevant companies have managed to save between 20 to 25 percent of fuel.

The total spending on the national programme “The Concept of Energy Security and Enhancing the Energy Independence of the Republic of Belarus” intended to run until 2020 is estimated at USD 19 billion (not allowing for the cost of using local fuels). Most part of this money is expected to come through increasing, in an appropriate and wise manner, heating and electricity tariffs. Because of that, experts believe it’s time for this country to abandon the practice of cross-subsidization with respect to energy consumption and keep providing financial support for low-income citizens and for the citizens who are under protection of the state.

The development of the Concept of Energy Security has been carried out on the basis of a long series of research and studies. Thus, for the first time in Belarus, experts devised a structure of fuel consumption mix and held an in-depth analysis of the promising areas of using alternative fuels.

It is crucial that experts, jointly with professionals from the Ministry of Statistics and Analysis, Ministry of Industry

and State Committee for Standardization, have developed a methodology of the energy security ensuring. The methodology envisages setting national energy saving targets by 2020 and specific energy saving goals with respect to ministries and departments. For this, experts have come up with a new energy saving criterion, which is a specific energy saving target for each region of the country, for Minsk, for ministries, departments and companies. It is proposed to identify the energy intensity of industrial goods as a ratio of the total fuel consumption to the volume of production of goods and services in comparable prices. State-run, non-commercial and some other organizations are expected to have specific targets with regard to reduction of their total fuel consumption.

The designers of the Concept have proposed conducting system-based inspections of energy consumption at companies. The inspections are to be carried out by highly-qualified professionals and researchers. Besides, it is planned that energy producers and consumers will be jointly developing measures for reducing power inputs.

Table 3. World energy consumption by fuel type, %

Energy resource	Consumption, %		
	1990	2000	Forecast for 2020
Total	100	100	100
specifically:			
Solid fuel	29,0	28,5	30,0
Oil	39,0	38,5	34,6
Natural gas	22,0	22,3	24,1
Nuclear energy	7,0	6,9	
Hydroenergy	2,4	2,7	2,6
Alternative, renewable and other resources	0,6	1,1	1,6

Source: British Petroleum: Statistical Review of World Energy, 2006.

Belarus needs reforming its system for the engineers training. The Academy of Sciences is concerned about the fact that the highest competition to universities is now for obtaining such professions as designer, international relations expert, sociologist

and psychologist. With all due respect to these professions and the people who choose them, we believe young people are not given the appropriate information about the prospects of this or that profession, and it is hard for them to identify what's best on their own. Such professional spheres as applied mathematics, electronics, construction, mechanical engineering have always been prestigious (and so will it be, I hope) and the relevant specialists have always been in demand.

The current five-year period is expected to become a watershed period in the country's shift to the innovation-based development model, which allows the economy to develop at a very high rate – a 8–9% growth in GDP per annum. It will help Belarus approach other European countries with respect to such indicators as GDP energy intensity and GDP per capita. There is a lot to be done. But there's also quite a lot that has already been done. Specifically, scientific schools have been preserved; the country has acquired considerable knowledge of how to carry out research activities and national socio-economic development based on the programme target approach.

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