Chapter 6

Ensuring environmental sustainability

The aim of Goal 7 is to ensure environmental sustainability for the planet and for individual countries. Sustainable development has been a fundamental theme of the UN over the last two decades. Major UN forums in Rio de Janeiro (1992) and Johannesburg (2002) were dedicated to questions of sustainable development and how mankind can achieve it. The urgency reflects awareness of ecological dangers and of an impasse connected with current economic models worldwide. A build-up of environmental deformations, some of them global, are threatening mankind's future and his very existence. Human health and well-being are under threat in many countries. In order to be sustainable, development must meet the needs of today's generation without compromising the ability of future generations to meet their needs.

Box 6.1. The Russian Presidential Decree "Concept for Russia's Transition to Sustainable Development" (1996)

Sustainable development is "stable socio-economic development, which does not destroy its natural basis. Improvement of people's quality of life must not exceed limits of the biosphere's tolerance to economic activities, beyond which there is a risk of damage to natural mechanisms of environmental regulation and a threat of global environmental changes".

The Russian Presidential Decree "Concept for Russia's Transition to Sustainable Development" was issued in 1996 on the basis of UN decisions and gives priority to the relationship between improvement of living standards and socio-economic development, on the one hand, and environmental limitations, on the other hand. This Concept is line with the MDG ideology (Box 6.1).

The World Summit on Sustainable Development (Johannesburg, 2002) decided to adopt and implement world-wide sustainable development strategies, starting from 2005.

6.1. PROBLEMS OF ENSURING SUSTAINABLE DEVELOPMENT

There is a growing awareness in the world that Russia is the main "environmental donor" on the planet and the main contributor to sustainability of the biosphere. The country has the largest forested area (over 20% of total world forest), the largest expanse of virgin land, huge water resources, and unique ecosystems and biodiversity. The economic value of services rendered by Russian natural ecosystems to prevention of global climate change is estimated at USD 50-150 billion a year.[1] Russia's natural resource capital also plays a major role in the world economy since the country has 30% of world reserves of natural gas, approximately 10% of oil reserves, 50% of diamonds, 25% of nickel reserves, 17% of tin, etc. For these reasons, achievement of environmentally sustainable development in Russia is important for the whole of mankind and not only for Russians.

The targets and indicators, which Goal 7 sets for human development, imply solution of two main problems in ensuring environmental sustainability:

- to reduce anthropogenic environmental impact and natural resource depletion;

– to improve environmental conditions of human development, to reduce environmental threats to people's security, health and daily lives. (Goal 7, its targets and indicators in the world and Russian contexts are shown in Appendix 6.1, Table 1).

Over the last two decades Russia has taken two steps towards addressing these issues: first, strategic directions for protection of the environment in Russia have been finalized; and, second, legal and regulatory foundations for environmental protection have been laid. Much environmental legislation and strategic documents for sustainable development have been put in place since the 1990s. The following documents deserve mentioning: "Foundations of the Strategy of the Russian Federation on Environmental Protection and Attainment of Sustainable Development" (1994); the Russian Presidential Decree "Concept for Russia's Transition to Sustainable Development" (1996); the Environmental Doctrine of the Russian Federation (2002); the Federal Target Programme of the Russian Federation "Environment and Natural Resources" (2002-2010), etc. In 2002 a new Federal Law "On Environmental Protection" was adopted. A total of over 30 federal laws and approximately 200 bylaws are effective in the country concerning environmental protection and use of natural resources.

The 1993 Constitution of the Russian Federation, Article 42, establishes the constitutional right of Russian citizens "to a favorable environment, ... and to compensation of damages caused to health or property by any violation of legislation on ecology".

Russia has actively promoted efforts by the international community to stabilize the global environmental situation. The Kyoto Protocol on prevention of global climate change could not take effect without Russian ratification, which was provided in 2004. Russia has also helped global environmental sustainability by ratifying the Convention on Biodiversity and the Montreal Protocol on Substances that Deplete the Ozone Layer. The country has joined the UN Convention to Combat Desertification and ratified the Stockholm Convention on Persistent Organic Pollutants.

Paradoxically, Russia's deep socio-economic crisis in the 1990s had a favorable effect on the natural environment: sharp recession in industry, agriculture the timber industry and other sectors reduced emissions and discharges of polluting substances into air and water, and reduced rates of natural resource depletion and degradation. These tendencies are clear in Table 6.1., which shows that discharge of polluted effluents dropped by almost one third in 1990-2003, pollutant atmospheric emissions dropped by one quarter, use of natural water sources fell by one third, deforestation rates were halved, oil extraction slipped by 18% and coal production was 30% lower.

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However, this "respite" for the environment ended as the Russian economy began to grow in 1999. Air pollution from stationary sources has started to rise, and air pollution from motor transport has grown more quickly; and production of energy sources, mainly oil, has increased by 1.4 times compared with 1995 (Table 6.1). The

Table 6.1. Basic indicators of industrial impact on the environment and natural resources depletion in Russia (1985-2003)

	1990	1995	2000	2001	2002	2003
Discharge of polluted effluents, billion m^3	27.8	24.5	20.3	19.8	19.8	19.0
Atmospheric emissions of polluting substances, million tons, of which:						
from stationary sources	34.1	21.3	18.8	19.1	19.5	19.8
from motor transport	21.0	11.0	13.5	14.2	14.4	14.8
Water intake from natural sources, billion m^3	106.1	86.6	75.9	74.6	72.7	72.2
Hazardous waste, million tons	...	83.3	127.5	139.2	210.6	287.3
Deforestation, million m^3	283.5	124.8	130.0	127.0	122.8	126.1
Oil (million tons)	516	307	324	348	380	421
Gas (billion m^3)	641	595	584	581	595	620
Coal (million tons)	395	263	258	270	256	277

problem of waste utilization is becoming acute: waste creation has growth by 3.4 times since 1995, and the level of recovery and neutralization has only improved by 60%.

Improvement of sanitary conditions along with reduction of environmental impact from the economy gave an overall improvement in living conditions, in line with the targets of Goal 7. As can be seen in Table 6.2, there has been substantial improvement of conditions in all types of settlements. In the country as a whole, water mains, sewerage, central heating and gas are supplied to 70-75% of housing (by area), while baths (showers) and hot water are available in 61-65% of housing. Urban housing is substantially better provided with these amenities compared with rural housing. Despite significant worsening of rural living standards in the 1990s due to the crisis in agriculture, provision of amenities in rural settlements improved. Rural areas saw marked improvements in provision of water mains (11% increase in the areas of housing supplied), sewerage (13%), central heating (21%) and hot water supply (11%).

Table 6.2. Table 6.2. Development of housing amenities (proportion of housing area, %)*

	Water-main	Sewerage	Central heating	Bath (shower)	Gas	Hot water supply
Housing, total						
1993	66	61	64	57	70	51
2003	75	70	75	65	70	61
Urban						
1993	83	80	84	75	68	69
2003	87	85	88	80	69	77
Rural						
1993	30	19	20	16	73	9
2003	41	32	41	25	75	20

* Statistical survey of rural housing amenities has only been carried out since 1993.

Upgrade of the housing stock and improvement of engineering infrastructure is helping to reduce resource consumption and environmental impact. Thus, in 1995-2003 average daily water supply to housing and other social needs was reduced by almost 30%, from 303 liters to 222 liters. Though this indicator is still high by world standards, this tendency is encouraging.

Despite reduction of environmental impact and improvement of housing amenities, the environmental situation in the country as a whole remains difficult. Moreover, a series of tendencies are shaping up in Russia, which may counter its sustainable development. These include:

- impact of environmental pollution on human health;
- structural shifts in the economy, tending to increase the proportion of sectors, which use natural resources and create pollution;
- high level of indicators for use of natural resources and creation of pollution;
- environmentally unbalanced investment strategy, which leads to growing disproportions between sectors, which use natural resources, and other sectors, which carry out refining, processing and infrastructure tasks;
- high levels of equipment depreciation;
- negative dynamics and values of macroeconomic indicators, which take account of the environment factor;

- understatement of economic value of natural resources and services;
- natural-resource-based export;
- imperfect legislation;
- inadequate mechanisms for exercising ownership rights to natural resources;
- inefficient environmental protection management;
- underestimation of the potential for sustainable development, lack of long-term environmentally balanced economic strategy, etc.

We will now review main aspects of the tendencies listed above.

Levels of environmental pollution and development of amenities have major influence on the key parameter of human development: health and longevity, i.e. human capital as a whole. Relevant key indicators raise concerns about successful human development in Russia, as has been discussed in previous Chapters of this Report. Approximately 60 million people now live in zones of Russia with an adverse environmental situation (15% of the country's territory). Since 1999 the number of cities with high and very high levels of atmospheric pollution has increased 1.6 times, and 60% of the urban population live in such cities.[2] The share of drinking water samples, which do not meet hygiene standards is approximately 20%, and the basic problems are inadequate water treatment technology and high levels of depreciation of water supply networks (more than 60-70%).

Relatively high levels of water and air pollution, and of waste production in comparison with world standards also present health hazards in Russia. As part of increasing international attention to environmental impact on human health, the World Health Organization (WHO), US Environmental Protection Agency and other organizations have prepared a methodology for human health risk assessment. Results of the assessment have been taken into account in decision-making processes by executive and legislative authorities in many countries. In particular,

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experts at Moscow State University have used the methodology to calculate economic costs of damage to human health in Russia, caused by air and water pollution. The figures suggest costs equal to between 3% to 6% of GDP.[3] These are high levels and represent a powerful argument for transition to environmentally sustainable economic development, and correction of several national development priorities with a view to the environment.

Unsustainable trends in Russian development are related in many respects to underestimation of the environmental factor in macroeconomic strategy, leading to further degradation of the environment and depletion of natural resources. The ongoing rise of the economy threatens to aggravate these processes, due to restructuring of the economy in the 1990s in favor of high environment exploitation (raw material-based and polluting industries), and deterioration of resource-economical and high-tech industries. This tendency is clear through the period 1990-2003 (Appendix 6.1, Table 2). The relative weight of the fuel industry had increased by 2.5 times in 2003 compared with 1990 to 20%. The share of the electric power industry had risen by three times (from 4% to 12.1%). The share of ferrous metallurgy in overall structure of the industrial sector increased 1.7 times over 1990-2003. During the same period the share of sectors, which have little environmental impact, has

The main obstacle to sustainable development in Russia is the inefficient, environment-exploiting structure of the economy.

considerably declined. The share of high-technology branches of mechanical engineering and metal working dropped from 32% to 20% between 1990 and 2003, and there has been catastrophic recession in light industry. The economy as a whole has seen considerable shift towards sectors, which make huge use of natural resources.

Badly balanced investment strategy, which causes growing disproportions between environment-exploiting sectors of the economy and processing sectors, aggravates environmental problems. In the absence of environmental or economic limitations and incentives the only criterion of efficiency is quick generation of high profits, and that is best achieved by exploitation and/or sale of natural resources (oil, gas, timber, etc.).

Increasing "weight" of Russia's economic structure from the viewpoint of environmental impact has been accompanied by deteriorating age structure of production facilities, and, as a consequence, by increased numbers of environmental incidents and disasters. Old equipment is replaced too slowly due to insufficient financing. Depreciation in some sectors is at levels of 50-60%.

Decentralization of environmental management has become a considerable problem. In the 1990s, under conditions of industrial recession and growing social problems, environmental protection standards were relaxed. This was reflected in steady reduction of the influence of environmental agencies within the Russian Government. The Ministry of Environmental Protection and Natural Resources, which had considerable power, existed from 1991-1996, but was then transformed into the Committee for Environmental Protection with sharply reduced functions and influence. In 2000 the Committee was disbanded and its functions transmitted to the Ministry of Natural Resources, whose main purpose is productive use of natural resources.

Russia's long-term environmental priorities are set out in Presidential Decrees and Russian Government strategy documents, which deal directly or indirectly with sustainable development.

Natural resource and environmental protection in the Russian Government is now vested in three bodies: the Ministry of Natural Resources of the Russian Federation; the Federal Agency for Hydrometeorology and Environmental Monitoring; and the Federal Environmental Technological and Nuclear Inspectorate. This disintegration of environment protection management does not promote environmental sustainability. Departmental functions may be duplicated (for example, the situation with environmental inspections is confusing) or, conversely, overlooked (for example, accurate identification of pollution impact on public health).

There are also legal problems. Environmental legislation in Russia is extensive, but its application to bring environmental offenders to book is problematic, due to inefficiency of enforcement mechanisms and sanctions. Environment protection norms and rules are dispersed among 800 various documents, of which 80% have recommendatory character. A large number of violations go unpunished, available legal sanctions (high penalties, closure of environmentally harmful enterprises or facilities, legal claims by citizens and public organizations for environmental damage) tend not to be applied.

So, the main obstacle to sustainable development in Russia is the inefficient, envi-

ronment-exploiting structure of the economy. Backwardness of the processing and transforming industries, and of infrastructure and distribution, backward and dirty technologies lead to constant or increasing environmental impact, high losses of natural resources and raw materials, and extra pollution.

6.2. TASKS FOR ENSURING ENVIRONMENTAL SUSTAINABILITY FOR RUSSIA

6.2.1. THE OUTLOOK FOR SUSTAINABILITY BASED ON RUSSIAN GOVERNMENT ACTION

Russia's long-term environmental priorities are set out in Presidential Decrees and Russian Government strategy documents, which deal directly or indirectly with sustainable development. Russia has set itself two Federal Target Programmes, "Environment and Natural Resources" and "Housing", which both have relevance for the environment. Both are scheduled for implementation up to 2010 (Box 6.2). In 2003 the Government adopted "Foundations of State Strategy for Use of Minerals and Sub-soil Resources". There are also National Environmental Action Plans (NEAPs), which comprise legislative and normative acts, as well as some other Federal Target Programmes, which are currently being developed and implemented. Three NEAPs have been adopted by the Government to date (for 1994-1995, for 1996-1997, for 1999-2001). The Ministry of Natural Resources adopted an Action Plan for Implementation of the Environmental Doctrine of the Russian Federation in 2003-2005.

However, the task of environmental sustainability is insufficiently taken into account in recent strategic documents of the Russian Government, which treat environmental problems as matters for tactical and short-term action rather than complex long-term policy. Official Government programmes for the short term, medium term and long term perspectives give minimal attention to environmental problems. The same neglect is evident in recent draft programmes, particularly the summary report "Goals, Targets and Performance Indicators of Budget Subjects (Federal Ministries, Services and Agencies supervised by the Russian Federal Government)" (2004).

There are objective and subjective reasons, which cause underestimation of the environmental factor in economic development and decision-making. The most common objective reason is inefficiency of the traditional market model of the economy for solution of environmental problems. This is an international problem and has led to the appearance of global and regional environmental problems (the "market failures" of theory) (Box 6.3). But in Russia's case the underestimation was also due to the above-mentioned sharp decline of industrial production in the 1990s, which temporarily reduced natural resource use and aggregate pollution.

Important subjective reasons include: an attitude to ecological restrictions, which views them as barriers to economic growth, adherence to the slogan "first the economy, then ecology"; fixation of decision-makers on short-term objectives ("patching holes"); the illusion of inexhaustibility of Russia's huge resources and its huge expanses spaces, which seem able to absorb/disseminate pollution ad infinitum, etc.

Box 6.2. The structure of the Federal Target Programme "Environment and Natural Resources"

The Programme includes eleven sub-programmes: "Forests", "Water Resources and Natural Areas of Water", "Water Bio-Resources and Aquaculture", "Quality Management of the Environment", "Waste", "Support of Special Protected Natural Areas", "Preservation of Rare and Vanishing Animals and Plants", "Protection of Lake Baikal and the Baikal Natural Area", "Revival of the Volga", "Hydro-meteorological Support of Life Safety and Rational Use of Natural Resources", "Progressive Technologies in Cartography and Geodetics".

There are objective and subjective reasons, which cause underestimation of the environmental factor in economic development and decision-making.

Transition to sustainable development requires incorporation of the ecological factor in the system of basic social and economic development indices. This MDG ideology matches this idea. Underestimation of the ecological factor in decision-making is in many respects connected with the fact that traditional development indicators neglect the value of natural capital and degradation of the environment: GDP, per-capita income, etc., ignore ecological degradation. Growth of these indicators in Russia today is due to technogenic environment-exploiting development. But this very process creates potential for sharp deterioration of economic indicators in the future due to natural resource depletion and environmental contamination.

The international community is working on development of criteria and measures of sustainable development, which sometimes involve a highly complex system of indicators. The United Nations offers a system for "Integrated Environmental and Economic Accounting", the World Bank uses the concept of "Genuine Savings", the OECD and the European community have GARP1, GARP2, TEPI, etc.[4] The basic point in these approaches is an attempt to take account of the damage caused by environmental pollution and depletion of natural resources at the macroeconomic level, and to adjust basic economic development indicators in the light of ecology. For example, data published by the World Bank, calculated using the genuine savings method, show significant variance between traditional economic and ecologically adjusted indicators for all countries. In Russia the genuine savings indicator has been negative throughout recent years, and urgently needs to be taken into account in the current conditions of economic growth. So, while from the conventional standpoint the year 2000 was the most prosperous for the Russian economy in many years (GDP grew by 9%), genuine savings were negative (-13%), mainly due to depletion of the raw-material base.

Box 6.3. "Market failures"

Environment degradation, natural resource depletion, and excessive pollution point to market malfunctions. From the conceptual point of view, "market failures" in environmental protection are, primarily, connected with the impossibility of adequate accounting for social costs, due to environmental damage, external effects (externalities) that complicate implementation of a "polluter pays" principle, and the problem of open access to natural resources, their less-than-fair price, if any, etc. The essential problem for the market is vagueness and short-sightedness. Vagueness is caused in many respects by lack of knowledge about laws of ecosystem functioning, which leads to neglect of distant and difficult-to-predict consequences of market decisions. There is also the problem of market "myopia": fixation on quick results, mainly profit, while underestimating long-term damage and benefits.

6.2.2. ADAPTATION OF TARGETS AND INDICATORS OF GOAL 7 TO RUSSIAN CONDITIONS

Use by the Russian Government of MDG ideology regarding ecologically sustainable development would promote increase of environmental management efficiency and solution of environmental problems, and would reduce ecological threats to public health. The latter goal, which is reflected in many core documents of the United Nations, is accepted and supported by Russia, although Russia has not done all it could for its realization. We will now consider Targets and Indicators of Goal 7 in more detail, review their adequacy to Russian realities and propose other targets and indicators, which are more suitable to the Russian context of sustainable development.

Target 9 "Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources" is consistent with

Russia's targets both in the short term and long term. The future of Russia, development of the human potential of its future generations, preservation of the world's greatest natural capital, and support of Russia's globally important ecosystem, depends on successful achievement of this target. The only amendment, which may be needed, is to the words "environmental resources". The exhortation to "reverse the loss of environmental resources" seems to refer mainly to renewable natural resources (soil, forests, water, etc.), which are crucial for the overwhelming majority of less developed countries. For Russia, the most serious problem is depletion of non-renewable mineral resources (oil, gas, metals and so on), and obviously it is unfeasible to completely stop them being used up. It makes more sense, therefore, to call for prevention of environmental resource loss by their excessive or ineffective use - that may be applicable to all resources and corresponds to the meaning of the word "losses" in the Russian language. In this case target 9 should read as follows: "Integrate the principles of sustainable development into country policies and programmes and prevent losses of natural resources".

This target is strictly connected with economic growth and its quality. Here again the major indicator is that of GDP energy intensity or, which is the same, energy consumption per 1 dollar of GDP, as in the MDG wording (Indicator 27). This indicator is No. 1 priority not only for ensuring environmental sustainability, but also, perhaps, for the whole national economy in Russia. A number of points should be stressed in this regard:

- the leading role of the energy sector in the Russian economy in formation of GDP, taxes, state budget incomes, employment, and export incomes;
- the energy sector is the major contributor to environmental pollution, depletion of natural resources and degradation of huge virgin territories in Russia. The sector is the largest polluting factor in Russia, produces more than 50% of all harmful atmospheric emissions in the country, approximately 20% of contaminated effluent, more than 30% of solid industrial waste and up to 70% of total greenhouse gases;
- the indicator of energy intensity is a representative indicator of sustainable development, reflecting both economic and ecological aspects;
- the role of the energy sector in the economy will remain the same in the future, judging by plans to increase its production, leading to increase of anthropogenic impact on the environment in Russia;
- there is urgent need for major reduction of energy intensity in the Russian economy, with realization of energy-saving programmes.

Use by the Russian Government of MDG ideology regarding ecologically sustainable development would promote increase of environmental management efficiency and solution of environmental problems, and would reduce ecological threats to public health.

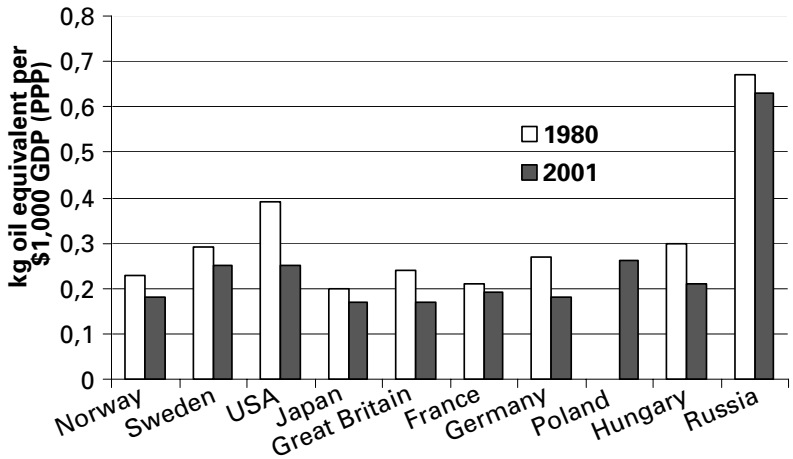
Energy intensity in the Russian economy is currently extremely high, and must be reduced. In a development that was unique in the world, Russia showed growth of the indicator by 16% in the 1990s.[5] Figure 6.1 shows energy intensity indicators of the countries ranking high in the UN Human Development Index, calculated on the basis of UN statistics. Russian energy intensity is on average 2.5-4 times higher than for these countries. Certainly, Russia is a northern country, but the indicators of the Scandinavian countries suggest huge potential for energy saving in Russia. The example of Norway is characteristic: it is a northern country like Russia, has significant power resources and at the same time

energy intensity is 3.3 times lower. East European transition economies - Poland and Hungary - have considerably lower energy intensity. The greatest progress in reducing GDP energy intensity has been achieved in the USA, Germany and Hungary, which have cut the indicator to about a third of its 1980 level.

Other indicators for Target 9 are also closely connected with development of energy production. Emissions of carbon dioxide have special importance in connection with ratification of the Kyoto Protocol by Russia. At present 96% of national emissions of carbon dioxide are due to fuel combustion for production of power and heat. Carbon dioxide is the main greenhouse gas influencing global climate change. In the MDG this indicator is defined as "carbon dioxide emissions per capita and consumption of ozone-depleting CFCs (ODP tons)" (indicator 28). It should be pointed out that ozone-depleting substances included in this indicator have not been produced in Russia since 2000, so they are no longer relevant for the country. It should also be noted that performance of the Kyoto Protocol is not measured by carbon dioxide emissions per capita, as proposed in the MDGs, but by performance of countries' obligations regarding total amounts of carbon dioxide emissions. Therefore, the MDG indicator 28 should be reworded for Russia as "Carbon dioxide emissions (tons)". According to commitments under the Kyoto Protocol, Russia should produce no more greenhouse gases during the first budgetary period of the Protocol (2008-2012) than in 1990. These are very mild requirements for Russia by virtue of its significant reduction of emissions following the economic crisis of the 1990s. Russia now emits only 70% of its 1990 carbon dioxide emission levels. Obligations of other countries are much tougher: the overwhelming majority of advanced countries must combine the goal of economic growth with the goal of reducing emissions of greenhouse gases by 6-8%. Rigidity and economic burden of those obligations have persuaded the USA to abstain from Kyoto Protocol ratification.

According to commitments under the Kyoto Protocol, Russia should produce no more greenhouse gases during the first budgetary period of the Protocol (2008-2012) than in 1990. These are very mild requirements for Russia by virtue of its significant reduction of emissions following the economic crisis of the 1990s.

Figure 6.1. Indicators and dynamics of energy intensity (kg of oil equivalent per $1,000 GDP at PPP) *



*Calculated by: Human Development Report. 2004. UNDP, New-York, 2004, pp.207-208.

The indicator, which we suggest for Russia, "Population size in highly-polluted urban areas (million people)", is also related to power generating. The contribution of energy production facilities to air pollution is approximately half of total pollution from fixed stationary sources. This indicator is a modification of MDG indicator 29 "Proportion of population using solid fuels", which is not relevant for Russia due to insignificance. Nevertheless, the purpose of the MDG indicator is obvious enough: to monitor the number of people liv-

ing with high levels of air pollution, and reduction of those numbers. This target is acute for Russia, particularly in big cities with high levels of pollution. The number of such cities totals 145 with total population of approximately 60 million.

MDG target 9, connected with realization of sustainable development principles, includes two other indicators, which, in the Russian context, are related in many respects to forestry:

- proportion of land area covered by forest (indicator 25);
- proportion of territory protected to maintain biological diversity of terrestrial environment (indicator 26).

These indicators can be applied as they are in Russian strategies/programmes. Russia is in a good position regarding forestry and biodiversity, occupying one of the leading positions in the world. The country has the world's largest forested territory and forested territory as a percentage of total territory is also one of the highest in the world at 45%. The crisis of the 1990s saw sharp reduction of deforestation, favoring preservation of forested areas. However, the "forestation" indicator has huge regional differentiation, varying from 0.2-1.0% (Kalmykia, Nenets Autonomous Area) to 70-80% (Republic of Komi, Irkutsk Region, Primorsky Krai, etc.). A low percentage of forested territories is characteristic in many regions of the European part of the country, which makes efforts to preserve and increase forested territories quite relevant there.

The percentage of territory, which is protected for conservation of biodiversity, is quite high in Russia. The country has more than 15,600 nature reserves. Statistical indicators for biodiversity conservation in Russia's regions only include data on federal reserves and national parks, which occupy approximately 2% of Russian territory. Other federal protected territories (special reserves and sanctuaries) take up another 1% of the country. The remaining 15,000 territories, controlled at regional and local levels, also fulfill functions of environmental stabilization and preservation of biodiversity. There are another 35 wetland territories of international importance in Russia, and 17 world heritage sites, of which 11 are cultural heritage sites and 6 are natural heritage sites, etc. The overall size of protected natural territories amounts to 10.5% of the total area of the country.

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MDG Target 10 concerns improvement of people's clean drinking water supply, and the corresponding Indicator 30 estimates the share of population having steady access to a source of good quality drinking water in cities and rural localities. The importance of this indicator is obvious: at present 2 billion people in the world are not provided with clean drinking water, and this is the cause of numerous diseases and deaths. For Russia this indicator can be amended to "Proportion of housing with mains water, urban and rural". Table 6.2 shows that this indicator is close to 90% in cities, and the proportion of rural dwellings with mains water is over 40%.

The theme of MDG target 11 is improvement of living standards: "By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers". Two indicators are used to assess progress in achieving this Goal: "Proportion of urban population with access to improved sanitation" (indicator

Possible perpetuation of the raw material basis of the Russian economy due to admission to the WTO could have unpredictable ecological consequences.

31) and "Proportion of households with access to secure tenure, owned or rented" (indicator 32). The target definition itself on improvement of living conditions of the population is quite suitable for Russia, although its interpretation in the MDGs as related to inhabitants of slums is irrelevant. As a general target for the country we would propose the following: "To improve housing development and quality". Two indicators could be informative for Russia: "Proportion of housing with drainage, urban and rural" and "Proportion of dilapidated and tumbledown housing". Dynamics of the former indicator are shown in Table 6.2. The indicator of dilapidated and tumbledown housing is now above 91.255 million square meters, and it is climbing: the total area of such dwellings has increased by 2.4 times since 1995, from 1.4% to 3.2% of total housing. In 2003 approximately 5 million Russians lived in dilapidated and tumbledown buildings. Most of these people had incomes below the subsistence minimum, and were unable to improve their living conditions.

6.3. SCENARIOS AND TARGET INDICATORS FOR TRANSITION TO SUSTAINABLE DEVELOPMENT

6.3.1. ENVIRONMENTAL SUSTAINABILITY OF ECONOMIC DEVELOPMENT SCENARIOS

Environmental sustainability in Russia will be influenced in the near future by a range of factors. Ecological effect of some factors can be defined unequivocally as negative: escalating extensive production of raw materials; continuation of the policy of natural resources export; territorial expansion of economic activity and destruction of extensive natural ecosystems; an increasing number of industrial accidents due to deterioration of equipment; structural change in the energy balance due to partial replacement of gas with coal, etc.

There are concerns about the state of Russia's reserves of natural resources. The draft, prepared in 2004 by the Ministry of Natural Resources, of a "Long-term State Programme for Subsoil Reserve Studies and Mineral Resource Replacement in Russia Based on the Balance of Consumption and Replacement of Mineral Resources up to 2020" gives a pessimistic assessment of real stocks. Commercial stocks of many minerals, including oil, uranium, copper, and mined gold, will run low in 2015. Oil and gas reserves in the Volga-Ural and West- Siberian regions are running out. Depletion of main oil and gas provinces in the Northern Caucasus has reached 70-80%, in the Ural-Volga region 50-70% and in the West-Siberian region depletion is above 45%.

Possible perpetuation of the raw material basis of the Russian economy due to admission to the WTO could have unpredictable ecological consequences. It is obvious that the most appealing assets in Russia for transnational and foreign companies are its natural resource sectors, particularly fuels, since investments in oil and gas production have a rapid yield. Foreign companies have much scope for rapidly strengthening their positions thanks to large investment potential and shortage of funds of many Russian companies.

Global climate change presents a substantial problem for the future of the national economy. The reality of climate change is recognized in all international documents and forecasts. Warming and thawing of frozen ground can have extremely negative effect on infrastructure facilities, structures, pipelines,

roads, etc., in the permafrost zone, and almost two thirds of Russia's territory is in that zone. Energy production facilities in Siberian and northern regions are especially vulnerable.

The future holds the threat of new problems for human development as well as ecological problems. For example, energy producers plan to restructure the fuel balance by reducing inputs of natural gas and extending use of coal and fuel oil for power production. The products of coal combustion are 10-50 times more toxic than gas, and those of fuel oil are 3 times more toxic. Such a change will increase air pollution in urban areas, raising disease and mortality rates. According to calculations by the Fund for Defense of the Environment, such a changeover in generating fuels will lead to 40,000 more deaths in Russia.

At the qualitative level we can try to make a general analysis of the three national development scenarios up to 2015, related to environmental sustainability: pessimistic, inertial and optimistic.

The first two scenarios will lead to a "non-sustainable" type of development in the Russian economy. Unfortunately, even continuation of current trends (the inertial scenario) will means increasing deterioration of the environment. Only the optimistic scenario, based on a major change in Russia's economic growth paradigm, can lead to sustainable development.

The scenarios can be based on programmes of the Russian Government, the Center for Strategic Developments, and the Ministry of Natural Resources. The two key documents in question are the "Energy Strategy of Russia for the period to 2020" and the draft "Medium-term Programme of Socio-economic Development of the Russian Federation (2005-2008)".

The existing model based on consumption of natural resources is highly dependent on the country's natural resource stocks. The pessimistic scenario up to 2015 contains two obvious potential threats: 1) above-mentioned depletion of commercial stocks of oil and other minerals by 2015; 2) possible sharp drop of world prices for oil and other raw materials (this is effectively equivalent to the first threat because commercial viability of new remote deposits, which require significant investments, automatically decreases).

Let us consider the "price" threat in more detail. Difficult climate and remote production sites make the cost of oil production in Russia several times higher than in the Middle East and Latin America, and the costs will continue to grow, so the general tendency is towards efficiency decline of energy production investments. The situation in the oil market may also change due to escalating oil recovery in the OPEC countries, post-war restoration of Iraq, etc., leading to increase in world oil supply and decline of prices. This possibility makes investment in new production territories more risky, since a drop in world prices could "cut-out" a significant part of oil production in the remote northern areas and at off-shore fields with undeveloped infrastructure. Huge investments, which have become inefficient, may be frozen, leaving huge territories and sea areas ecologically damaged.

Such price developments, along with depletion of commercial stocks, will cause sharp reduction of federal budget proceeds and spending on social needs, and unemployment will grow. Clearly, the state and companies will considerably reduce their spending on environmental protection in such a situation, the operating load on old fields will increase, and money-saving priorities will lead

In the last 3-4 years the President of Russia and members of the Government have repeatedly emphasized the need to escape raw-material-based development of the Russian economy.

to corner-cutting as regards ecological standards (atmospheric emissions and discharges of pollutants into water), leading to environmental contamination and threats to health. This scenario leads the country further away from sustainable development.

The second scenario (inertial) is clear enough: in 2015 "everything will be as now". The country will manage to discover and develop new mineral reserves; with high world prices for raw materials development of offshore sites in the Barents Sea and Sakhalin will be profitable; huge export of oil, gas, wood, metals, chemical raw materials, etc., will continue. All this will mean the preservation of the present economic structure, a raw-material and environment-exploiting development model, with further depletion of natural resources and growth of pollution. It is obvious that such growth cannot be sustainable and negative consequences similar to those in the pessimistic scenario may appear after 2020-2030.

Realization of the third scenario (optimistic), allowing transition to sustainable development, needs a major change in the existing development paradigm to break "non-sustainable" trends in the economy. The new type of economy that is required can be defined in several ways: a knowledge-based economy (the most widespread international definition); an innovation economy; a high-tech economy; an information economy; a post-industrial economy; a sustainable economy; and so on. Aside from the formal definition, the basis for reaching such an economy is: priority development of human capital, knowledge and information, and deep structural-technological changes. In the last 3-4 years the President of Russia and members of the Government have repeatedly emphasized the need to escape raw-material-based development of the Russian economy (Box 6.4). All recent conceptual documents, strategies and programmes of the Government are focused on a new type of development. (Detailed description of such a future economy is beyond the scope of this Report. The issue of the new economy based on knowledge was the subject of the previous UNDP Human Development Report for Russia (2004)).

The main features of the proposed future economy from the viewpoint of environmental sustainability are as follows: priority is given to development of technology-intensive, high-tech, processing and infrastructural sectors with minimal environmental impact; essential importance is given to ecological conditions of human life and their provision; environmental pollution is reduced; the share of the raw-material sector in the economy decreases; efficiency and economy of natural resource utilization rise significantly, cutting consumption of natural resources and pollution volumes per unit of final result (reduction of the intensity of environment-exploitation). Clearly, transition to sustainable development requires compensation for exhaustion of natural capital through higher investments in human and material capital. Important practical steps include major increase of investments in science, education, public health, innovative development, and establishment of special funds, such as the Fund of Future Generations, which exists in many countries of the world. The economic mechanism of the knowledge-based economy (through the system of taxes, credits, privileges, investment climate, etc.) stimulates creation, distribution and use of knowledge for growth and "suppresses" those types of activity, which deplete natural capital and pollute the environment. Many of the above-men-

tioned features have already proved themselves in developed countries.

Transition to ecologically and economically sustainable growth based on environmentally-balanced, structural and technological reorganization of the economy, with efficient resource saving and reduction of pollution, clearly offers great potential. Structural and technological rationalization of the economy could free up to one half of all natural resources, which are now used inefficiently, with growth of final results and major reduction of pollution levels. Such a course would considerably reduce production levels and areas given over to natural resource and mineral production, reduce land under cultivation, diminish deforestation, etc., by improving use and deepening processing of natural and raw material resources, and it would also significantly raise people's living standards. According to the "Energy Strategy for Russia up to 2020" (2003), fairly simple energy-saving technologies would make it possible for Russia to save up to half of the energy, which it now consumes.

The "Factor Four" Report to the Rome Club (1997)[6] shows how it is possible to double production by halving resource use, through application of specific technologies. Contemporary industrial infrastructure could be maintained using half of current global energy consumption, while the new infrastructure based on the existing technologies could give 90% reduction. Russia could reduce energy consumption by 3-6 times using traditional (not cutting-edge) western technologies, and achieve growth of output results.

Certainly, it would be naive to try and forcibly cut growth rates of the natural-resource sectors, primarily energy production, in Russia, given the current social and economic situation in the country. However, efficiency of these sectors needs to be improved. Assessment of existing ecological and economic risks shows that Russia will gain more if it increases yields from fields in already developed resource regions of the country and abroad: new deposits in the north of the Caspian Sea, more active participation in development of energy resources in Central Asia, etc. At present, the oil extraction factor at fields has significantly declined, from 50% at the end of 1980s to no more than 30% now, according to expert estimates. This is partly due to ageing of large fields and deterioration of stocks, but it is also due to weakening of state control over subsoil extraction.

According to the optimistic scenario in the Energy Strategy, structural reorganization of the economy and implementation of energy-saving technologies should bring energy intensity down 45% by 2015 and 58% by 2020.

Ecologically expedient reduction of the proportion of natural resources in export structure under the optimistic scenario would not mean automatic reduction of economic gains from use of the country's natural-resource capital (its "natural advantages"). Restructuring of the national economy, discussed above, and particularly increase in the share of refining and processing sectors could raise tens of billions more for Russia from sale abroad of processed products instead of raw materials.

6.3.2. TARGET REFERENCE POINTS FOR THE MDG INDICATORS

We now review quantitative parameters of progress indicators for MDG Goal 7 (ensuring environmental sustainability) and its targets, based on the indicators proposed above and adapted for Russia.

Chapter 6

Assessment of existing ecological and economic risks shows that Russia will gain more if it increases yields from fields in already developed resource regions of the country and abroad.

Decrease of energy intensity is crucial if Russia is to realize the optimistic scenario. This would be an essential link in the chain pulling the economy towards sustainable development. Reduction of energy intensity, along with other factors, usually accompanies positive structural shifts in the economy, reduction of the proportion of environment-exploiting sectors and parallel growth of high-tech sectors. Orientation to lower energy intensity should promote energy-saving programmes, which have not been carried out in Russia to date. The energy-saving potential in Russia is huge, and the energy intensity indicator is the key for Goal 7 in Russia. Its reduction will be the major precondition for progress with other Goal 7 indicators, i.e. there is a correlation between dynamics of the indicators:

- as regards protected and forested territories – saving of energy resources and rationalization of their use will make it possible to do without expensive projects to develop production at virgin sites including forests;
- carbon dioxide emissions – reduction of energy intensity through improvement of domestic energy-use technologies will reduce emission of greenhouse gases;
- ecological aspect of human living conditions – modern energy-use technologies and energy saving considerably reduces environmental pollution.

Box 6.4. From a speech by Russian President, Vladimir Putin:

"It is obvious that unless we start to move quickly today, particularly in implementation of structural reforms, we may face a lengthy economic stagnation tomorrow. We still live predominantly in a rent, not a productive, type of economy. Our economic system has as a matter of fact changed very little. What is the primary source of money? Oil, gas, metals, other raw materials. The additional income yielded by export is either "eaten up" or feeds capital outflow, or, at best, is invested in the same raw material sector."

Source: Izvestia, April 25, 2005.

A power consumption forecast is given in the "Energy Strategy for Russia up to 2020", approved by the Russian Government in 2003. Average GDP power consumption worldwide has decreased by 19% in the last 20 years, and in the developed countries by 21-27%. In Russia the energy intensity of GDP increased by 18% in 1990-1998 due to deep economic crisis. As the economy has recovered energy intensity has begun to fall by 2-3% annually. According to the optimistic scenario in the Energy Strategy, structural reorganization of the economy and implementation of energy-saving technologies should bring energy intensity down 45% by 2015 and 58% by 2020 (Appendix 6.1, Figure 1).

Development dynamics of "forested" and protected lands will be influenced up to 2015 by development of energy production. For example, according to available estimates, one dollar of investments in development of northern fields destroys 2-4 square meters of natural ecosystems. The multi-billion dollar spending required for new developments makes the ecological damage obvious. Vast tracts of land will have to be developed for new energy production infrastructure: pipelines, roads, etc. Reduction of forested land will also be affected by increase of timber felling. The current level of timber felling is almost 2.5 times lower than in 1990, but growth of domestic and international demand for wood products will cause expansion.

Therefore, we could take maintenance of the current 45% of Russia under forest as the indicator for the optimistic scenario by 2015 via increased reforestation and increased depth of wood processing to reduce need for primary wood as raw material. Preservation of forests will also be promoted by Russia's ratification of the Kyoto Protocol, under which reforestation to limit national carbon dioxide

emissions can be both profitable and ecologically effective.

Many developed countries have high proportions of protected land in their total territory (Austria and Germany have 33% each, the USA 26%, Great Britain 21%, etc.). This suggests that the share of protected land in Russia (now over 10%) could be extended to 20-25%, particularly considering the importance of Russian protected lands for preservation of the world biosphere, and the fact that 65% of Russia's land is still almost untouched by the economy. However, such extension is bound to be counteracted by growth of raw material sectors: subsoil resources, timber and agriculture (assuming the pessimistic or inertial scenarios).

It is natural to link the indicator for aggregate carbon dioxide emissions by 2015 with Russia's obligations under the Kyoto protocol. According to data from the Federal Hydrometeorology and Environmental Monitoring Service, Russian anthropogenic emissions of carbon dioxide in 2003 were 3050 million tons or 70% of total emissions of greenhouse gases in 1990. The contribution of Russia to global emission is 6.3%, representing 26.7% of US emissions, 47.2% of those in the European Union, and 47.9% of those in China.[7] Emissions of carbon dioxide (together with other five greenhouse gases) in 1990 are the ecological limit for the country during the first budgetary period of the Kyoto protocol from 2008 to 2012. It is still not clear what agreements and indicators will follow after that term, but the determination of almost 130 countries, which ratified the Kyoto Protocol, shows strong commitment of the world community to fight the climate changes. So toughening of the top limit for greenhouse gases emissions by 2015 is likely. There is currently a broad discussion on whether Russia's obligations under the Kyoto Protocol will shackle the country's economic growth. According to the overwhelming majority of opinions, they will not. Under the optimistic scenario, with radical reorganization of energy production structures and reduction of power consumption, Russia will not exceed volumes of greenhouse gases emissions as compared with 1990. This is confirmed by the forecast assessment of the "Third National Report by the Russian Federation", according to which, even with economic growth carbon dioxide emissions in 2015 will not exceed 85-90% of the 1990 level, assuming economic restructuring. Russia could obtain significant economic benefits from sale in the world market of its free quotas on greenhouse gases emissions, which are estimated to have value of several billion dollars.

Improvement of ecological living conditions depends much on development of the housing market, and favorable development is targeted by the.

Uncertainty about future development of various trends makes it hard to predict the number of the people living in highly polluted cities. As was already noted, air pollution both from stationary sources and vehicles is growing, leading to increase in the number of now "dirty" cities. Under the optimistic scenario structural and technological restructuring of the economy plus transition to EURO ecology standards for cars could halve the number of people living in highly polluted cities from approximately 60 million to 30 million.

Improvement of ecological living conditions depends much on development of

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The current situation points again to the value of establishing a central ecological department, under the Federal Government.

the housing market, and favorable development is targeted by the Federal Target Programme "Housing" and, in particular, its sub-programme "Relocation of Citizens of the Russian Federation from Dilapidated and Tumbledown Housing". Under the optimistic scenario practically all urban housing could be connected to water mains and sewerage by 2015 (95-97% of housing). It is more difficult to predict development in rural settlements. From 1993 to 2003 the proportion of rural dwellings with amenities increased significantly, by 11-13%. So the rural target for 2015 regarding mains water could be 55-57% (41% in 2003), and 48-50% for sewerage (32% in 2003).

The small percentage of dilapidated and tumbledown housing (3%) makes it fair to expect that all such housing will have been pulled down by 2015.

6.4. MONITORING OF PROGRESS TO GOAL 7 AND NECESSARY CONDITIONS

The institutional factor is highly important for monitoring of progress toward sustainable development. As was already noted, current Government structure involves confusion and dissociation between agencies responsible for decision-making on matters of environmental sustainability. Many regions have responded by establishing their own systems of ecological management. For example, the Tomsk Region has created one of the country's most effective structures for ecological management at regional and municipal levels.

The current situation points again to the value of establishing a central ecological department, under the Federal Government, to support uniform federal ecological policy and carry out ecological supervision, as happened in the 1990s (although the bodies vested with this responsibility, varied). The new entity could have status of a Federal Service interacting with all federal, regional and local levels of government. Such a Service could carry out monitoring of the country's progress in ensuring environmental sustainability. A system of indicators for sustainable development would assist the monitoring (this is a commonly used approach in other countries).

We will now review problems of monitoring the MDG Indicators in more detail, firstly as regards statistical support.

The Indicator "Proportion of land area covered by forest" is calculated based on state forest surveys which gather information on surface area of forest, stocks of wood by type, and yearly gain of wood and its use. The surveys are carried out once every five years.

The Indicator "Proportion of protected area" is now presented in state statistics for natural preserves and national parks of federal importance. However, as noted above, these two categories account for only one fifth of all the protected areas in the country, much of which is the responsibility of regions. Departmental and regional statistics for all types of protected areas are available, and the Federal State Statistics Service could aggregate and update them on a regular basis.

There are a number of methods for calculation of the energy intensity indicator. The indicator is quantitatively defined in documents and programmes of the Federal

Government, but the Russian Statistics Service does not publish it. Since this indicator is the key for sustainable development, it is expedient for the Russian Statistics Service to annually calculate and publish it.

Inventory check and control of the indicator "Carbon dioxide emissions" as well as other greenhouse gas emissions are defined in Kyoto Protocol requirements, so this indicator needs to be included in Russian official statistics. Emissions of greenhouse gases are currently estimated in documents of the Interdepartmental Commission of the Russian Federation on Problems of Climate Change, and in departmental reporting of the Federal Hydrometeorology and Environmental Monitoring Service.

Data on population of highly polluted urban areas and air quality measures (based on the complex air pollution index) are available in departmental statistics of the Ministry of Natural Resources and the Federal Hydrometeorology and Environmental Monitoring Service. These data should be annually published by the Russian Statistics Service.

Three indicators reflecting ecological conditions and quality of housing ("Proportion of housing with mains water, urban and rural", "Proportion of population with access to sewerage, urban and rural", "Proportion of dilapidated and a tumbledown housing") are well documented in state statistics and are annually updated.

Three important future indicators of Russia's progress in attaining environmental sustainability within the MDG framework can be proposed (Appendix 6.2):

- virgin lands;
- fixed asset replacement ratio;
- population using drinking water, which does not meet hygiene standards (million people).

6.5. CONCLUSIONS AND RECOMMENDATIONS

Transition to sustainable development implies strengthening of environmental priorities in state policy. In Russia's case we would point out the following key directions for change, which, directly or indirectly, could lead to minimization of environmental impact and to more efficient use of natural resources:

- to develop and adopt a long-term strategy of environmentally sustainable development in the Russian Federation;
- to create environmental conditions in Russia, which will facilitate development of human capital;
- to eliminate environmental threats to human health;
- to consolidate state control and monitoring of environment quality, primarily air quality (particularly in major cities) and quality of drinking water;
- to improve housing amenities, particularly ecological conditions of urban and rural dwelling;
- to upgrade people's environmental education and culture at all levels of the educational system, to propagate the ideas of environmental sustainability;
- to carry out environmentally balanced restructuring of the economy, to foster knowledge-based innovation and creation of a knowledge-based economy;
- to adjust customary indicators of development to take account of the environmental aspect; to incorporate adequate valuation of natural resources and services, and environmental impact in economic indicators when taking economic decisions on macro- and micro-levels;
- to build environmentally favorable taxation, credit systems, subsidies, trade tariffs and duty systems;
- to create conditions for extended replacement of natural resources, which will stim-

ulate and compel natural-resource users to replenish the resources, which they consume, at rates exceeding the extraction and utilization rates;

- to radically improve use of natural resources and liquidate their loss at extraction sites and in all stages of their transformation, and to implement resource-saving technologies using existing and new economic and legal instruments;
- to substantially reduce consumption of natural resources and pollution per unit of final result (on the macro-level: per unit of GDP) leading to reduction of environment-exploitation and pollution intensity indicators, including energy intensity;
- to improve efficiency and differentiate the payment system for use of natural resources, in order to promote recovery of natural rent;
- to build an efficient system of economic sanctions for violation of environmental standards, to fully implement the "polluter pays" principle;
- to implement programmes for rehabilitation of territories in a critical environmental condition, including measures for improvement of health of local populations; to grant state support to works for liquidation of local environmental damage;
- to clearly delimit ownership rights to natural resources at federal and regional levels, to return key natural resources to federal property;
- to re-establish a single "environmental" department under the Federal Government to stop inefficiency and decentralization of environmental protection management; to extend potential for environmental management and control at regional and municipal levels;
- to redirect export strategy towards reduction of the raw material share in exports, and increase in the share of high-tech products with a high proportion of added value;
- to improve laws related to environmental protection and use of natural resources, as well as environmental factors related to public health;
- to ensure active involvement of the general public and business in solution of national and regional environmental problems;
- to support business participation in voluntary environmental programmes and mechanisms, such as environmental insurance, environmental certification, environmental audit;
- to support the role of Russia's global ecosystem services in ensuring the planet's biosphere sustainability; to use environmental arguments at the international level to obtain benefits, including economic benefits, for Russia;
- to support programmes of international and regional cooperation in environmental protection as well as international procedures and protocols.

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Table 1. MDG Goal 7. Ensure environmental sustainability

MDG Targets	MDG Targets for Russia	Indicators of progress in attaining the Target	Indicators of progress in attaining the Target for Russia	Today's value of indicator	Target indicator for 2015
Target 9. Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources	Target 9. Integrate the principles of sustainable development into country policies and programmes and prevent losses of natural resources	25. Proportion of land area covered by forest;	25. Proportion of land area covered by forest;	45%	At least 45%
		26. Ratio of area protected for biodiversity purposes to surface area;	26. Ratio of area protected to maintain biodiversity to surface area;	10.5%	20-25%
		27. Energy use (kg oil equivalent) per USD1000 GDP (PPP);	27. Energy intensity;	1.47 t equivalent fuel/ USD1000	0.82 tons equivalent fuel/ USD 1000 (approx. 55% of the 2000 level)
		28. Carbon dioxide emissions per capita and consumption of ozone-depleting CFCs (ODP tons)	28. Carbon dioxide emissions (tons)	3050 million tons (approx. 70% of emissions in 1990)	3700-3900 million tons (85-90% of emissions in 1990)
		29. Proportion of population using solid fuels	29. Urban population size in over-polluted areas	Approx. 60 million people	30 million people
Target 10. Halve the proportion of people without sustainable access to safe drinking water	Target 10. To provide the population with sustainable access to safe drinking water	30. Proportion of population with sustainable access to an improved water source, urban and rural	30. Proportion of available housing with running water, urban and rura	83% of urban housing; 41% of rural housing	95-97% of urban housing; 55-57% of rural housing
Target 11. By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers	Target 11. To ensure improvement of quality of people's living conditions	31. Proportion of population with access to improved sanitation, urban and rural;	31. Proportion of population with access to improved sanitation, urban and rural;	80% of urban housing; 32% of rural housing	95-97% of urban housing; 48-50% of rural housing
		32. Proportion of households with access to secure tenure, owned or rented	32. Proportion of dilapidated and tumbledown housing	3%	0

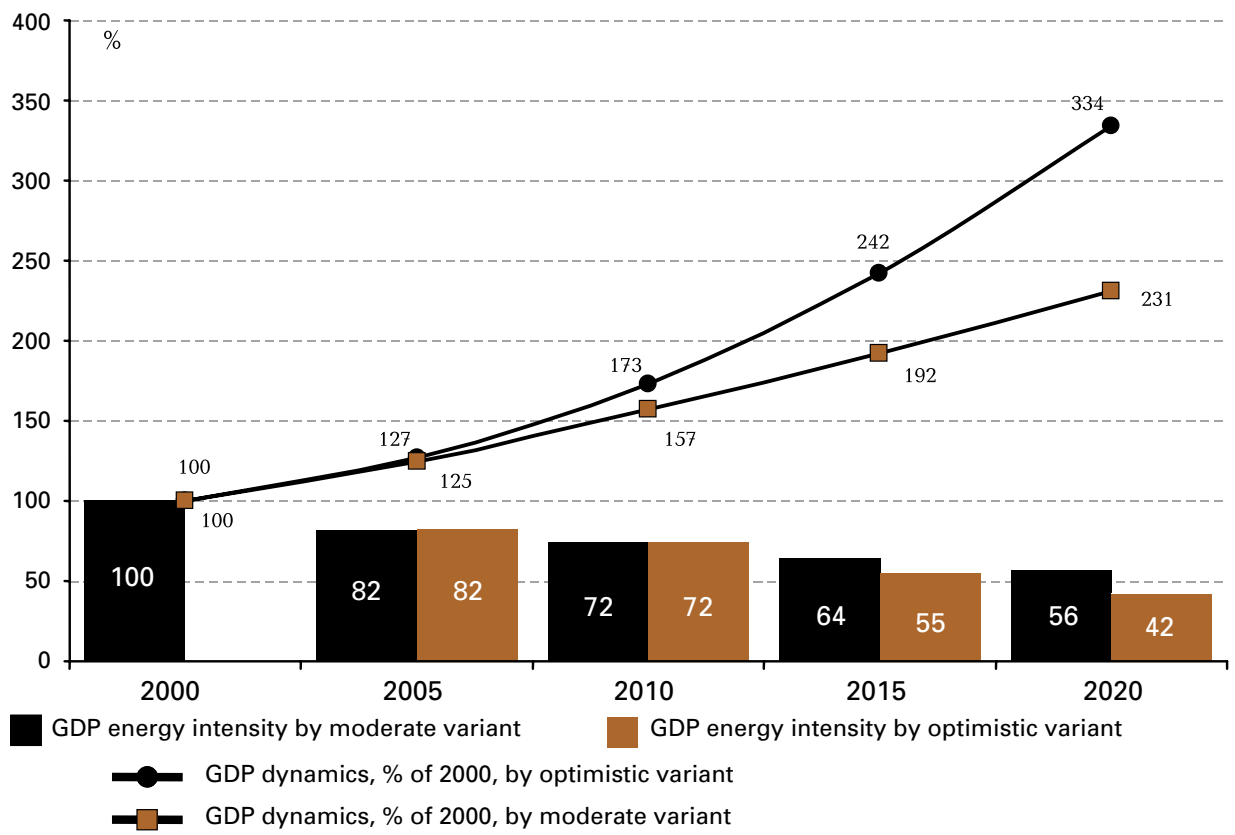
Appendix 6.1.

Table 2. Change of branch structure in industrial production in Russia over 1990-2003 (%)

Branches	1990	1995	2000	2003
Electric power industry	4.0	10.5	9.2	12.1
Fuel production (oil-extracting, oil refining, gas, coal)	7.6	16.9	15.8	19.2
Ferrous metallurgy	5.5	7.7	8.6	9.5
Non-ferrous metallurgy	6.0	9.0	10.3	7.2
Chemical and petrochemical	7.8	6.3	7.5	6.2
Mechanical engineering and metal working	31.5	19.2	20.5	20.2
Forestry, wood processing and pulp-and-paper industry	5.8	5.1	4.8	4.2
Construction materials	3.8	3.8	2.9	3.1
Light industry	12.3	2.3	1.8	1.4
Food industry	15.7	15.3	14.9	13.6
Other branches		2.0	1.6	3.3
Total of all industries	100	100	100	100

Source: Author's calculations, Russian Statistical Year-book 2004. Moscow: ed. by the Russian Statistics Service, 2004.

Figure 1. GDP dynamics and its energy intensity in Russia from 2000 to 2020 (% of 2000)



Appendix 6.2.

Three important future indicators can be proposed for Russia's progress in achieving the Goal of environmental sustainability within the MDG framework:

- virgin lands;
- fixed asset replacement ratio;
- population using drinking water, which does not meet hygiene standards (million.people).

The first two indicators can be added to the indicators of target 9 "Integrate the principles of sustainable development into country policies and programmes and reverse the loss of natural resources", and the third one to target 10 "To provide the population with sustainable access to safe drinking water".

Indicators, which show contrary tendencies, can also be applied in the analysis of protection of ecosystem functions and biodiversity. Theory and world practice most often use the indicator of protected area (MDG indicator 26). The area of these territories in Russia is increasing. Russia plays the leading role in the world in terms of the preservation of global public goods, and renders major ecological services to the whole planet. Russia's ecosystem offers the biggest single contribution to planetary stability, largely due to the huge areas of Russia, which still remain in their natural state. Russia has more land undisturbed by economic activities than any other country, representing approximately 65% of the country's surface area. This territory is significantly more than ecosystems kept in their natural state in other large countries: Brazil, Canada, Australia, the USA and others. Areas with natural ecosystems are shrinking worldwide: at the beginning of the 20th century they had been destroyed on 20% of the world's land surface, but now that figure is 61-63%. In Russia they are being reduced mainly by the energy and timber industries. Russia's indicator of virgin lands is important for the rest of the world.

Another indicator can be proposed, which directly ties population number and polluted water consumption: "population using drinking water, which does not matching hygiene standards (million people)". At present in Russia 20% of drinking water samples do not match hygiene standards. Departmental information of the Ministry of Natural Resources of the Russian Federation can be used as statistical basis for this indicator.

The environmental threat of deterioration and ageing of fixed assets was already mentioned above. The factor of capital renewal in the industry has dropped from 10.6% in 1970 to 1.8% in 2003, reflecting completely inadequate investment levels. This indicator is available in state statistics.

Box 6.5.

Box 6.5. Environmental charges

Economic efficiency of the model of environmental impact charges

The system of payment for environmental impact appeared at the end of 1992 and was as follows:

- Facilities, which produced environmental impact, were subject to payment calculated as a product of payment rates multiplied by the scope of the impact (atmospheric emissions, discharges into water, production and disposal of waste), and the payment progressively increased depending on the excess over standard rates and provisionally agreed limits of the impact;
- sums invested in environment protection measures (a specified list of approved works) were deductible from the payments;
- revenues from the payments were accumulated in a system of special off-budget (environmental) funds and were spent to finance federal and regional environmental projects and programs.

Adoption of the Budget and Tax Codes (2000) ended the target-oriented use of funds raised from the payments (at least, at federal level). This logic was in the spirit of general budget reform in Russia, which naturally terminated the economic experiment of environmental impact payment as a possible state source of financing for environmental projects and programs. Opponents of this reform argued that it was better to have a small but guaranteed budget for environmental purposes than to depend on the will of Parliament in distribution of budget funds based on current socio-economic priorities.

The general ratios of environmental charges within allowed norms (chargeable to the enterprise's expense items), and both within and above agreed limits (payable from net profit) were 40% and 60% respectively, according to average statistical estimates for 1999-2001. Cost characteristics of the payments based on this ratio in main branches of the economy are shown in Figure 1. The following figures show the significant size of extra payments for environmental impact: in non-ferrous metallurgy they were more than 450 million rubles, in fuel production 350 million rubles, and in the electric power industry more than 270 million rubles.

Environmental payment for environmental impact within permitted levels (as well as the total payment) is incommensurably small in comparison with the expenses required from enterprises to reduce environmental impact. For this reason the payment had ceased to be a stimulating factor in realization of environmental protection investments by enterprises. According to the Russian Statistics Service, the environmental payment for emissions (discharges) of pollutants within permitted levels and for waste disposal in 2000 was not more than 8.8% of investments in fixed capital assigned to environmental protection, and only 1.8% of total expenses of enterprises for environmental protection. At the same time, according to expert estimates (survey of enterprises in various industries), the amounts, which, according to enterprises' own estimates, were necessary as environmental protection investments, exceeded actually charged environmental payments by 2-3 times.

According to the main goal of state environmental policy, which is provision of citizens' rights to a favorable environment and preservation of sustainable environmental equilibrium, the primary purpose of the environmental payment should be to create economic incentives for enterprises to reduce environmental impact and convert their facilities to "environment-friendly" technologies (reduction of environmental impact, reduction of raw material input to production, increase of energy efficiency). However, the average standard environmental payment in 2000-2001 was just 0.04-0.05% of production costs (Figure 2.). Such tiny payments, even if they were doubled as proposed, were insufficient to give enterprises significant financial incentives to reduce environmental impact.

The proportion of environmental payment for standard emissions and discharges of pollutants, and waste disposal, in revenues of the federal budget for 2001 and 2002 was not more than approximately 0.05% and 0.04% of total tax revenues respectively. At that, the cost of administration of the payment was approximately commensurable with its size. The complexity of pollution monitoring and the cumbersome nature of the payment system are evidenced by the fact that this fee was levied on approximately 250 polluting companies, although more than 95% of total receipts were from 35-40 polluting companies.

Value of federal and regional budget incomes from standard environmental payments for pollutant emissions and discharges and waste disposal was commensurable with Government expenses for administration of environmental protection and urgent environ-

Figure 1. Approximate ratio of standard and extra environmental payments in various branches of the economy

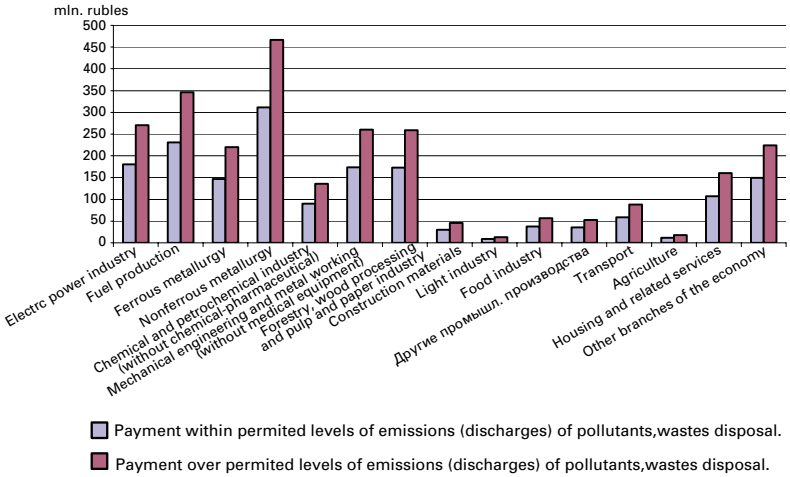
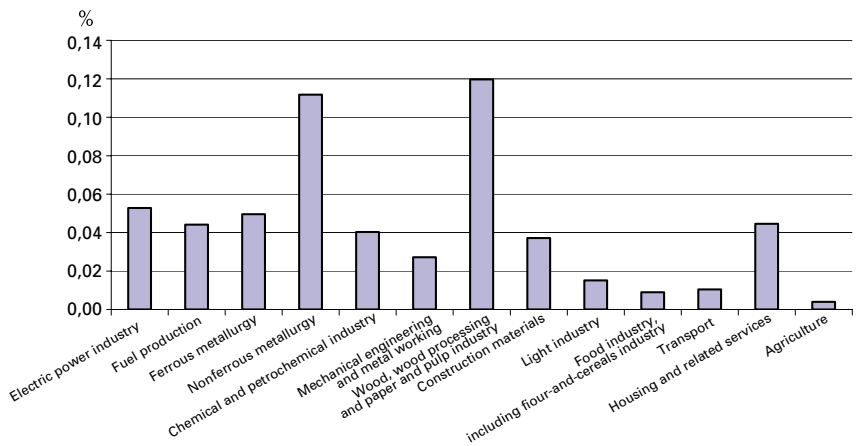


Figure 2. Ratio of standard environmental payments to production costs (2000)



mental interventions. However, environmental protection investments were financed from other sources of state income.

Different industries produce substantially different environmental impact above allowed standard rates (Figure 3). The "dirtiest" industries, which produce above-standard impact, are the coal industry, ferrous and nonferrous metallurgy, and wood processing. The proportion of extra environmental payments in those industries exceeds 60% of the total payments charged.

Improvement of environmental payments mechanism

The Federal Law "On Environmental Protection" determines types of environmental impact, which become the basis for collection of payment. However, the legislator has not defined the form of collection of payment, leaving decision on that matter to a special law.

A Government session in the spring of 2005 defined its position on the payment, which essentially is as follows:

- environmental extra payment should be established and gradually increased as an incentive for payers to implement measures aimed at environmental protection within the framework of environmental protection investments;
- standard environmental payment (for environmental impact within the limits of effective standard rates) should be canceled;
- the practice of setting provisionally agreed standard rates (limits) on pollutant emissions and discharge should be excluded;
- a basic list of pollutants should be finalized and approved so that environmental payments can be administered and charged;
- subjects (regions) of the Russian Federation should be allowed to expand the basic list of pollutants and to set regional rates of payment, based on their environmental situation.

The corresponding draft federal law will be considered by the State Duma in the autumn session of 2005, when a final form of environmental payment and its basic characteristics will be determined.

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Figure 3. Proportion of environmental extra payments in the total payments charged (according to expert estimations)