Ways to Improve Environmental Policy in Russia*

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0. Introduction

The latest world economic crisis made quite evident all the scantiness and frailty of the existing world economic model. Ignoring social and ecological aspects of development as well as stereotypes of maximum consumption standards has led to crisis which has a global character coupled with negative consequences. A modern type of economic development can be called technological. This type has such distinctive features as exhaustion and extra-exploitation of natural resources, enormous pollution and waste products, as well as economic damage caused by environmental degradation.

Clearly, environmental issues are very important for Russia. Russia is one of the most polluting countries in the world. Its contribution to the total world emission of major hazardous substances (solid substances, sulphurous oxide, nitrous oxide and carbonic gas) accounts for 13%. Nonetheless, the Russian economy spends impermissibly little on these goals. A proportion of environmental protection investments in the total volume of national investments is about 1.2–2.6 % per year, in comparison with developed countries where this figure ranges from 6% to 25%. The growth rate of environmental protection investment in 2011 in Russia constituted 84.2% of the 1995 level. The growth rate of the current environmental costs in 2011 constituted only 71% of the 1995 level. Such a situation in the field of environment protection costs has determined the dynamics of putting into service the production facilities for sewage treatment, trapping and liquidation of hazardous substances in waste gases. The number of environment equipment put into operation is reducing. If in 1990 the capacity of facilities put into service for sewage treatment amounted to 2 million cubic meters per day, in 2011 it was only 0.7 million cubic m per day. In addition to that, installations for trapping and liquidation of hazardous substances in waste gases accounted for 16.4 million cubic m per hour in 1990 and 9.7 million cubic m in 2011. So, there is a necessity of ecological expenditure increase.

1. **Russian pollution taxes**

The fundamental question is where we should find additional financial sources to improve environmental situation in the country. Firstly, it is necessary both to increase centralized investments and create incentives for enterprises to construct environmental protection facilities. The main task is to improve the economic mechanism of environmental management. Our ecological legislation is not perfect. Enterprises prefer to emit harmful substances rather than to make pollution abatement. According to the opinions of the leading economists and ecologists, ecologization of the tax system is necessary. The size of our pollution taxes does not provide necessary volumes of investment and current expenditures for the purpose of pollution abatement. To make it worse, pollution taxes are depreciating quickly because of inflation. For instance, in 2011 prices increased to the level of 2003 by 2.83 times, whereas index of pollution taxes was only 193 %. In developed countries currently there is an increase in the rates of environmental payments with the amount of collected payment about 1% of GDP (in Russia it is 0.03–0.04 % of GDP), despite the fact that the standards of pollution charges are 10-100 times higher for various ingredients (see Table 1).

Table 1. Pollution taxes for SO_2 and NO_x
(euro per ton) in 2005

Country	Pollution taxes	
	SO_2	NO_x
Czech Republic	28	22
Estonia	3,52	8,5
Poland	85	85
Slovakia	22,7	18,2
Slovenia	14	-
Finland	17,1	-
France	27,4	38,1
Italy	53,2	105
Russia	2,6	5,5

The current system of pollution taxes needs to be refined and improved to develop standards for environmental charges. Modern economic science has developed several approaches.

The first approach suggests that payments for pollution should be based on an economic assessment of the damage because of contamination. Damage assessments should provide an evaluation of direct and indirect economic and environmental losses in monetary terms as a result of negative environmental impacts. However, the implementation of this approach entails certain difficulties due to the lack of agreed methods to assess damages. In a number of studies an attempt was made to provide such an evaluation which showed that at present enterprises in the Russian economy cause environmental damage to such an extent that they are not able to compensate it. According to the results of research conducted at the Institute of Economic Forecasting of the Russian Academy of Sciences, the overall damage to Russia's environment is over 10%.

The second approach is based on the assessment of ability of the society to allocate resources for activities to protect the environment. The total amount of environmental charges is determined by the amount of environmental costs in the previous years and the forecast of their possible and appropriate growth. All estimated payments are distributed among the polluting industries in accordance with the amount of damage, taking into account the harmfulness of pollutants and the local environmental situation. In practice it is the second approach which is applied in Russia now.

The third approach is based on the estimation of costs needed to prevent environmental protection expenditures. Now this approach has no obvious practical application because of the difficulties in the assessment of such expenditures.

The fourth approach allows calculating of the size of pollution taxes based on the value of net resources required to dilute polluted resources, making it possible to bring the contents of the resource pollutants to the level of maximum permissible concentration. This method is almost out of use due to its complexity (for example, it cannot be applied for air).

The third approach has been taken by researchers of Institute of Economics and Industrial Engineering of the Siberian Branch of the Russian Academy of Sciences (Institute of Economics and IE SB RAS) to estimate the necessary size of pollution taxes.

2. Dynamic input-output model of Russian economy with ecological block

The method considered in this paper makes it possible to avoid the main difficulties in the implementation of third approach, i.e. it allows estimating the costs of preventing pollution of water and air resources. The assessment of the environmental protection costs was carried out according to the results of predictive calculations using the dynamic input-output model (DIOM) of the Russian economy with an environmental protection block (EP block). This model complex has been developed in the Institute of Economics and IE SB RAS. Fig. 1 presents a brief scheme of this model complex.

In addition to *n* elements which denote traditional sectors of the economy, *m* elements which represent natural resources are allocated here. One-to-one correspondence is expected between each of these elements and the areas of environmental protection (air protection, water conservation, etc.). At this stage of our research, one natural resource is studied — atmospheric air. For the environmental activity, the reproduction processes of the main environmental funds and the formation of environmental costs are modeled into the DIOM (Dynamic Input-Output Model). The EP block describes the tangible indicators of ecological processes. Depending on the volume of manufactured goods in the traditional sectors of economy (X_i), the volume of pollutants generated during the production process is determined. Thus, this model system allows us to forecast the level of pollution formation in the industrial production depending on the economic development of Russia with the help of coefficients of pollution generation per unit of gross production output. The estimates of the expenditures for reducing air pollution help determine volumes of pollution trapping. The difference between formation and pollution trapping gives us volumes of emissions.

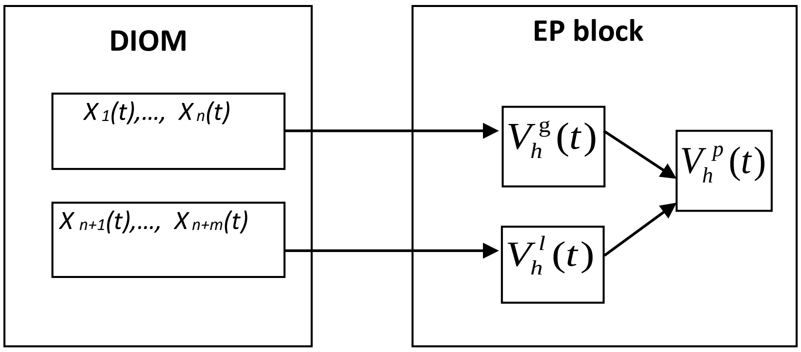

Fig.1. A brief diagram of the DIOM with an EP block

This is a description of the EP block:

$x(t) = (x_1(t),\ldots,x_n(t),x_{n+1}(t),\ldots,x_{n+m}(t))$ – vector of gross outputs, where

$x_i(t),\ i = 1,\ldots,n$ – gross output of industry i in the year t,

$x_{n+h}(t),\ h = 1,\ldots,m$ – current environmental protection cost for natural resource h.

The volume of pollutants generated in the production process is described by the formula:

$$V_h^g(t) = \sum_{i=1}^{n} w_{ih}(t)x_i(t) + D_h(t), \text{ where}$$

w_{ih} – coefficient of pollutant h generation (volume of polluted natural resource h, referring to manufacturing of a unit of production of industry i);

$D_h(t)$ - output of pollutant h (volume of pollution or destruction of a natural resource) in a household.

The volume of current environmental protection cost for natural resource *h* or product of environmental protection industry *h* is determined by the equation:

$$x_{n+h}(t) = \sum_{i=1}^{n} v_{ih}(t) V_{ih}^{l}(t), \quad V_{h}^{l}(t) = \sum_{i=1}^{n} V_{ih}^{l}(t), \quad \text{where}$$

$v_{ih}(t)$ – current cost to recover a unit of natural resource *h* (to destroy or to trap a unit of pollutant *h*) in industry *i*;

$V_h^l(t)$ - volume of a recovered natural resource (liquidated or trapped pollutant) of type *h*.

The volume of pollutant h (a polluted natural resource), which gets into the natural environment without purification (or by volume of destroyed but not reproduced natural resource), is described by the formula:

$$V_{h}^{p}(t) = V_{h}^{g}(t) - V_{h}^{l}(t).$$

A more detailed description of the economic and ecological units of the model complex is given in the paper [1].

3. Results of forecast calculations

The model calculation was based on several scenarios of Russia's economic development in the period of overcoming the global economic crisis in 2013-2020. Tables 2 and 3 show indexes according one of these scenarios. Key factors which will influence Russian domestic markets are the positive consequences of Russia's joining the WTO in 2011, and Olympic Games in Sochi in 2014, an effective monetary and fiscal policy. The dynamics of key indicators that will affect Russian economy in 2013-2020 are shown in Table 2.

Table 2. Forecast key factors of national economy in Russia in 2014-2020

	2014	2015	2016	2017	2018	2019	2020
Urals price (in USD per barrel)	101.6	103.7	105.7	107.8	110.0	112.2	114.4
Change in GDP (in %)	+2.3	+2.5	+2.8	+3.0	+3.6	+3.9	+4.1
Change in M2 (in %)	+10	+10	+10	+10	+10	+10	+10

Table 3. Forecast industry outputs in 2014-2020 (growth rate, %)

	2014	2015	2016	2017	2018	2019	2020
Agriculture	102.3	103.9	102.5	102.6	102.7	102.9	103.0
Coal	97.4	104.6	101.8	102.9	103.3	103.8	104.3
Oil	100.9	101.5	101.0	101.0	101.0	101.0	101.0
Gas	100.9	101.5	101.0	101.0	101.0	101.0	101.0
Other minerals	103.7	99.3	102.0	104.0	103.2	103.7	104.1
Food industry	101.6	103.0	103.6	103.1	103.3	103.4	103.5
Light industry	102.2	101.7	104.6	104.8	104.7	105.2	105.6
Logging, wood-working, pulp and paper industry	96.9	91.7	95.4	97.5	96.7	97.3	97.7
Oil products and coke	103.8	102.4	102.0	103.0	102.6	102.6	102.7
Chemical and petrochemical industry	106.5	100.8	105.8	107.7	107.1	107.8	108.3
Other non-metal mineral products	100.8	100.4	100.8	102.8	101.8	102.4	102.9
Metallurgy	99.5	96.4	102.5	101.8	102.0	103.0	103.8
Metal-working industry	101.9	99.0	103.9	104.9	104.5	105.3	105.8
Machine-building industry	104.1	95.8	99.8	105.1	102.9	104.1	105.0
Other products of industry	105.2	101.0	101.5	104.1	103.0	103.4	103.6
Power engineering	102.7	99.9	101.3	102.6	102.1	102.4	102.6
Collection, sewage treatment and distribution of water	102.7	99.9	101.3	102.6	102.1	102.4	102.6
Construction	103.7	102.2	96.4	100.4	98.5	98.5	98.6
Trade	105.6	105.7	102.3	104.3	103.3	103.4	103.4
Transport and communication	104.8	103.8	102.0	103.8	103.0	103.1	103.2
Services	103.0	104.4	101.4	103.7	103.0	103.3	103.6

At the one stage of calculations, Russia's environmental and economic developments, which were subject to increasing volumes of trapped air pollutants, were forecast up to 2020. In the area of air protection, the implementation of the prepared for signing so-called Bali Roadmap (BRM) was simulated (BRM was approved in December 2007 at the UN Conference on Climate Change, Indonesia, and requires developed countries to reduce greenhouse emissions to 60% of the 1990 levels by 2020). Although the document was sabotaged by many countries that are unwilling to be bound by any real commitment, in any case its implementation will be useful for Russia. In 1990 in Russia GHG (greenhouse gases) emissions were estimated at 39.599 mln t, and in accordance with the BRM requirements they have to be reduced to 23.760 mln by 2020. Since greenhouse gases account for 76% of all emissions into the atmosphere, we can estimate the total volume of emissions for 2020 (31.263 mln t).

The estimate received as a result of predictive calculations of the volumes of air pollutants produced by different industries and in the national economy as a whole, the specified amounts of greenhouse gas emissions and other air pollutants into the atmosphere in accordance with the objective of BRM make it possible to determine the dynamics of trapping air pollutants in the fo recast period. Calculations based on the model complex allow for the estimation of the total volumes of current and investment expenditures in 2014-2020 (at 2011 prices) to ensure compliance with the specified environmental objectives, i.e. 652.062 bln rubles for the capture of atmospheric pollutants according to the forecast scenario.

Let us estimate the average regional rate of pollution tax and compare these results with those of similar existing rates. We shall proceed from the principle of cost recovery for the destruction of atmospheric pollution due to charges collected. Since records are maintained for a fairly large number of ingredients which enter the atmosphere, let us consider the problem of assessing environmental charges on the example of air-polluting nitrogen oxide, the reduction of emissions of which, along with other greenhouse gases, is assumed by BRM. Since the proportion of this substance among all pollutants in the atmosphere is 13.66%, we will proceed from the corresponding share in the total costs of its capture, i.e. 652, 062.1 mln rubles x 0.1366 = 89, 0717.7 mln rubles at 2011 prices. These costs were distributed by the federal districts in proportion to the current regional cost structure for the protection of air resources (Table 4, column 1).

Table 4. Real and model-calculated regional norms of payment for NO_x in 2014-2020 (price of 2011)

	Total environmental cost in 2014-2020 (million Rbl)	Total emission in 2014-2020 (thou tons)	Forecast payment norms (Rbl per ton)	Lower and upper boundaries of the regional coefficients of the environmental situation	Real payment norms (Rbl per ton)
	[1]	[2]	[3]=[1]:[2]	[4]	[5]=[4]x420,7
Central FO	16751.9	2130.1	7864	1.12-1.21	471-509
North-West FO	10266.7	3056.5	3359	1.06-1.33	446-559
South FO	3912.0	843.8	4636	1.23-1.46	517-614
North-Caucasian FO	1213.5	182.6	6646	1.23-1.46	517-614
Privolzhskiy FO	19031.2	3509.7	5422	1.14-1.21	479-509
Ural FO	18093.7	6832.8	2648	1.07-1.18	450-496
Siberian FO	13872.9	7889.8	1758	1.02-1.13	429-475
Far East FO	5929.8	1098.4	5399	1.00-1.20	421-505
Russia	89071.7	25543.7	-		-

Column 2 in Table 4 shows the projected total volumes of regional emissions of nitrogen oxide in 2014-2020 (for whole Russia it is 13.66% out of 186.997 mln t of emissions of air pollutants, that is, 25.544 mln t). The pollution taxes which are estimated based on predictive calculations (column 3 in Table 4) and obtained by dividing the data from column 1 by the data in column 2, we compare with real payment rates at 2011 prices given in column 5. According to Government Decree of the Russian Federation № 344 of June 12, 2003, the average standard payment for emitting nitrogen oxide is 218 rubles. We used the inflation index of ecological payment (1.93 in 2011 to the level of 2003) and obtained the average standard payment for emitting nitrogen oxide at 2011 prices – 420.74 rubles. Given the lower and upper boundaries of the regional coefficients of the environmental situation and environmental significance (column 4 in Table 4), this base rate of payments was differentiated by the federal district (see column 5 = column 4 x 420.74 rubles). It is obvious from Table 4 that in all federal districts, even the upper limits of the existing rates do not coincide with those in the forecast of the required size of payments for air pollution with nitrogen oxides. In addition, forecasts of payments are more differentiated depending on the environmental situation in each district compared to the actual standards.

4. Conclusion

Thus, the results of the calculations make it possible to assess the extent of the increase in payments for environmental pollution in Russia, which correspond to the world practice. Although most Russian economists and ecologists recognize the need to increase the pollution taxes, many opposed this measure, citing the inability of enterprises to pay higher fees for pollution. Of course, the improvement of the environmental legislation should occur in a complex interactive way with the improvement of the entire tax system. In particular, it is proposed to aim fiscal policy at solving environmental problems with a general decline in direct taxes. In addition, in order to reduce tax burden, the practice of granting tax reliefs and other financial incentives should be more widely used (offsets of environmental payments in the amount of the environmental costs incurred, provision of favorable loans, state guarantees for environmental loans, schemes of accelerated depreciation of environmental capital stock) to stimulate the implementation of advanced technologies, unconventional energy types, the use of recycled resources and waste management, the implementation of other effective measures to protect the environment. All these measures are obviously an effective means of economic and environmental mechanism.

Bibliography

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