

The Improvement of Russian Environmental Protection Methods Using a Dynamic Input-Output Model

Topic: Industry Structure in Time

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The environmental issues are very important for Russia as it is one of the most polluting countries in the world. Russia accounts for 13% of total world emissions of major hazardous substances (solid substances, sulphurous oxide, nitrous oxide and carbonic gas). Maximum concentration level of harmful substances is higher than permitted level in the atmosphere of 210 Russian cities. Nonetheless, the Russian economy spends intolerably little on environmental protection goals. The proportion of environmental protection investments in total national investments is about 1.2% to 2.6 % per year, in comparison with developed countries where this figure ranges from 6% to 25%. The growth rate of Russian environmental protection investment in 2013 constituted 76.2% of the 1995 level. The growth rate of the current environmental costs in 2013 constituted only 38.5% of the 1995 level.

The fundamental question is where we should find additional financial sources to improve the environmental situation in the country. First, 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 find it more profitable to emit harmful substances rather than invest in pollution abatements. According to the opinions of the leading economists and ecologists, ecologization of the tax system is necessary. The current level of pollution taxes does not provide for the necessary amount of investment or cover current expenditures for the purpose of pollution abatement. To make it worse, pollution taxes are declining quickly in real terms because of inflation. In developed countries there is currently an increase in the rates of environmental taxes with the collected amount being about 1% of GDP (in Russia it is 0.03% to 0.04 % of GDP), despite the fact that the standards of pollution charges are 10 to 100 times higher for various ingredients.

The current system of pollution taxes needs to be refined and improved to develop standards for environmental charges. One of the approaches to solve this problem is based on assessment of necessary expenditures for environmental protection goals. This approach currently has no obvious practical application because of the difficulties in the assessment of such expenditures. The method considered in this paper makes it possible to avoid the main difficulties in the implementation of this approach. 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 Industrial Engineering of the Siberian Branch of the Russian Academy of Sciences (IEIE SB RAS).

In addition to n elements which denote the traditional sectors of the economy, m elements which represent natural resources are allocated here. A 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 environmental activity, reproduction processes of the main environmental funds and the formation of environmental costs are modeled into the DIOM. The EP block describes the tangible indicators of ecological processes. The pollutants generated during the production process is determined by the amount of manufactured goods in the traditional sectors of economy. 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. Estimates of expenditures for reducing air pollution help determine volumes of pollution trapping or pollution liquidation. The difference between formation and pollution trapping gives us the amount of emissions. The model's main equations, hypothesis of ecological and economic development of the Russian Federation and results of forecast calculations for 2015–2020 will be represented in the paper. The results of forecast calculations allows us to estimate the future pollution and protection costs corresponding to some goals of improving environmental situation in Russia, and this way allows us to estimate the average regional rate of pollution tax. We shall proceed from the principle of environmental protection cost recovery due to pollution taxes collected. In addition, some other instruments of the economic mechanism of environmental management will be discussed.