

ENVIRONMENTAL POLICY OF THE CORPORATION: EFFICIENCY OF THE SYSTEMIC APPROACH

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ABSTRACT: Ensuring environmental safety is a serious problem that can be solved through environmental policy. The article considers the ecological efficiency of the systemic approach to the implementation of environmental policy in the context of the Rosatom State Atomic Energy Corporation. It is shown that the main feature of the Corporation's environmental policy is a systematic approach, which consists in the implementation of the following principles: planning, implementation, reporting, control, and continuous improvement of environmental performance based on these principles. A decrease in the collective dose of personnel radiation exposure from 206.2 to 113.7 mSv during 15 years and a reduction of all types of harmful impact on the environment is shown based on experimental data. Implementation of the Federal Target Program for 2008-2015 allowed increasing the area of the rehabilitated territories almost twice, disposal of the spent fuel assemblies – by 1.2 times, number of the liquidated dangerous objects – by 1.3 times. The ecological efficiency of the implementation of the systemic approach in the environmental policy of the Corporation is shown based on specific factors indicating reduction of hazardous substances' emissions, discharges into water bodies, and waste generation, as well as factors indicating the efficiency of liquidation of the nuclear industry hazardous facilities and rehabilitation of radiation-contaminated areas. The systemic approach and high environmental efficiency performance allow recommending the Rosatom's best practices for the environmental policy implementation in other energy and industrial sectors.

Keywords: Ecological efficiency, Environmental policy, Systemic approach, Ecological indicators

1. INTRODUCTION

Ensuring comprehensive security is the basis for the sustainable existence of any state. At that, environmental safety occupies a very important place. A dam break or accident at a chemical plant can change the lives of people inhabiting the area.

Environmental policy receives considerable attention in the European Union [1], Japan, South Korea, China [2], and the United States [3]–[5]. This is associated with the sustainable development [6]–[8] and global challenges of our time, such as climate change [9]. Above stated applies also to countries with economies in transition [10] and Russia [11]–[14].

The legislations of the USA, EU, and Russia establish a close relationship between industrial and environmental safety, as well as environmental protection and labor protection.

The main number of accidents at enterprises have an adverse impact not only on the production process and profits of enterprises but also on the environment and public health.

Interrelation of different types of safety is confirmed in case of environmental safety violation that has a negative impact on the possibility of ensuring industrial safety. In particular, pollution of environmental components in the area of industrial facilities creates a threat of non-compliance with

technological processes and even violation of the industrial facilities integrity. So, pollution of drinking and technical water supply sources demands to carry out additional works on water purification to a standard level of purity. Pollution of soils and atmospheric air can make products of plant growing and animal husbandry unsuitable for use in technological processes.

The environmental policy provides for the obligation to ensure environmental safety and environmental protection, while industrial policy provides for the obligation to ensure industrial safety and labor protection. They complement each other and serve one purpose, which consists in ensuring the safety of activities for human life and health, as well as the preservation of the environment (both natural and man-made).

2. METHODS

A comparative analysis of the environmental policies development and implementation was the main method used in this work. Besides, we applied systemic analysis to show in environmental protection specific indicators how this affected the results.

Statistical reporting in the field of environmental protection and natural resource

management served as the main source of relevant and accurate information.

In 2016, the implementation of the Federal Target Program (FTP) “Nuclear and Radiation Safety in 2016-2020 and until 2030” was launched. The program became a continuation of the successfully completed FTP for 2008-2015, during which legacy facilities were brought into a stable controlled condition, and a legislative framework for the management of spent nuclear fuel, radioactive waste, and nuclear facilities decommissioning was formed. The effectiveness of the legislative program was evaluated in the present work by a comparative analysis of the indicators of contaminated areas rehabilitation, indicators of spent fuel disposal, and the elimination of hazardous facilities for the period from 2008 to 2015.

3. RESULTS AND DISCUSSION

The main feature of Rosatom's Environmental Policy is a systematic approach to its planning and implementation. The current system of annual careful planning of Environmental Policy and reporting on the implementation of planned measures within a certain period and in compliance with the requirements, monitoring over the availability and validity of environmental permits in Rosatom's organizations, as well as strengthening the control over compliance with environmental legislation allowed creating a real working system for its implementation since the approval of the Environmental Policy of the Rosatom State Atomic Energy Corporation in 2008.

Applied systemic approach to ensuring environmental safety and environmental protection, as well as effective implementation of Environmental Policy indeed help achieve high results and improve environmental performance.

The results of 2015 in the field of nuclear and radiation safety are the following: the sustainable and safe functioning of nuclear industry enterprises was ensured, no incidents with radiological consequences were noted, the personal exposure doses were not exceeded. Over the past 15 years, the

collective dose of personnel exposure had decreased almost twofold (Fig. 1).

The results of 2015 in the field of radioactive waste and spent fuel management, as well as nuclear facilities decommissioning, are the following. The Federal Target Program on nuclear and radiation safety in 2008-2015 was fulfilled successfully. The effectiveness of the FTP is proved by the following facts: the rehabilitation of radiation-contaminated territories exceeded the target by 1.8 times; the removal of spent fuel assemblies exceeded the target by 1.2 times; the liquidation of hazardous facilities exceeded the target by 1.3 times (Fig. 2). The radioactive effluents storage facility at Karachay Lake in the Chelyabinsk Region was decommissioned. Its area amounted approximately to 36 hectares, while the total activity of accumulated radioactive wastes had exceeded 120 million curies. The problem of Techensky cascade of reservoirs was solved.

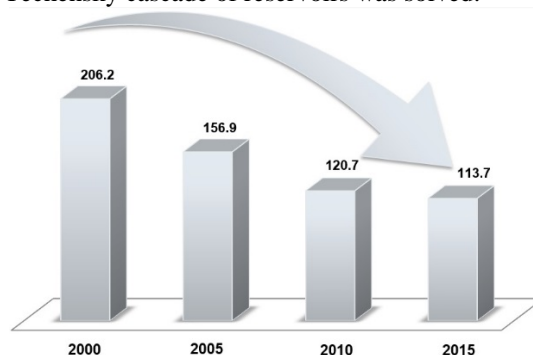


Fig. 1 Collective dose of personnel exposure, mSv (dynamics pattern over 15 years) [15]

Ensuring environmental safety and environmental protection are characterized by the following factors. Emissions and discharges of radioactive substances are well below the established standards. The actual emissions of radioactive substances account for 27% of the allowable emission limits (Fig. 3a) while actual discharge of radioactive substances amounts for 13.6% of the allowable discharge limits (Fig. 3b).

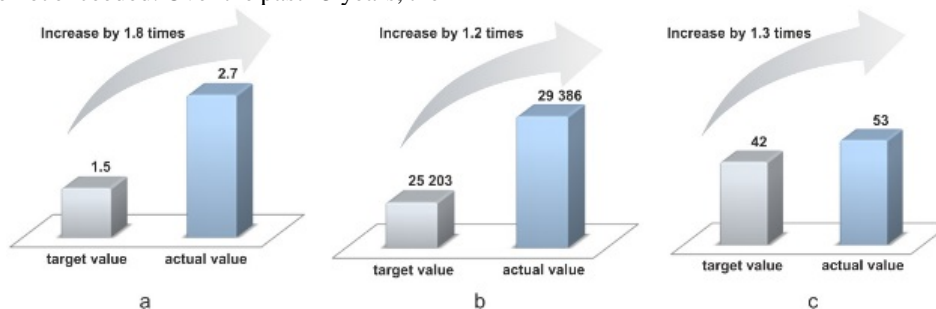


Fig. 2 Results of the Federal Target Program for 2008-2015 implementation (left to right): a) rehabilitation of radiation-contaminated territories, mln m³; b) disposal of spent fuel assemblies, pcs; c) liquidation of hazardous facilities, pcs [15]

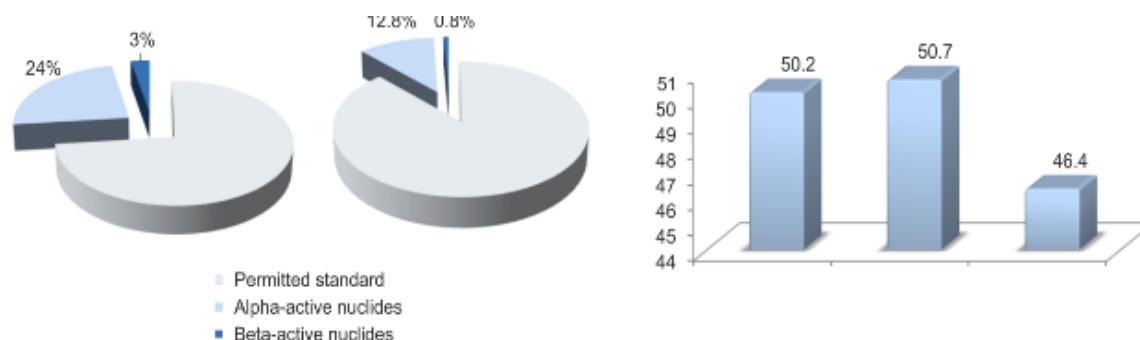


Fig. 3 Environmental safety indicators (left to right): a) actual and allowable emission limits of radioactive substances; b) actual and allowable discharge limits of radioactive substances; c) gross emission of pollutants by the Corporation (kt) in 2013-2015 [15]

Emissions of harmful substances have been reduced by 8.5% per year (Fig. 3c). Waste generation of the 1st and 2nd hazard classes has been reduced by 1.4 times per year. Energy consumption has been reduced by 29% (comparing to the base year of 2009). No fines have been imposed for violating environmental legislation with regard to all ten operating nuclear power plants. The proportion of air polluting emissions of the Corporation in the total emissions in Russia accounts for 0.15%. The proportion of discharge of polluted waters of the Corporation in the total discharge in Russia accounts for 0.8%. The proportion of waste generation of the Corporation in the total volume of wastes in Russia accounts for 0.5%. The proportion of costs and investments in environmental protection in the total amount of costs in Russia accounts for 6%.

The aggregate cost spent on environmental protection amounts to 31.4 bln rubles. The proportion of environmental protection costs is significantly higher than that of costs caused by harmful effects.

Summing up the implementation of environmental policy, we should note the following:

- The environmental, nuclear, radiation and industrial safety of nuclear power plants and other nuclear facilities has been ensured in accordance with international and Russian requirements.
- No events of the 2nd or higher level in accordance with the international INES scale were recorded.
- No incidents involving radiation effects were recorded.
- No events classified as "accident at a hazardous production facility" were recorded.

An important component when implementing the Environmental Policy is the implementation of the environmental management system (EMS) and integrated management systems (IMS) at enterprises. The implementation of the EMS/IMS

leads to direct economic effects and reduces environmental impact. IMS is implemented at 8 enterprises, EMS – at 14 enterprises out of the 48 environmentally significant organizations. Currently, 27 enterprises are preparing for the implementation of such systems.

A systemic approach (Fig. 4) allowed achieving the above positive results.

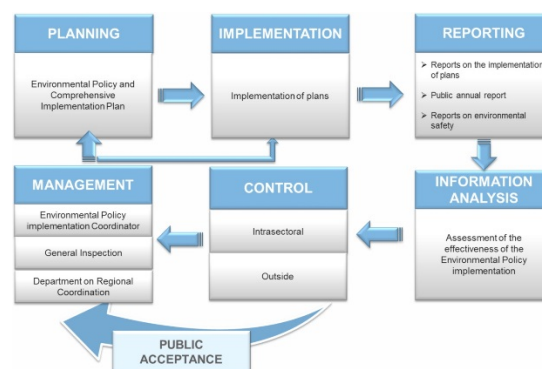


Fig. 4 Systemic approach to the environmental policy implementation [15]

Planning, implementation, reporting, and control are the four key principles of the systemic approach (Figs. 5 and 6).

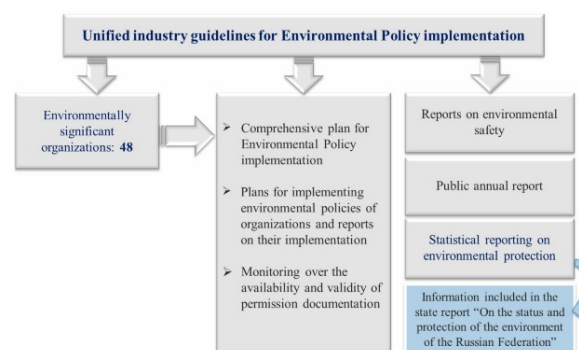


Fig. 5 Key principles of the systemic approach [15]

INTERNAL CONTROL (what is controlled)	EXTERNAL CONTRTOL (controller and processes)
➤ Implementation of plans with regard to environmental policy	➤ Public Council of Rosatom State Atomic Energy Corporation
➤ Compliance with the established environmental impact standards	➤ Environmental non-governmental organizations
➤ Availability and validity of the permission documentation	➤ Public Environmental Expert Review
➤ Analysis of statistical information	➤ Participation of stakeholders in the preparation and certification of the public annual report
➤ Examination of environmental reports	➤ Examination of environmental reports
➤ Analysis of the documentation submitted for public debates and to the State Environmental Review	➤ Public debates on the objects of the State Environmental Review

Fig. 6 Control system [15]

4. CONCLUSION

The implementation of four key principles of the systemic approach (planning, implementation, reporting, and control) allowed improving consistently environmental safety indicators from year to year.

Planning is carried out both at the state level (FTP), and in all organizations of the Rosatom State Atomic Energy Corporation, i.e. in 48 environmentally significant organizations and all divisions.

As a result, by 2016, fines for violation of environmental legislation at all 10 nuclear power plants were equal to zero.

The proportion of pollutant emissions accounted for by the Rosatom State Atomic Energy Corporation was 0.15% of the total emissions in Russia, discharges accounted for 0.8%, waste generation – 0.5%, while the proportion of environmental costs was 6%.

Together with the continuous improvement of all indicators of environmental, nuclear and radiation safety, this is the main result of the strategy based on a systemic approach to the implementation of environmental policy.

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