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IMPLEMENTATION OF BEST AVAILABLE TECHNIQUES IN RUSSIA: PERFORMANCE ASSESSMENT PRINCIPLES

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ABSTRACT

Best Available Techniques (BAT) have been used as the instrument of the industrial emissions minimisation and environmental modernisation of industry since the 90s. Researchers and practitioners believe that the most advanced methods of the BAT assessment have been developed and implemented under the European Integrated Pollution Prevention and Control (IPPC) and Industrial Emissions Directives.

BATs in the European Union are defined and revised through an official framework: the Sevilla Process. It sets a step-by-step procedure of information exchange among stakeholders supported by data analysis and expert judgements. In the Russian Federation, BATs are established through a similar process involving experts, regulators, industry as well as non-governmental organisations, universities and research centres.

When BATs and BAT-associated emission (BAT-AEL) and performance levels (BAT-EPL) are defined and systematised in the Reference Documents on Best Available Techniques (BREF), regulatees need to assess their performance and to make sure that the installations are compliant with the officially established BATs.

Therefore, two groups of BAT assessment methods are distinguished. They differ in scope (industrial sector or installation level), area of application (national, sectoral or installation) and objectives. Regulators and practitioners look for methods that are applicable at industrial sector level with a qualitative or quantitative approach, or at installation level in order to assess and compare performances or to find the most appropriate technique in a given situation.

In Russia, BAT assessment objectives at the industrial sector level include: (1) analysis of sector-related performance and emission levels; (2) comparison of candidate BATs and BAT-AELs; (3) determination of sectoral BATs and BAT-AELs and establishing legally bind requirements. All application areas include adaptation of the internationally approved methodologies and development of the national approaches (including those specific for the new IPPC areas not covered by the European BREFs).

At the installation level, BAT assessment objectives comprise (1) performance comparison between the installation and BATs; (2) applicable technique(s) selection; and (3) performance evaluation according to local conditions. At both levels, multi-criteria decision-making process has to be applied.

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At the installation level, performance comparison with BATs is required to determine whether significant improvements are necessary or can wait. In order to quantify the performances of BAT, energy, material flows and environmental aspects have to be analysed. The success of the selection of techniques through multi-criteria decision-making depends on the choice of criteria and their weighting made by a group of BAT experts. Consideration of local conditions for application at installation level is important in selecting ways to apply or discard BATs determined at national scale.

Keywords: Environmental Industrial Policy (EIP), Best Available Techniques (BAT), resource efficiency, BAT assessment principles, BAT expert society

INTRODUCTION

The manufacturing industry is one key element in a world economy that has been characterised as mostly linear: extract (primary resources), manufacture (products) and dispose (waste). The interrelated challenges of avoiding pollution; improving resource efficiency; and altering industrial structures in order to mitigate negative impacts on the environment, need to be addressed by the manufacturing industry [1]. This can be done by means of developing and implementing the environmental ('greener' but not quite 'green' industrial policy [2, 3]. The Environmental Industrial Policy (EIP) is an industrial policy that is meant to trigger and facilitate structural changes as required both to respond to environmental conditions and to develop an economy being more circular than linear.

In accordance with the federal project 'The BAT Implementation' plan, the basic EIP principles should be developed by the end of 2022 along with the establishment of the BAT assessment system and BAT expert community [4]. The results of environmental and technological modernisation of Russian industry and the BAT transition itself heavily depend on the credibility of BAT assessment criteria, the transparency of the whole process of establishing binding requirements for compliance with BAT and the degree of their implementation by the enterprises subject to new BAT-related regulation. The purpose of the study is to develop a scientific basis for the use of BAT assessment system as a tool for EIP implementation.

INTERRELATEDNESS OF THE NVIRONMENTAL INDUSTRIAL POLICY AND BEST AVAILABLE TECHNIQUES

The appearance of EIP concept in the national scientific literature has happened quite recently: the first publications on the harmonisation of state environmental and industrial policies were published in 2018 [2, 5]. Dmitry Manturov, the Minister for Industry and Trade of the Russian Federation, defined EIP as a holistic system of principles and rules for regulating industrial and environmental legal relations in order to achieve a balance of economic, environmental and social interests of the society [2].

Back in 2014-2017, a heated dispute revolved around the harmonisation of priorities, the interdepartmental co-operation and the development of economic tools for the industry 'greening'. However, the difference in the nature and directions of industrial policy (which, in its essence, were stimulating the re-industrialisation of the Russian economy) and environmental policy (protective by its nature and considering production as a source of pollution) prevents the main stakeholders form co-ordinating their positions [6]. The evidence to this statement is brought by the discussions on BAT

transition stages determined by the Federal Law 'On Amending Federal Law on 'Environmental Protection' and other legislative acts of the Russian Federation' [7] and 'On Industrial Policy of the Russian Federation' [3]. The BAT is a combination of economically viable and technically feasible technological, technical and managerial decisions allowing to achieve high environmental performance and production efficiency and simultaneously ensure a reliable level of environmental protection. This concept has become widespread in many countries of the world [8, 9]: 'best' reflects the high environmental performance and resource efficiency; 'available' means economic viability and technical feasibility; 'techniques' includes methods and techniques in general (process lines, technical solutions, management systems). Best Available Techniques are often considered to be the environmental modernisation mechanism [10].

The BAT transition implies the development of technological regulation in the field of environmental protection; this regulation should be based on continuously improving (and getting more stringent) but feasible norms and parameters serving as a driving force for the production modernisation and innovation. The EIP serve as a framework for developing support tools for national companies (and in particular – industrial installations) subject to compliance with BAT requirements and implementation of environmental performance enhancement programmes (EPEPs) [3]; the BAT is considered to be the one of the key EIP mechanisms to begin working in Russian in the nearest future [2, 5, 6].

DETERMINING THE BEST AVAILABLE TECHNIQUES: INTERNATIONAL EXPERIENCE AND RUSSIAN APPROACHES

The BAT determination under the new regulatory system means defining the conditions for enterprises of a particular industrial sector to meet in order to obtain integrated environmental permits (IERs), as well as the methods for achieving these conditions.

In accordance with the European Industrial Emissions Directive (IED) [11], the BAT determination is a result information exchange between Member States, industrial associations, environmental non-governmental organisations and the European Commission. During the information exchange the participants are collecting all relevant data on technologies, management systems, emission and resource consumption levels, economic feasibility and technical applicability of various methods for certain industrial sector and, as a result, certain BAT solutions are identified. In fact, the information exchange process is accompanied by benchmarking – a comparative analysis of the practical solutions employed by the sectoral enterprises against several key criteria [11, 12, 13]:

- the use of low-waste technological processes, methods of recycling and recovery and the refuse to use substances that are particularly hazardous to humans and the environment;
- the prevention or reduction of hazardous emissions;
- high resource and energy efficiency;
- experience in practical application of comparable solutions by industrial enterprises;

– the layout of certain industrial sector, commissioning time for the existing installations, modernisation programmes, etc.

A technology or technical solution is considered economically acceptable when there is definite evidence for its industrial operation; this fact opens up opportunities for widespread adoption of such technology/technical solution in the relevant sector after taking into account financial costs and advantages of negative environmental impact reduction. The technology is considered available if it is already practically used by enterprises. However, if the practical implementation was subsidised by the state, it's premature to talk about the availability of technology for the industry as a whole.

Willingness of the industry to bear additional expenses due to the tightening of the BAT requirements can be regarded as elasticity – the reaction of one variable to the change of another. The industry costs to comply with the legislative requirements should be considered as a response function, and the legally binding variable – is the degree of regulatory impact, the strictness of the requirements. Let us consider the case of the EU chemical industry elasticity. Fig. 1 is based on the data of the European Chemical Industry Council published in 2018 [14]. The expenses of chemical enterprises on the compliance with legal requirements (including IED) are almost doubled during the period from 2004 to 2014, but the production continued to grow with simultaneous decline in energy intensity and hazardous emissions [9].

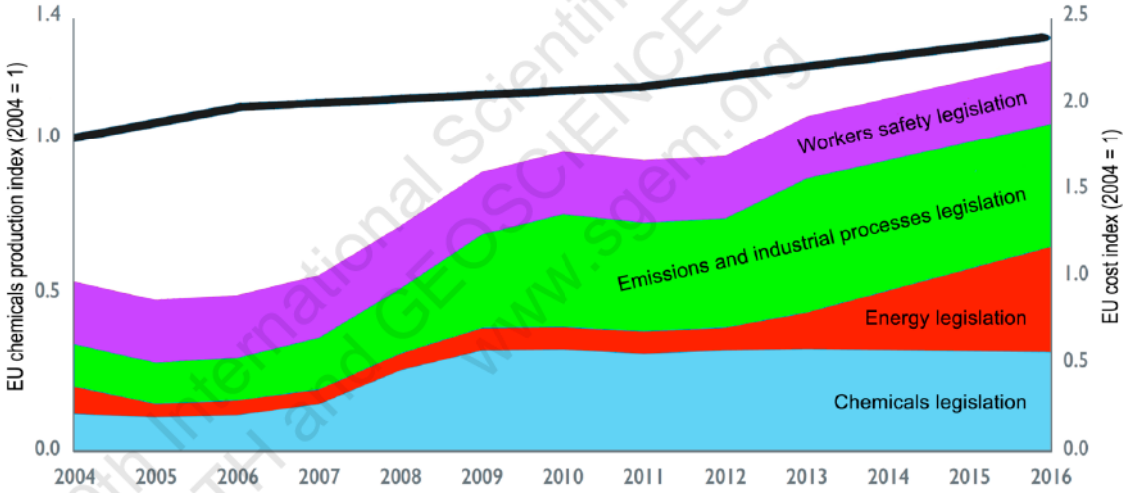

Figure 1. The EU chemical industry elasticity as an increase in the expenses on the compliance with legal requirements in response to tightening requirements

Russian criteria for comparative analysis of solutions that can be defined as BAT are close to the international criteria; however, they are set in accordance with the peculiarities of national legal language [3, 7]. The benchmarking procedures were organised back in 2015-2017 in order to determine BAT and prepare national BAT Reference Books among industry associations and enterprises. The approximate algorithm for the BAT determination is shown in Fig. 2. The data on resource consumption levels and environmental factors (essential for analysis and BAT determination) were often submitted to BAT Bureau by company management under the non-disclosure conditions. The economic information was limited to the discussion of payments for negative impacts and expenditures on environmental protection measures. The information on the investments required for the implementation of the technological process or environmental protection equipment was not reported by the

participants. Thus, during the BAT determination process in Russia, the economic feasibility of applying certain solutions was determined on a qualitative level just as it was done in the EU.

In Russia, the 'Encyclopaedia of Technologies' project is being implemented currently. It aims to form unified approaches to the selection of indicators and procedures for assessing resource efficiency by using analysis of technological life cycles: the processes of emergence and transformation of production technologies around the world through several socio-historical stages [6].

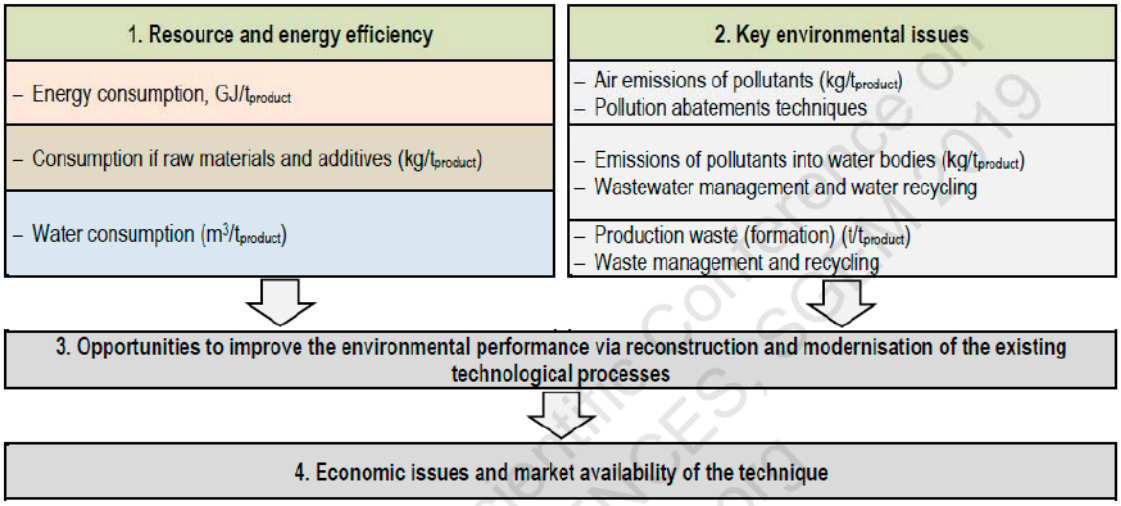

Figure 2. The comparative analysis of techniques during BAT determination process: main steps

The project results will be presented in a form of a collective monograph that will serve as a rationale for determination of the next 'generation' of Best Available Techniques.

ASSESSMENF OF TECHNOLOGY, TECHNICAL SOLUTIONS AND MANAGEMENT SYSTEMS AT THE ENTERPRISE LEVEL

The BAT for specific areas of applications (industrial sectors) are defined both in EU and Russian Reference Documents (in the EU and Russia), and by legally binding documents: EU BAT Conclusions [11] and the Decrees of the Russian Ministry for Natural Resources and Environment (MNRE) [7]. During 2019-2024 Category I installations (large enterprises of key industrial sectors with substantial environmental impact) are required to receive integrated environmental permit (IEP), thus demonstrating compliance with the requirements established for the industry.

The main task to be solved for each of 7,000 Category I installations is to evaluate technological solutions already present at production site and determine the BAT compliance. In each case, it is necessary to make an inventory of the processes, material and energy flows; a characterisation of the related environmental impacts and a review of a list of applicable BATs to identify the BATs already in place. The last part of the procedure is a review of the techniques which could be added or cannot be applied to the installation studied. When an installation does not reach the performance of the BATs (BAT-AELs), its operator must find techniques which would help to improve its environmental performance at an acceptable cost. In Russia, operators are obliged to

develop Environmental Performance Enhancement Programmes (EPEPs) and submit them to the Inter-Departmental Commission of the Ministry for Industry and Trade for the expert assessment and formal approval.

At the installation level, the BAT assessment task can be solved either by managers and employees themselves (chief technologist, chief power engineer and chief environmental manager are competent and work in close co-operation), or by external consultants (this solution is becoming more widespread for the companies that tend to use out-sourcing). In any case, the methods for solving the task lie in the methods of internal audit and criteria established by BAT Reference Documents and MNRE Decrees.

There is another, 'mirror' task, too. BAT experts (members of the BAT Expert Society) have to assess the documents that substantiate compliance with the BAT requirements or describe EPEPs (environmental management programmes which targets are defined by the BAT requirements). The qualified assessment of these documents and sector-specific technological processes have to be performed by sector experts. For example, the EU member states often offer such experts permanent jobs at the agencies responsible for issuing and reviewing Integrated Environmental Permits [8].

All these tasks for BAT determination and assessment will require the use of multi-criteria approaches and investigation of technological, technical, environmental features of enterprises and industrial sectors [15]. The table 1 shows the main procedures for the BAT determination at the sector level and technology assessment at the enterprise level.

Table 1. Definition of BAT at the sectoral level and assessment of technologies and environmental performance at the enterprise level

Level	Tasks	Work performers	Users
Industrial sector	Benchmarking and the BAT determination, quantitative characteristics of environmental performance and resource efficiency for BAT compliance	BAT experts	Regulators Regulated community Supervisory authorities
IPPC installation (in Russia – Category I installation)	Assessment of technological processes, techniques and management systems and preparation of justifications for IEP applications and draft EPEP	Employees of the company (with the support of consultants)	Operators
IPPC installation (in Russia – Category I installation)	Documentary assessment of the justifications for IEP applications and draft EPEP	BAT experts	Regulators Supervisory authorities Operators

The Russian Federal Supervisory Natural Resources Management Service, a governmental body responsible for granting IEPs, currently does not have enough technology specialists as staff members while the most Russian regions have dozens of

Category I installations from diverse sectors of the economy. Therefore, in order to assess the justifications for IEP applications and EPEP projects, it seems logical to have the BAT experts to be involved in the process of solving the first and (or) second tasks; these people are participated in BAT determination while preparing BAT Reference Documents, have experience of interacting with industry, developing new production process and environmental protection equipment, implementation of industry modernisation projects, etc. so they are capable enough to take this supporting role.

Currently, Russia is developing not only a system for BAT assessment but also pays attention to the expert community [4] – an association of specialists with scientific and practical knowledge, qualifications and business reputation in the field of BAT nominated by industrial and professional associations. The members of the expert community will continue to work in research and educational institutions and will be involved in the assessment of specific documents related to BAT implementation in accordance with their knowledge and experience. Decisions on the EPEP approval will be adopted jointly and later approved by the Interdepartmental Commission on the consideration of EPEPs. The co-ordination the expert community will be carried out by the Russian BAT Bureau.

CONCLUSION

Environmental modernisation theory has been offered as a possible solution to the environmental challenges being faced advanced industrial countries. It suggests that regulation can help solving environmental problems whilst at the same time making industry more competitive. In theory this can be achieved if regulation encourages the development and application of innovative technologies and production techniques. Environmental Industrial Policy and regulation in the field of Best Available Techniques helps companies to overcome the considerable barriers to innovation which prevent them from moving beyond control ('end-of-pile') approaches to consider cleaner technologies, from complementing technological change with organisational change and from exploring the strategic as well as the operational opportunities for improvement.

In the Russian Federation, Best Available Techniques form one of the main mechanisms for the Environmental Industrial Policy implementation. In order to accomplish the national priority tasks, it is necessary to ensure the transition of more than 7,000 Category I installations towards BAT-based regulatory system. The BAT requirements (based on benchmarking results and internationally accepted criteria) have been determined are defined for all key Russian industries. The principles for BAT identification (including economic efficiency and availability of technology) are consistently improved by the leading Russian BAT experts.

At the installation level, there is a need to evaluate environmental performance levels, to review techniques in place and to assess the overall compliance with BAT requirements. The international experience suggests that such assessment can be done either by operators themselves or by environmental consultants. In Russia, performance assessment procedures have been initiated by several leading companies planning to obtain Integrated Environmental Permits in 2019-2020.

The main task of the national BAT assessment system in the nearest future will be the analysis of draft Environmental Performance Enhancement Programmes and, hopefully,

the justification of Integrated Environmental Permit applications of Category I installations. Members of the BAT Expert Society will be involved in this task. Such an approach will not only ensure objectivity and high quality of the assessment process and its results but also help to obtain the information necessary to clarify industry requirements and determine the next BAT 'generation' in the Russian Federation.

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