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ENVIRONMENTAL PERFORMANCE ENHANCEMENT PROGRAMMES AND MANAGEMENT SYSTEMS OF INDUSTRIAL ENTERPRISES

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ABSTRACT

In Russia, the national Integrated Pollution Prevention and Control (IPPC) Act introducing the concept of Best Available Techniques (BAT) was adopted in 2014. Since then, applying BATs and complying with BAT-associated Emission Levels (BAT-AELs) has become an issue of great importance for the industries concerned and has implied obligations at two levels. Firstly, the Ministry for Industry and Trade (MIT) and the Ministry for Natural Resources and Environment (MNRE) had to set out the appropriate process for drawing up and reviewing sector-specific and inter-sectoral Reference Documents on BAT (BREFs) and respective sector-related BAT-AELs. Secondly, regional environmental authorities (MNRE units) and operators have to compare performances of industrial installations with the information contained in BREFs and established in special MNRE orders approving sectoral BAT-AELs.

In total, there are over 7,000 IPPC installations in Russia (called Category I installations); 300 of them (largest polluters) have to demonstrate the compliance with the new IPPC/BAT legislation in 2019-2022. It is expected that at least 120-130 installations of 300 are not fully compliant with the new BAT-AEL requirements and will therefore be obliged to work out and implement Environmental Performance Enhancement Programmes (EPEPs). EPEPs contain sets of technological (primary), technical (end-of-pipe) and organisational solutions aimed at achieving applicable BAT-AEL requirements. According to the legislation, an EPEP has to be implemented in 7 years maximum; during this period the installation concerned can be operated under 'softened' requirements; after 7 years operators have to demonstrate that their emission limit values (ELVs) are compliant with sectoral BAT-AELs.

At the installation level, the decision on working out an EPEP is made as the result of the self-assessment (internal technological audit and Environmental Management System audit for which applicable BATs and BAT-AELs are used as the priority criteria). BAT expert support is needed at this stage since most operators are not yet experienced in BAT-related requirements. When a draft EPEP is formed, it has to be submitted to the Inter-Departmental Commission managed by MIT. This Commission (consisting of the representatives of interested authorities and supported by BAT

experts) makes decisions on the quality of EPEPs and thereby issues 'semi-permits' for not fully compliant installations. These documents should be included in the applications for integrated environmental permits (IEPs) and in order to prove that operators are prepared to implement EPEPs and achieve full compliance with BAT-related requirements in time.

Keywords: Best Available Techniques, Integrated Environmental Permits, Environmental Performance Enhancement Programmes, Inter-Departmental Commission, Environmental Management Systems.

INTRODUCTION

In 2019, according to the Federal Law No 219-FZ (Russian Integrated Pollution Prevention and Control Act or BAT Law) [1], first Russian installations will apply for the Integrated Environmental Permits (IEPs). Though most legislative acts have been developed and issued in 2014-2019, many uncertainties dealing with the procedures of granting IEPs and assessing EPEPs prevent industry managers from submitting their applications to the environmental authorities.

Regulators and regulatees continue discussing opportunities for the involvement of BAT experts both in the IEP granting procedure (managed by Rosprirodnadzor, the subordinate agency of MNRE) and in the assessment of draft EPEPs by the Inter-Departmental Commission managed by MIT. The reason for involving BAT experts is clear: new permitting system is based on the BAT concept, while Rosprirodnadzor officers being experienced in such issues as air and water conservation or waste management, do not have the technological background necessary to evaluate IEP applications and draft EPEPs. Moreover, in some of the Federation subjects (regions), there are hundreds of IPPC installations of various economic sectors, and it is not possible to imagine that Rosprirodnadzor officers are well trained in all these technological processes [2].

Nevertheless, the timing is tough, and according to the managers of larger companies, preparations are in progress. Installations included in the list of major polluters (300 of them) have 3.5 years to run all assessments, develop EPEPs (if necessary), work out self-monitoring programmes and submit applications to Rosprirodnadzor. We intend to analyse available information and describe approaches to the development and assessment of EPEPs either already followed by IPPC installations or suggested to be explored.

ENVIRONMENTAL PERFORMANCE ENHANCEMENT AS THE CORE ELEMENT OF THE BEST AVAILABLE TECHNIQUES CONCEPT

The concept of Best Available Techniques has been developed since 1960s; Sweden was one of the first countries where BATs became that basis for the environmental permitting. Nordic experts of the International Project "Preparing regional experts to apply the principles of BAT and the practical use of the Russian BREF documents for various branches" (implemented in the Barents region) often repeat that BATs continually develop, emerging techniques replace older BATs, key environmental issues of the past become less important, while new issues linked to the circular economy and green growth become recognised by the international community. BAT development is an ongoing process aimed at the enhancement of industrial environmental performance and resource efficiency and minimisation of environmental impacts.

Analysing the process of drawing up and reviewing Reference Documents on Best Available Techniques, one can see that BREFs of the new 'generation' contain clearer descriptions of technological processes and techniques and at the same time set requirements to BAT-AELs, mandatory sector-related emission levels associated with BATs [3]. This is why both in the European Union and Russia, BAT-related discussions often become heated disputes: regulators aim to make requirements more stringent arguing that the necessary techniques are both available at the market and economically feasible; regulatees try hard to keep BAT-AELs at the 'comfortable' (easily achievable) levels claiming that too strict requirements contradict economic growth objectives. Still, all stakeholders realise that BATs are one of the important driving forces of the technological development, and that newer processes need to be characterised not only by the improved quality of products and services, but also by better resource efficiency, reduced environmental impacts, the use of less harmful substances and renewable energy sources.

Both 'older' and 'newer' European BREFs consider Environmental Management Systems (EMS) as Best Available Techniques. The European Industrial Emissions Directive defines 'techniques' (under the definition of 'Best Available Techniques') as "both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned" [4]. In this respect, an EMS is a technique allowing operators of installations to address environmental issues in a systematic and demonstrable way. EMSs are most effective and efficient where they form an inherent part of the overall management and operation of an installation.

Ideally, an EMS should focus the attention of the operator on the environmental performance of the installation; in particular, through the application of clear operating procedures for both normal and other than normal operating conditions, and by setting out the associated lines of responsibility. All effective EMSs incorporate the concept of continual improvement (recurring activity to enhance environmental performance), meaning that environmental management is an ongoing process, not a project which eventually comes to an end. There are various process designs, but most EMSs are based on the Plan-Do-Check-Act cycle (which is widely used in other company management contexts). The cycle is an iterative dynamic model, where the completion of one cycle flows into the beginning of the next.

An EMS can take the form of a standardised or non-standardised ('customised') system. Implementation and adherence to an internationally accepted standardised system, such as ISO 14001:2015 [5], can give higher credibility to the EMS especially when subjected to a properly performed external verification. However, non-standardised systems can, in principle, be equally effective provided that they are properly designed and implemented. The previous ISO 14001:2004 standard had two specific features not existent in the newer version (ISO 14001:2015). Firstly, the standard established requirements both to objectives and targets; objectives were seen as longer-term generalised purposes, while targets were considered as measurable shorter-term tasks to be implemented by an organisation. Secondly, an Environmental Management Programme (EMP) was described in detail as the key mechanism for improving environmental performance. In this article we follow the EMS logic because it helps to understand the role of EPEPs both EMS and BAT/IEP wise (please see Fig. 1).

In general, ISO 14001:2015 assists an organisation to the intended outcomes of its environmental EMS, which provide value for the environment, the organisation itself and interested parties. Consistent with the organisation's environmental policy, the intended outcomes of an ESM include [5]:

- enhancement of environmental performance;
- fulfilment of compliance obligations;
- achievement of environmental objectives.

Numerous textbooks and articles discuss the driving forces and barriers for the implementation of an EMS (see for instance [6, 7]). We suggest that from the standpoint of IEPs and BAT, these driving forces first of all include:

- enhanced environmental performance;
- better controlled environmental impacts;
- improved insight into the environmental aspects of the company which can be used to fulfil the environmental requirements of regulatory authorities;
- improved basis for decision-making;
- reduced liability, non-compliance and insurance costs.

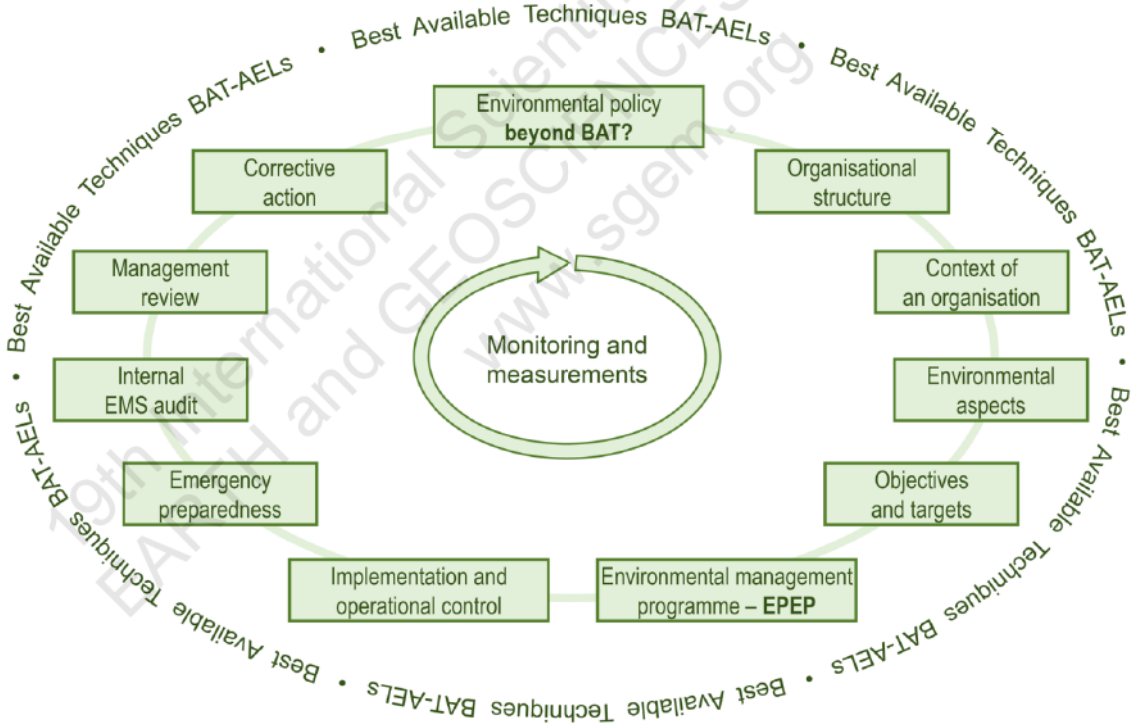

Fig. 1. Requirements of Best Available Techniques as the boundary conditions for the Environmental Management System development

The rate, extent and timescale of actions that support continual improvement are determined by the organisation. Environmental performance can be enhanced by applying the EMS as a whole or improving one or more of its elements. This means that objectives and targets are set in accordance with the priorities of the organisation

management. Quite often, companies are criticised by regulators and NGOs for setting ‘vague’ objectives, achieve certification and use the fact of ISO 14001:2015 registration for marketing purposes. We suggest that for IPPC installations, applicable BAT requirements and in particular BAT-AELs can form the boundary conditions for setting objectives and targets of EMSs and other (complimentary) systems – Energy Management Systems (EnMS) [8].

This position helps (1) to systematise the process of improving environmental performance and energy efficiency to achieve BAT requirements or even to step beyond BAT’ and (2) to strengthen EMSs and EnMSs and makes them recognised by various stakeholders [9].

PRACTICAL EXAMPLES OF ENVIRONMENTAL PERFORMANCE ENHANCEMENT PROGRAMMES IMPLEMENTED BY RUSSIAN INSTALLATIONS LOCATED IN THE BARENTS REGION

We have already mentioned the International Project “Preparing regional experts to apply the principles of BAT and the practical use of the Russian BREF documents for various branches” implemented in the Barents region. The Barents Environmental Hot Spot List formed in 2003 consisted of 42 major polluters and severely polluted sites that impose health and environmental hazards on their surrounding communities and nature. The Hot Spots are located in the Russian part of the Barents region; in Murmansk and Arkhangelsk Oblasts, Nenets Autonomous Okrug and the Republics of Karelia and Komi. Many of the Barents Hot Spots have achieved significant environmental improvements during the recent years, while others remain to be solved. So far nine Hot Spots were excluded from the Barents Hot Spot list. Among the remaining sites, there are IPPC installations that are obliged to obtain IEPs at the first instance – in 2019-2022.

In 2014-2015, Nordic experts suggested that Integrated Environmental Permits can become the key exclusion criteria, but as we mentioned, the IEP granting procedure is still uncertain, and operators do not rush to apply for IEPs. Participants of the international workshops held in the Barents region in 2018-2019 put forwards an idea of using EPEPs as the exclusion criteria. First of all, it is EPEP that drives the performance enhancement process. Second of all, EPEPs aim at the implementation of BATs and achievement of sector-related BAT-AELs. Finally, EPEPs have to be considered and approved by the MIT’s Inter-Departmental Commission [1, 10].

In the two priority sectors of the International Project, namely, in pulp and paper production and municipal wastewater treatment, there are leading installations aiming to be excluded from the Hot Spots List as soon as possible. Mondi Pulp & Paper Mill in Syktyvkar, being an IPPC installation and an environmental Hot Spot of the Barents region, has been fundamentally reconstructed in 2007-2018; its technological processes, environmental performance and energy efficiency fully comply with the BAT requirements established in Russia and the EU.

Over the last decade, Mondi Syktyvkar has increased energy self-sufficiency, reduced emissions of pollutants as well as carbon emissions, increased energy efficiency and reduced the overall environmental footprint of the mill through major investments. Investment at Syktyvkar by 2019 includes a new biofuel boiler and turbine, replacing the current three bark boilers and four turbines, increase in energy efficiency and reduction of carbon intensity of the mill and usage of the mill’s total bark and sewage

sludge for energy generation. The investment will also substitute 127 million m^3 of natural gas, resulting in a total capacity for green energy generation of 170 MW. In 2019-2010, it is planned to develop and implement an EnMS. By integrating energy management into business practice, Mondi Syktyvkar intends to establish a process for continual improvement of energy performance. By improving energy performance and associated energy costs, the mill can become more competitive. In addition, implementation can lead Mondi Syktyvkar to meet Mondi Group climate change mitigation goals by reducing their energy-related greenhouse gas emissions.

Unlike in most countries, Russian municipal wastewater treatment (MWWT) sector is now regulated by the BAT Law [1, 11]. In the Barents region, major MWWT plants are included both in the List of Environmental Hot Spots and in the List of IPPC installations.

By 2018, Petrozavodsk wastewater treatment facilities (the city of Petrozavodsk, Karelia Republic) had been reconstructed with the support of Nordic countries; concentrations of suspended solids, phosphorus and nitrogen compounds as we as chemical and biological oxygen meet requirements set by the Russian Reference Document on Best Available Techniques for Centralised Municipal Wastewater Treatment [12]. At the next step, it is planned to improve the system of treatment and disposal of sewage. Two basic objectives of treating sludge before final disposal are to reduce its volume and to stabilise the organic materials. Stabilised sludge does not have an offensive odour and can be handled without causing a nuisance or health hazard. At the same time, smaller sludge volume reduces the costs of pumping and storage.

Thus, there are two examples of multi-stage EPEPs aimed at the enhancement of environmental performance and resulting in the achievement of sector-related BAT-AELs established in the Russian Federation. Both operators plan to further improve performance of their installations in accordance with environmental and energy efficiency policies of their organisations. It is suggested using these EPEPs as evidences that (1) the environmental performance characteristics of the Hot Spots considered have been improved, and (2) the organisations comply with the requirements of the new Russian BAT legislation. These evidences have to be proved and lessons learnt by the Hot Spots demonstrated to the national and international stakeholders. This is why it is reasonable to test the process of the expert assessment of EPEPs within the procedure set by the Inter-Departmental Commission on the consideration of EPEPs. This Commission consisting of the representatives of interested authorities and supported by BAT experts makes decisions on the quality of EPEPs and thereby issues 'semi-permits' for not fully compliant installations. These documents to be included in the EIP applications and proving that operators are prepared to implement EPEPs and achieve full compliance with BAT-related requirements in time. In our case, two Hot Spot installations are already compliant with BAT requirements and are ready to prove it to BAT experts.

This approach is based on the opportunities formed by the new Russian legislation [2]; it is unlikely that such a step-by-step process is embedded in the legislation of other countries. Still, the expert assessment of both the environmental performance itself and projects aimed at its improvement is described in many research publications [13, 14, 15].

It is expected that Pulp & Paper and MWWT experts will consider EPEPs submitted by Mondi Syktyvkar and Petrozavodsk MWWT facility before the end of 2019. Sector experts who can be involved in the assessment of EPEPs, should have underpinning knowledge of Best Available Techniques in the abovementioned sectors and be

independent and unbiased. In Russia, there are experts who have been working in the field of BAT since the late 90s, initiating pilot projects, running sector environmental performance and resource efficiency benchmarking procedures and developing draft legislative acts [2]. Thus, high level of skill and experience, independence and discipline of BAT experts (including those specialised in the Pulp & Paper and MWWT sectors) have already been proven. The Inter-Departmental Commission and Russian BAT Bureau have solid reasons to invite these experts to assess draft EPEPs. Some of the experts are familiar with the Barents region industries and participated in site visits and training workshops conducted within the framework of the International Project "Preparing regional experts to apply the principles of BAT and the practical use of the Russian BREF documents for various branches", implemented in the Barents region.

CONCLUSION

Environmental Management Systems are often criticised for not guaranteeing that the continual improvement principle requires to achieve better results in the control of the priority environmental aspects of industrial enterprises. Each new version of ISO 14001 standard aims to make this principle stronger and better substantiated.

For IPPC installations, BAT requirements and especially quantitative conditions of BAT-AELs, can be used as the boundary conditions for setting environmental objectives and targets. This will allow applying well-established EMS instruments to ensure that the environmental performance is gradually improved. On the other hand, BAT-AELs will provide the necessary information both for internal and external stakeholders on the required environmental performance levels.

In Russia, EPEPs can be considered as special forms of Environmental Management Programmes, compulsory for IPPC installations not fully compliant with BAT requirements. It is expected that only in 2019-2022, 120-130 installations will be obliged to develop draft EPEPs and submit them to the MIT's Inter-Departmental Commission. The Commission is responsible for assessing draft EPEPs, approving (declining) them and issuing special documents – pre-requisites for obtaining IEPs.

Within the International Project "Preparing regional experts to apply the principles of BAT and the practical use of the Russian BREF documents for various branches", operators of two IPPC installations showing gradual environmental performance improvement are prepared to compile the necessary papers and to submit their EPEPs to the Inter-Departmental Commission. This will allow them to obtain official approval documents that could be used to initiate the exclusion procedure. Thereby installations listed as Environmental Hot Spots of the Barents region have good chances to become first Russian organisations (1) testing EPEP assessment and approval procedure and (2) being excluded from the Environmental Hot Spots List on the reason of implementing successful EPEPs.

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