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BEST AVAILABLE TECHNIQUES, ENERGY EFFICIENCY ENHANCEMENT AND CARBON EMISSIONS REDUCTION

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ABSTRACT

Two well-known regulatory constructions – technological regulation based on Best Available Techniques (BAT) and greenhouse gases (GHG) emissions regulation – aim at cleaning and greening industrial production. BAT-related legislation and practices have been applied in the UK and Sweden for over 30 years, while European Parliament passed the Integrated Pollution Prevention and Control (IPPC) Directive in 1996. In Russia, the ‘BAT Law’ was issued in 2014, and in 2019 first IPPC installations will receive Integrated Environmental Permits (IEPs). BAT-related regulatory constructions tackle ‘ordinary’ pollutants and first of all require that IPPC installations implement pollution prevention and (or) control techniques, achieve high resource and energy efficiency (EE), avoid (or minimise) the use of hazardous substances and consider recycling while operating production processes.

Different policies and regulatory constructions with their main purpose to slow the growth of GHG emissions have been in existence for 25 years. The focus of climate change policy expanded to include more sectors of the economy. In industry, there are two key areas of GHG emissions: firstly, emissions from energy use; and secondly, emissions from technological processes. Industrial ‘process emissions’ generally account for 3-8% of total GHG emissions although they can be very important in individual industry sectors, such as cement and aluminium production. Sector-related targets should be set considering opportunities to reduce both ‘energy’ and ‘process’ emissions.

The most rapid GHG emission reduction trends in industry over the 90s were due to technology development, e.g. the ability to cost-effectively reduce N₂O emissions from adipic acid production or to substitute HFCs by other refrigerants. International criteria for selecting BATs also open opportunities for high production EE and secondary use of materials, which in turn may lead to the reduction of GHG emissions. GHGs are discussed in the Reference Documents on Best Available Techniques (BREFs) though BAT-associated emission levels (BAT-AELs) are never set for them.

Many countries have initiated policies to limit or reduce GHG emissions from the industrial sector. For example, the UK and EU emission trading schemes (ETS) are operated by putting a limit on overall emissions from covered installations which is reduced each year. Within this limit, companies can buy and sell emission allowances as

needed. Similar approaches may be introduced in Russia in the near future. This ‘cap-and-trade’ approach gives companies the flexibility they need to cut their emissions in the most cost-effective way.

It is underlined that two permitting systems – the first, based on the IEPs and BATs, and the second, allowing emissions of GHGs should operate independently from each other. At the same time, instruments forming incentives for the implementation of BATs, EE enhancement and recycling of various materials may and ought to provide for reducing GHG emissions in industry.

Keywords: Best Available Techniques, technological regulation, energy efficiency enhancement, carbon emissions reduction, Integrated Environmental Permits.

INTRODUCTION

The transition to a low-carbon economy is one of the defining issues of the 21st century. Countries set road-maps for the transition to low-carbon, cleaner, greener and circular economy. In Russia, the national strategy for low-carbon development is being worked out; the Ministry for Economic Development (MED) co-ordinates the process, while the Ministry for Industry and Trade (MIT) contributes towards the preparation of the strategy setting achievable objectives for the industrial sectors.

At the same time, several national projects are being implemented in accordance with the Presidential Decree ‘On the National Goals and Strategic Objectives of the Development of the Russian Federation for the Period up to 2024’ [1]. The National project ‘Environment’ addresses such issues as the negative environmental impact minimisation and rational use of natural resources (resource efficiency); BAT-based regulatory system is considered as one the mechanisms to achieve objectives of this project. There is no special project in the field of the technological development but such National projects as ‘Science’, ‘Education’, ‘Digital economy’, etc. have to contribute towards the attainment of such national objectives as ‘Acceleration of the technological development’ and ‘Development of the high-productive export-oriented sub-sector in basic economic sectors, first of all, in manufacturing industry’.

To provide for the synergy between the technological development (supported via various mechanisms), environmental conservation, pollution prevention and resource efficiency (addressed by the legislative acts and regulations rooted in environmental and industrial policies) and low-carbon development (the strategy is being currently worked out in Russia), it is necessary to analyse the existing regulatory constructions, identify opportunities for their improvement and draw up the new regulations based on the international and national experience.

BAT-BASED REGULATION: INTERNATIONAL AND RUSSIAN EXPERIENCE

In 2019, the first wave of Russian Category I enterprises (large industrial installations with significant negative environmental impact) is going to apply for IEPs, special documents containing technological parameters (the Russian equivalent of European BAT-AELs) for specific industrial sectors. BAT transition is a significant step towards the implementation of the environmental industrial policy. Legislative and regulatory legal acts in this area are still being formed and refined. Most documents are developed on the initiative of the Ministry of Natural Resources and Environment of the Russian Federation (MNRE) [2] and MIT [3]. It is likely that the new Federal Law ‘On state

regulation of greenhouse gas emissions and amending certain legislative acts of the Russian Federation' will be adopted in 2019 too, since its draft has already been prepared by MED. It is worth mentioning though that the positions of all stakeholders concerning BAT concept and GHG emission regulation still require additional clarification and alignment.

First of all, the environmental regulation based on BAT parameters pays close attention to ensuring resource and energy efficiency but does not pursue the goal of regulating GHG emissions [1, 4] but it is possible not only to reduce the negative impact of conventional, traditional pollutants on the environments by applying BAT solutions at industrial installations, but also to significantly increase the production resource efficiency and significantly decrease GHG emissions.

In order to understand the reasons behind GHG exclusion from the BAT-based regulation and the peculiarities of their interrelation let us take a closer look at these regulatory systems.

BAT-based (technological) regulation is continuously improving both in Russia and abroad for many years: starting from 1996 when the principle of integrated environmental protection (currently contained within the EU Industrial Emissions Directive (IED) [4]) and the requirement for the industries to operate within BAT-based technological parameters is being successfully applied in the European Union Member States and other countries [5]. This principle is implemented primarily through the issuing of IEPs to the largest enterprises in key industries that consume a significant amount of resources (including energy and water) and have a substantial negative environmental impact. The European Bureau for Integrated Pollution Prevention and Control (IPPC Bureau) is developing BAT Reference Documents (BREF) for all industries mentioned in IED. To date, more than EU 52,000 installations are subject to BAT requirements: they have received (and updated, if necessary) IEPs, prepared emission reports (on air emissions, waste water discharge, waste management as well as physical factors).

Russian BAT regulation will cover nearly 7,000 Category I enterprises; the first IEPs will be issued in 2019-2022 to pilot fuel and energy facilities, metallurgical and chemical plants, municipal waste water treatment enterprises [6]. The requirements for these installations are systematised in the Russian BREFs. Although the Russian BAT Bureau cooperates with European partners, it should be noted that national BREFs are prepared by Russian experts using national experience and practice. The numerical values of sector-specific technological parameters (Russian BAT-AEL) will be adopted by the MNRE in 2019.

In other countries (e.g. in the United States) the permit granting practice is not that common, but nevertheless the state regulation of large enterprises is based on the BAT approach of preventing pollution and ensuring the rational use of natural resources [5].

GHG REGULATION: INTERNATIONAL EXPERIENCE AND RUSSIAN APPROACHES

With adoption in 1992 the United Nations Framework Convention on Climate Change (UNFCCC) [7] and the Kyoto Protocol five years later the developed countries and emerging economies are obliged to reduce or stabilise GHG emissions. The Kyoto GHG list includes carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O),

hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆). The first period for Kyoto Protocol ended in 2012, the second will come to an end in 2020 so that it can be replaced by a new international agreement. The second period of the Kyoto Protocol saw the GHG list updated with nitrogen trifluoride (NF₃).

In December 2015, a new agreement under the UNFCCC was prepared to replace the Kyoto Protocol and was adopted in Paris [8]. At present, there is a discussion concerning the ratification of this agreement by Russia.

According to the IED [4], GHG emissions were excluded from the IEPs in order to eliminate duplication of technological regulation requirements on one hand and requirements established for GHG emissions on the other, with the exception of well-known environmental pollutants like sulphur hexafluoride or halogen-containing hydrocarbons.

In 2008, the European Commission developed the first set of legal measures – ‘2020 Climate and Energy package’. The main elements of the package came into force in 2009 and included: Directive 2009/28/EC on the promotion of the use of energy from renewable sources; Directive 2009/29/EC amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community; Decision No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community GHG emission reduction commitments up to 2020, etc. [9-12].

Two regulatory systems continue to improve: since 2010, the BAT requirements have become more unambiguous, the so-called BAT Conclusions are issued for industries with clear indication of BAT-AELs, management approaches (environmental and energy management systems) and methods for environmental control. The resource consumption levels (primarily energy), recommendations on the alternative energy sources and water circulation systems are also described in the BREFs. The ‘second generation’ BREFs pay very close attention to the methods for enhancing production EE: BAT for enhancing EE are discussed in detail and estimates for achievable specific energy consumption levels are provided. However, none of the European BREFs and, moreover, the BAT Conclusions contains obligatory BAT-AELs for GHG emissions [5].

The EU Reference Document on EE [13] fills a special place in the EU legal field because it was developed within two regulatory frameworks: the Directive on Integrated Pollution Prevention and Control (first version of IED) and the EU Climate Strategy. This BREF deals with sustainable and efficient use of any type of energy obtained from any source, implementation of energy management systems, optimisation of fuel combustion systems, steam systems, compressed air systems, pumping systems, heating, ventilation, air conditioning, lighting, drying processes, concentration and separation of substances. Naturally, this inter-sectoral (‘horizontal’) BREF does not contain any specific BAT-AELs; on the contrary, this BREFs is recommended for use as a methodological material when working with sector specific (‘vertical’) BREFs. The EU EE BREF emphasises that by investing in EE, companies can benefit from increased energy security and reduced risks related to volatile fuel prices by being less reliable on non-renewable fossil fuels. Other benefits of EE include more cost-efficient production, increased productivity, reduced material losses and higher product quality. Also, more energy efficient operation and production processes always lead to better

environmental performance and compliance. Furthermore, adapting and developing future technologies for EE and thereby strengthening their competitiveness can be a great motivation for enterprises.

The Russian BREF on EE (ITS 48-2017) contains the analysis of EE potential in Russian industrial sectors based on data from national statistical researches and information submitted by Russian enterprises; it also includes recommendations to Category I installations operating in Russia [14]. Both the European and Russian BREF have no BAT-AELs and no GHG emission levels. This position was discussed with several Russian stakeholders during ITS 48-2017 development. The statement had been made as clear as possible: no BAT-AELs and GHG emission levels will be presented in the document but rather application of methods and approaches to reduce energy consumption and indirectly contribute to GHG emission reduction (see Fig. 1).

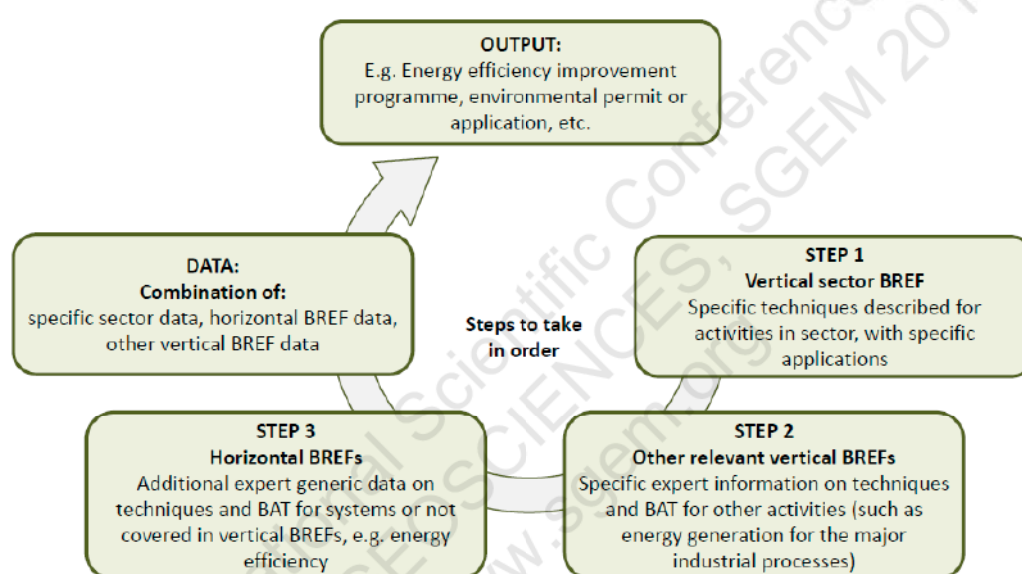


Figure 1. Application of sectoral Russian and horizontal BREFs for the environmental performance assessment and energy efficiency enhancement programmes development

Fig 1 demonstrates the interrelatedness of BATs applied to:

- achieve the IPPC/BAT requirements and obtain IEPs,
- improve production energy efficiency and reduce respective costs;
- reduce GHG emissions – both energy and process ones.

Again, though technological, technical and managerial solutions (techniques) are used simultaneously, the regulation systems in the field of IPPC/BAT and in the area of GHG emissions remain independent.

SETTING SECTOR-RELATED OBJECTIVES FOR GHG EMISSIONS REDUCTION

In Russia, MED is responsible for providing policies and tools for EE improvement since 2017. In 2018, the Ministry issued a state report on EE improvement. The document shows current trends in the energy consumption for industries, presents opinions on applicability of Russian BREFs to EE enhancement, presents the reports of

several large companies that have implemented energy management systems or relevant programmes (metallurgy, oil refining, pulp and paper, etc.).

As already mentioned previously MED has developed a draft version of Federal Law on GHG emissions; there is a high probability that the adopted version of the Russian GHG Law will include the following:

- target indicators for GHG emissions for the Russian Federation as a whole and by economic sector;
- general requirements for economic and (or) other activities in order to reduce GHG emissions and (or) increase their absorption;
- permits for GHG emissions for legal entities and individual entrepreneurs engaged in business and other activities and subjected to state GHG emission regulation;
- economic mechanisms for regulating GHG emissions including Russian equivalent of the EU GHG emission trading.

Setting sectoral target indicators and determining the GHG emission conditions for permits will require additional research on the contribution to the total GHG emissions by sectors and also by enterprises. The tools for such analysis are known, they are used both in Russia and abroad. Most of the Russian leading companies have already established corporate GHG emission inventories and are currently participating in voluntary dissemination initiatives on GHG reporting. For example, the managers of Russian pulp and paper enterprises emphasise that BAT for EE enhancement along with the use of alternative fuels have already help to reduce GHG emissions; but they still believe that GHG emissions permits should be separate documents not related to IEPs.

In order to assess the reserves for EE enhancement (and limiting the so-called ‘energy-related’ GHG emissions) and the potential for reducing emissions due to technological processes (as, for example, in cement production where CO₂ is reduced because of the use of metallurgical slags as additives to raw materials), it is necessary to have reliable information on energy efficient solutions applied within Russia and abroad. For example, there are many British economic and technical approaches to EE enhancement, which are used in Russia: e.g. Russian State Standard on EE for ceramics production was prepared with the expert advice from British Experts in 2012 [15]. The results of those project were applied during the development of Russian BREF on ceramics in 2015.

Since 2019, Russian expert organisations and industrial enterprises have been implementing the project entitled ‘Assessing the Potential and Building Capacity in the Field of EE and BAT with Regard to GHG Emissions Reduction in Russian Energy and Carbon Intensive Industry Sectors’.

Environmental performance and EE are assessed and opportunities for reducing GHG emissions while applying technological, technical and managerial solutions are identified for the production of cement, inorganic fertilizers and for selected metallurgical sub-sectors. Sector-based recommendations (guides) and training materials on EE enhancement and GHG emissions reduction will be prepared, used for training practitioners and presented to wider stakeholders. It is expected that the project will help to work out the rationale necessary to set realistic targets for reducing GHG emissions in the abovementioned industrial sectors.

CONCLUSION

The efficient use of energy and the decoupling of energy use from growth is a key aim of sustainability policies. The energy is considered as a resource of the crucial importance and it has to be used efficiently; at industrial enterprises energy has to be used to provide products or services. The BAT concept considers the replacement of primary fuels by secondary fuels or renewable energy sources but first of all it focuses on the EE improvement. Still, some specific sector-related BREFs discuss the use of secondary fuels and wastes as energy sources. The replacement of fossil fuels by other options is an important issue, with benefits such as the net decrease in CO₂ and other GHG emissions, improved sustainability and security of energy supply, but is dealt with primarily by the GHG regulation.

Energy intensive industries, such as metallurgy and cement manufacturing, are struggling with overcapacity as the economic downturn has driven down global demand. 2015 year showed the lowest price of steel in over a decade; as a result, many companies have had to shut down plants and there is limited spare capital for innovation and investment. Russian cement production decreased in 2017 due to the construction sector slowing down. These are hard times but they provide an opportunity for a overhaul of inefficient technology. This is true for all countries, but in Russia these challenges are recognised at the national level and addressed by a series of the Decrees of the President and the Government.

In Russia, two regulatory constructions – BAT-based regulation and GHG emissions regulation are being developed nearly simultaneously, though the BAT concept has more advanced system of legislative acts and norms already in place. As time goes, the industrial reform (re-industrialisation) is shifting towards ‘greener’ production and circular economy. New challenges for improving resource and energy efficiency as well as GHG emission reduction have to be addressed by the wide range of industrial enterprises. We will certainly return to this topic and discuss the possibility and feasibility of creating practical guidelines for energy-intensive and ‘carbon-intensive’ sectors of the Russian economy, present the experience of leading companies, tell about new national and international projects.

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