Analysis of modern environmental management mechanisms for energy providers

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Abstract. In the paper the essential changes in Federal Law № 219-FZ “About changes in Federal Law “On protection of the environment” and the separate acts of the law of Russian Federation” under 21.07.2014 are concerned, the mechanisms and new energy provider environment management principles are analyzed. The main field of environment protection realization from heat power facilities’ negative effects according to the new Russian environmental regulation requirements is presented. The new environmental norming and control principles for industrial facilities based on the best available technologies are determined. Their implementation issues taking into account development financing are analyzed.

Keywords: best available technologies, complex ecological permit, technological norming.

1. Introduction

The heat power source of thermal power plant and energy provider boiler house is fuel consumption. Depending on the fuel type the negative effect on the environment is caused by combustion gases: nitrogen oxides, sulfur dioxide, carbon monoxide and solid particles forming during combustion [1]. The polluting agents’ threat is intensified by their interaction with other agents inside the atmosphere.

Therefore, to gradually reduce the negative influence on environment the norms of specific pollutant emissions are established and the technological norming based on the principles of best available technologies to secure the norms is required [2].

According to federal law №219 FZ under 21.07.2014 “About changes in Federal Law “On protection of the environment” and the separate acts of the law of Russian Federation” the new principles of state environment protection policy are developed to mitigate the pollutant negative influence on the environment. These changes provide for the introduction of a technological norming system, based on the basics of best available technologies, grouping all industrial facilities into four categories by pollution concentration, state environmental audit for facility information acquisition and systematization. Depending on equipment power all energy facilities are categories I and II, which have a higher pollutant effect index.

2. Methods

In the new environmental legislation [1-3] there are new details on the importance of environmental management programs for categories I, II and III objects ecological control according to the established regulations. Acquired data should be stored by the facility and represent the necessary measures to reduce pollutant negative influence on the environment.
To apply the environmental legislation all category I industrial objects must get a complex ecological permit. Such a permit that implements an ecological efficiency increase program, include the basics of standard and technological pollution indicators determination [2].

When introducing norming and ecological control of industrial facilities based on the best available technologies category I objects should be equipped with automated pollution continuous control and accounting devices. Applying the devices allows quick and efficient important ecological decisions and reducing the number of over permitted pollutions. Such a control system allows taking measures for following the environment protection legal requirements. However, many industrial facilities are not ready for such financial expenses. The challenge of using such systems to prevent negative effects is the lack of well-qualified personnel.

Depending on the year of power generating installation putting into service and its performance the various pollutant emission reduction measures are taken. Overall there are three installation groups: ones put into service before 1982, in the period from 1982 to 31.12.2000 and after 01.01.2001. For each group, there is a certain range of technological indexes for various types of fuel consumption and installation power. I.e., the state ecological norming with pollution requirement strengthening is introduced.

The indexes proposed in the information and technical reference book is different from the GOST R 50831-95 standard indexes for the worse. Nevertheless, for category I installations, put into service before 31.12.1981 the requirement strengthening is not reasonable. It is firstly because of their depreciation, obsoletion, low energy efficiency and need for capital improvement or decommissioning [1].

3. Results and Discussion

For installation, put into service from 01.01.1982 the limits of the technological parameters for best available technologies particle and nitrogen oxide emissions are set specific emissions, which could be obtained by using the current technologies. The standard emissions are presented in plots 1-5.

Within the framework of industrial ecological control of large combustion installations pollutant, the marker materials should be normed [1].

For gas fuel, thermal power plants the main normed marker materials are nitrogen oxides and carbon oxide.

Figure 1. Furnace gas nitrogen oxide and carbon oxide concentration relations on year equipment put into operation for gas fuel consumption.

For liquid fuel thermal power plants, the main normed marker materials are nitrogen oxides, sulfur dioxide, carbon oxide, fuel oil ash (in terms of an equivalent amount of vanadium).
For solid fuel thermal power plants, the main normed marker materials are nitrogen oxides, sulfur dioxide, carbon oxide, solid fuel ash.
The analysis of furnace gas pollutants presented in figures 1-5 has shown that depending on the year of putting boiler unit into service, its power and operation mode measures, which do not require sufficient improvements of operating equipment or implementation of a new improved boiler unit, it leads to solid particle, sulfur oxide, nitrogen oxide concentration reduction in furnace gas under the established threshold values of carbon monoxide.

Establishing new specific boiler unit pollutant emission regulations, first of all, is necessary for gradually thermal power plant negative effect reduction and taking into account economic efficiency for the introduction of the best available technologies.

The main purpose of the changes in the regulatory documents firstly is the importance of obsolete equipment modernization at active objects and modern equipment manufacturing meeting all ecological and energy efficiency requirements of energy facilities. To achieve the goal, the best available technologies information and technical reference book have been developed [1].

In the information and technical reference book the structure of thermal power plant generating equipment, which is in operation for more than 30 years, and pollutant ecological indexes are presented. According to the specialists’ observations for the last 25 years, thermal power plant gross emissions reduced approximately 3 times and most of the industrial facilities follow the normed indexes of maximum permissible emissions.

Energy facility pollutant effect reduction is due to:

- sufficiently increased ratio of combusted gas fuel and decreased consumption of liquid fuel;
- implementation of the efficient measures for zeroing nitrogen and sulfur oxides in thermal power plant boilers;
- implementation of modern dust-collecting equipment on thermal power plants;
- applying combined cycle gas generation equipment.

4. Conclusion

To implement the environment improvement measures in Russian Federation it is necessary to not only develop laws and regulations and design mechanisms for their implementation but also work through the financial support measures for best available technologies implementation.

When implementing such technologies, it is necessary to put together environmental benefits and expenses for the project realization. For energy facilities, there are boiler unit requirements, which consist of plant location, chimney flue height, region climate. Thus there is a situation when one facility does not have a technical capability of best available technologies implementation to reduce pollutants and others, which can afford it, are not motivated [3–6].

Therefore, the changeover to technological norming allows ordering environmental requirements for boiler units and speeding up industry modernization and improvement, which will lead to pollutant
reduction of thermal power plants. Thus the planned over the coming years change over to technological pollutant norming makes it possible to increase domestic thermal power plants competitiveness versus foreign fuel consumption units.

5. References

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