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STUDY OF THE ENVIRONMENTAL IMPACT IN FUEL AND ENERGY COMPLEX OF THE REPUBLIC OF BELARUS

ИЗУЧЕНИЕ ВОЗДЕЙСТВИЙ НА ОКРУЖАЮЩУЮ СРЕДУ ТОПЛИВНО-ЭНЕРГЕТИЧЕСКОГО КОМПЛЕКСА РЕСПУБЛИКИ БЕЛАРУСЬ

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ABSTRACT

ENVIRONMENT, FUEL AND ENERGY COMPLEX, ENERGY SOURCE, THERMAL ELECTRIC STATION, EMISSIONS IN ATMOSPHERE

The general characteristic of the fuel and energy complex of the Republic of Belarus is given. Thermal power plants and their negative impact on the environment, various types of fuel burned for energy production, as well as substances polluting the environment when burning various types of fuel are considered. Alternative energy sources, types of environmental impact of a nuclear power plant are considered. Conclusions are drawn on the topic of publication.

АННОТАЦИЯ

ОКРУЖАЮЩАЯ СРЕДА, ТОПЛИВНО-ЭНЕРГЕТИЧЕСКИЙ КОМПЛЕКС, ИСТОЧНИК ЭНЕРГИИ, ТЕПЛОЭЛЕКТРОСТАНЦИЯ, ВЫБРОСЫ В АТМОСФЕРНЫЙ ВОЗДУХ

Приводится общая характеристика топливно-энергетического комплекса Республики Беларусь. Рассматриваются теплоэлектростанции и их негативное воздействие на окружающую среду, различные виды сжигаемого топлива для производства энергии, а также вещества, загрязняющие окружающую среду при сжигании различных видов топлива. Рассматриваются альтернативные источники энергии, виды воздействия на окружающую среду атомной электростанции. В заключении сделаны выводы по теме публикации.

INTRODUCTION

The object of the research is burning of different types of fuel in fuel and energy complex of Republic of Belarus. The purpose of the work is studying and the analysis of ecological aspects of combustion different types of fuel.

The Republic of Belarus faces a complicated situation with provision of the energy safety

due to a predominant big share of natural gas in power consumption of the Belarusian power system. The power sector is dominated by thermal power generation (more than 95 per cent).

Depending on the characteristics of primary energy resources, used for production of heat and electric power, the energy enterprises at different extent pollute the surrounding ambience by the remainder of its production.

Anthropogenic influence of the energetic objects upon the surrounding ambience possesses many forms. The effect of this may bring changes into the composition and characteristics of the atmosphere, as well as various changes, which are taking place in hydrosphere and lithosphere.

In general there are different from the ecological point of view such types of primary sources of energy, as organic fuel, nuclear fuel, water power, solar energy, wind energy, energy of tide, waves, geothermal energy.

Practically there are no objects, which completely do not influence upon the surrounding ambience. At the same time in no event it is possible to consider all objects of electric energetic branch as ecologically equal.

THERMAL ELECTRIC STATIONS – TES

The greatest number of negative influence is connected with development and usage of the thermal electric station/ operating on organic fuel.

To the main interaction of the TES with the surrounding ambience pertains consumption of fuel, water, oxygen of the air, change of the landscape, as well as any types of emission into all parts of the geosphere.

Together with the smoke gases of the TES into the air pool there are thrown hard and gaseous contaminators, amongst which there are such polluting materials, as ash, oxides of sulphur and nitrogen. Besides them big amount of carbon dioxide is emitted into the air, which is absent in the list of the polluting materials, and water vapors.

The TES emission, thrown into the atmosphere, pollutes the soil and its vegetable cover. The main role in these phenomena belongs to some ingredients, being contained in the emission of the ash: quicksilver, lead, zinc, chromium, arsenic and others. Oxides of nitrogen and sulphur being present in the smoke of gases also may render negative action on the soil, particularly on the vegetable cover.

The negative influence of the TES is aggravated with the fact, that their work must be supplied with constant fuel mining (the fuel base), accompanied with additional negative influence on the surrounding ambience:

- by contamination the air pool, water and land;
- by consumption of land and water resources, by exhaustion of non-recoverable stock of fuel (the natural mineral resources).

Thereby the TES, which is burning organic types of fuel, may adversely affect practically all

spheres of the surrounding ambiances and subject the nature to all considered type of the influence. Their direct influence upon the surrounding ambience very much depends on the established ecological situation. For prevention of the TES negative influence it is obligatory to observe the standards for guarding the natural ambience and safety of the people.

TRADITIONAL FUELS (FOSSIL FUELS, BIOFUEL)

About 90 % of the electricity we need comes from burning fossil fuels such as oil, gas and coal. These resources pollute and are not renewable, so once we have burned them all up, there will be no more.

Billions of tons of coal and oil are consumed around the world every year. When these fuels are burnt, they produce smoke and other by-products, which are emitted into the atmosphere.

Substitution of fuel oil by wood fuel improves the quality of the environment because of reduction of SOX and carbon dioxide.

Environmental impacts of wood energy use and production can be both positive and negative, and an assessment of these impacts should always be part of wood energy policy making.

Acceleration of wood use for energy purposes is crucially affected by many ecological and socio-economic aspects. First of all, in countries that have no fossil fuel wood waste is cheaper fuel than imported fuel. By using wood fuel for energy production in such countries the funds assigned for importing fossil fuel can be saved.

Environmental effect of wood fuel use instead of conventional fuel sources can be assessing by comparing burning products (SO_x, NO_x, CO₂, etc.).

Different fuel sources have different emission of combustible elements. This is dependent on fuel elementary composition and conditions of the combustion process. E.g. emission of particles in solid fuel combustion depends on the capacity of combustion system.

ALTERNATIVE ENERGY SOURCES

The most "clean" production is realized at installations, using solar energy, wind, hydro resources and heat of geothermal wells. However, the share of these sources in covering the need for energy is small, there is no trend of its growth in the nearest prospect, consequently, there are no grounds to expect, that development of the energy branch on the basis of these "clean" sources to some degree will reduce sharpness of the problem for protection of the surrounding ambience.

Nuclear or atomic energy. It is incredible to think that from the nucleus of the atom — one of the smallest things in the world — can come enormous amounts of energy. This energy, which is called nuclear or atomic energy, can either be controlled in nuclear power stations to create electricity for millions of homes, or it can be used in war to destroy millions of homes.

NUCLEAR POWER PLANT – NPP

NPP is a source of four types of impacts affecting the quality of life of the population and the natural environment. These impacts are as follows: radioactive, chemical, thermal and urbanization-related.

When the NPP operates normally, the population and environment are absolutely protected against the NPP radiation impacts; however, in case of any deviations from normal operation, the radiation impact can become the most significant.

Sources of chemical impact on atmosphere include gaseous discharges during operation of the process equipment via ventilation systems and chimneys.

Thereby, in respect of contamination of the air pool with usual chemical contaminants the NPP may be considered as ecological clean objects.

The NPP has advantages over the alternative sources of energy:

- it does not use organic fuel for production of electric power;
- it does not pollute atmosphere with emission of hard particles (created by ash) and different gas-forming materials;
- it does not use oxygen of the air;
- it does not throw hotbed gases into the atmospheric air;
- it does not contaminate land and water facilities with ash-and-slam remainders;
- it does not serve as the source of spreading cancerigenic and even radioactive materials under normal usage (the emission is limited with allowable quota, radioactive waste is localized, concentrated and buried);
- there are absent such phenomena, as raising dust of ash remainders, contamination of atmosphere with products of combustion from ash-and-slam remainders.

CONCLUSION

Environmental protection is of a universal concern. That is why serious measures to create a system of ecological security should be taken. Pollution can be stopped or at least reduced by using fuels which are low in pollution, more complete burning of solid fuels, shift to using alternative forms of power and banning the use of nuclear power.

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