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PROSPECTS FOR THE DEVELOPMENT OF THERMAL ENERGY

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The purpose of the work: to prove the prospects for the development of Thermal Engineering in our days, as well as to talk about the pros and cons of this topic.

Objectives: to convey this idea to senior managers so that we can get energy from CHP plants more efficiently and with better quality.

Relevance of the topic: this topic is very relevant in the current realities, since now the issue of ecology is very acute, and the improvement of thermal power technologies will help to significantly reduce emissions of harmful substances into the atmosphere.

Research methods: the research takes place in an oral judicious form, using the literature of other authors. We will touch on the advantages as well as the disadvantages of the development of thermal power engineering; everyone can speak on any topic.

Below I will briefly describe my topic of the report.

Thermal power engineering is a branch of energy, the focus of which is on the processes of converting heat into other types of energy. Modern thermal power engineers, based on the theory of combustion and heat transfer, are engaged in the study and improvement of existing power plants, investigate the thermophysical properties of heat carriers and seek to minimize the harmful environmental impact from the operation of thermal power plants [1].

The proven reserves of fossil fuels are enough for the sustainable operation of thermal power engineering for many decades. According to modern data, the provision of the world community's needs for oil and natural gas, based on proven recoverable resources, is estimated at 50-70 years, coal - more than 200 years.

Advantages of thermal power energy:

Financial Benefits: One of the main advantages of thermal power is the low cost of power generation. The plants use fossil fuels to generate power which is still abundant and economical. The initial investment cost for the installation of a thermal power plant is also less as compared to the other types of power plants. Considering the proximity to urban areas, the transportation and other costs are minimal. Usually, these plants are placed near the load center thereby reducing the power distribution cost [2].

Location Advantage: One of the greatest advantages of thermal plants is that they can be located in any suitable area without any specific geographical requirements, unlike a hydroelectric project. Thermal plant locations can be selected considering areas where displacement of people is not required. The locations of thermal power plants are generally not far from consuming centers, so the cost-benefit ratio is always better than hydroelectric projects. Thermal power stations generally develop in plain regions and also do not require much larger areas, thus favoring the scope of expansion [3].

Environmental Impact: The installation and construction phase of the thermal power plant causes no major environmental damage. The thermal power generation process involves using fuels that have virtually no toxic emissions. For the installation of thermal power plants, not very large areas of land are required. This is an advantage in terms of protecting forest life which is getting destroyed due to an increase in the setting up of industrial plants. The construction of thermal power stations also does not involve much time, thereby reducing chances of air and soil pollution to a large extent.

A reliable source of energy: Thermal energy generation is considered a more reliable source to handle future power demands. The power plants have the flexibility to respond to various power requirements and the changing demand pattern. It can adjust the output of power generation as per the demand. Thermal power provides a stable output and is considered the backbone of grid supply [4]. The technology for thermal power generation is well established and easily accessible making it a more reliable source of energy.

Disadvantages of thermal power energy:

The direct environmental hazard at the local and regional levels is created by atmospheric emissions of harmful substances with combustion products of fossil fuels. Modern thermal power plants account for up to 70% of industrial water intake from natural sources, which is a large part of the water resources of many countries experiencing problems with fresh water supply [5].

The volume of water requirement: Thermal plants require a large amount of water to produce steam that can drive the turbines to produce electricity. The huge requirement of water causes a serious impact on water sources in rivers, lakes, and groundwater.

Use of fossil fuels: The fuels used to produce thermal power are exhaustible resources. Thermal power generation requires the extraction of coal and natural oil from the earth which causes depletion of these fossil fuels. The power generation in thermal plants is also dependent on the quality of coal or natural oil sometimes affecting the optimum level of output.

Air and soil pollution: The operation of power plants, in the long run, causes air pollution due to the emission of harmful gasses. The occasional release of harmful gasses like sulfur dioxide, carbon dioxide, and other gasses makes an adverse impact on the environment. Some thermal power plants are also said to emit a large amount of mercury and generate fly ashes that can contaminate air, water, and soil in the surroundings [6]. There are chances of pollution created from non-point sources due to transportation of coal, loading, and unloading of fuels,

storage of coal and oil, etc. Water pollution can be caused by plant effluents, ash handling, demineralization, etc.

High maintenance cost: The cost of maintenance and operation of a thermal power plant is quite high. The machines and equipment in thermal plants are complicated and require skilled personnel to handle them efficiently. The occurrence of machine trouble is frequent and maintenance requirement is more. Lack of modern equipment and qualified personnel to handle operations and maintenance restricts further expansion of plant capacity and resources. There are additional costs involved for transportation of raw materials and maintaining large storage space for coal and other fuels [7].

Low efficiency and life span: The overall efficiency of the thermal power plant is considered low. Many coal-based thermal power plants use older technologies that lack chances of upgrading. This also affects the general life span of and efficiency of thermal power plants as compared to hydroelectric power plants. Environment experts have suggested limiting the operation of coal-based power plants considering the climate changes due to pollution and the greenhouse effect. The relative financial security regarding restrictions on fossil fuel extraction may create an additional disadvantage for the required expansion of thermal power plants [8].

Conclusion: The rapid growth of electricity needs in the 21st century, the crisis state of the environment, the technological problems that must be solved to meet these needs, based on modern criteria for a sharp increase in energy efficiency, cost reduction and minimization of environmental impact, require a large expansion of research and development in thermal power engineering.

Therefore, important areas of scientific and technological progress in thermal power engineering are:

Creation of new generations of power equipment;

Reconstruction and modernization of existing equipment;

Ensuring the required level of industrial safety of power equipment.

Creation of effective gas cleaning systems for power equipment;

Solution of scientific and technical problems related to the development of equipment for supercritical steam parameters, technologies for obtaining cheap equipment for fuel cells, electric energy storage systems.

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