CONVERSION *OF HEAT ENERGY INTO ELECTRICAL ENERGY*

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Abstract: *The conversion of thermal energy to electrical energy is currently being used on a large scale. As modern energy sources, we can support the conversion of thermal energy into electricity. The use of heat in technological and household appliances is carried out using various heating, heat supply systems. The technique of artificial frost formation also plays an important role in the thermal technique.*

Key words*: heat , energy, thermal energy , electricity, technology.*

Thermal energy is a field of energy and thermal engineering that deals with the conversion of heat into other types of energy, mainly mechanical energy and through it into electrical energy, i.e. thermal energy. The basis of the entire energy system of the world is thermal energy. 2/3 of the world's power plants are thermal cycles, it mainly works in the Rankine cycle with steam and the Brayton cycle in the gas turbine. The theoretical basis of thermal energy is thermodynamics, heat and mass exchange, and fluid and gas mechanics. The main task of thermal energy is the problem of rational use of thermal energy in industry and utilities. subject of study - thermodynamic cycles and schemes of power plants, their level of perfection, fuel combustion, heat transfer issues, thermophysical properties of working fluids and coolants, etc.

Thermal energy conversion is carried out in various machines, devices and devices, which are divided into:

• production: heat generator, oven

• collector: solar collector

• conversion: steam turbine

• Transfer: Heating main, Heat exchanger

• consumers: heater

The technical basis of modern heat energy is thermal power plants of thermal power plants (IES) consisting of boiler units and steam turbines. Among the traditional types, thermal energy dominates globally, 46% of the world's electricity is coal-based, 18% is gas-based, and more than 3% - oil is produced due to the burning of biomass. All of them are thermal power plants. it accounts for 80% of the world's power plant production.For 2013, the average efficiency of thermal power plants was 34%, the most efficient coal-fired power plants were 46%, and the most efficient gas-fired power plants were 61%.In 2009, 47% of electricity in Russia was produced by burning gas and 18% by burning coal. Hydropower and nuclear power plants produced 17% and 16%, respectively.There are 88 thermal power plants in Kazakhstan. Another 9% are hydroelectric, 3% are renewable energy (wind and solar). Coal power plants in Kazakhstan have 74% shares. Natural gas power plants - 11% and liquid fuel (fuel oil, diesel fuel) - 4%. A total of 69 thermal power plants operate in Kazakhstan: 8 national and 61 private.The energy industry of the countries of the world such as Poland and South Africa is almost entirely based on the use of coal, and the Netherlands is based on gas. China, Australia and Mexico have a very high share of thermal energy.According to the European Electricity and Heat Association (VGB Power Tech), energy production will grow by 1.3% annually for the European Union and 2.5% for the rest of the countries until 2030. energy demand will increase from 3.0 TWt in 2002 to 4.4 TWt in 2020

The most important feature of the energy system that distinguishes it from other large industrial and production associations is the simultaneity of the processes of production, distribution and consumption of electricity due to the impossibility of storing finished products and the impossibility of imbalance. and between the total power consumed in the power system. A change in the amount of power produced will inevitably lead to a change in its consumption. voltages, currents, network frequency, etc.

The energy system is generally called a large system, because it consists of subsystems that interact with each other.

The rapid development of automation in heat energy has revealed a number of management problems. These are:

1. Great inertia of the dynamic properties of heat and material processes.

2. Great uncertainty of control object properties.

3. Time variability of the properties of the control object, which requires additional time to adjust the control system during operation.

4. In modern Russian education, there is such a direction as "Heat power and heat engineering" for training bachelors, in the future heat power engineers will be trained to work in boiler houses, thermal power plants, etc. can also work on similar objects.

5. In 1944, the Department of "Heat Engineering and Thermal Energy" was established at the North-West State Technical Institute.

6. In 1946, as a result of changing the name of the Faculty of Thermal Engineering, the Faculty of Thermal Energy (TEF) appeared at the Moscow Power Institute.

7. In 1954, the first issue of the journal "Thermal Power Engineering" was published, its English equivalent is "Thermal Engineering".

8. In 1956, the Faculty of Thermal Energy (TEF) appeared at the Kuibyshev Industrial Institute[12]. In the same year and with the same name, a faculty was established at the Tomsk Polytechnic Institute.

9. In 1964, the Faculty of Thermal Energy was established at the Ural Polytechnic Institute.

10. In 1971, the Faculty of Heat and Power Engineering appeared at the Kazan branch of MEU[15], and in the same year, the Faculty of Thermal Engineering was separated from the Department of Thermal Engineering at the Irkutsk University of Technology.

Thermal power plants (PPP) are a set of devices that convert the thermal energy of solid, liquid and gaseous organic fuels into electrical energy. The main power units include a boiler system consisting of a battery of water-moving pipes (tubes), steam turbines (steam engines) and turbogenerators. The water sent to the boiler system is converted into high-pressure steam and fed to the turbine blades. As a result, the generator mechanically connected to the turbine is rotated at the appropriate speed, and mechanical energy is converted into electrical energy in the generator according to the law of electromagnetic induction. Only 30% of the thermal energy of the fuel used in the IES is converted into useful electrical energy, that is, the efficiency of the IES is equal to 30%. In order to increase the value of the useful work coefficient, the steam pressure in the boiler is increased as much as possible, and all the steam that has passed through the turbine blades is cooled by means of coolers, converted back into water (condensed) and sent to the boiler system. Such thermal power plants are called condensing power plants (KES) and in them, the value of the useful coefficient of operation increases to h=30-35%, and due to the

fact that the water circulates in a closed system, the maintenance of the boiler consisting of pipe batteries is drastically reduced. Thermal power plants are usually built near a deposit of cheap solid, liquid or gas fuel. The main part of the electricity received from the generators of the station is delivered to consumers at a distance of several 100 km by means of a step-up transformer and high-voltage power lines, and the rest is supplied at the station's own generator voltage or through a step-down transformer (see also: Issshushk Power Center).

Depending on the scale of electricity supply, the thermal power plant is divided into types used at the district, industrial, rural, urban scale, communal economy, and other types of transportation. The thermal power plant can be integrated into integrated electrical systems or used separately.

The thermal power station was built in the 80s of the 19th century. The first thermal power plant was built in New York (1882). The first thermal power plant in Russia was built by engineer MK Polivanov in Moscow (1906). The first thermal power station in Uzbekistan was built at the beginning of the 20th century (see Heat energy). There are 10 thermal power plants operating in Uzbekistan (2002). The largest thermal power plant in the republic is Syrdaryo GRES (3000 MW), New Angren GRES (1800 MW), Tashkent GRES (1860 MW), Navoi GRES (1250 MW), Angren GRES (484 MW), Takhyatosh GRES (430 MW), Talimarjon GRES (project capacity 3200 MW) (Nuristan). The thermal power plant is an automated enterprise. Fuel combustion processes, boiler water supply, voltage and frequency adjustment in boiler units are fully automated. The units of the thermal power plant are controlled from the central control panel. Nuclear power plants, geothermal power plants, and solar power plants are also thermal power plants.

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