

Process Of Power Generation

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The process of generating electric power from its primary source is known as Electricity generation. Therefore, electric power is the energy that individuals use in the home and the industries. The main electric utility in the electricity industry is to deliver electricity to the consumers, and the other utilities are distribution, transmission, storing energy and recovery. The property of the electrical energy is that it is not naturally present. Therefore, it must be produced. The production of the electric power is done in the power plant. Thus electricity in many cases is generated in the power station by the electromechanical generator. The generator is mainly driven by heat engines that are fueled by nuclear fission or combustion fusion. But in other ways, the kinetic energy of wind and water can also be used to generate electric power. The other sources of electric power are geothermal power and solar photovoltaic. ("US Department of Energy", 1994)

Historically, the fundamental principles of electric generation were first discovered in 1820 and in 1830 by the scientist known as Michael Faraday. He discovered the principle of induction, which is used in the development and operation of the transformer. The generator is the electrical device that converts the form of the energy into electric power. Generators operate based on the principle of induction. This is the relationship between electricity and magnetism. Also, the generator can change mechanical energy (kinetic energy) into electrical energy. ("US Department of Energy", 1994)

The generator is the most common method of producing electricity. It normally uses an electromagnet to produce electricity. Inside the generator, there is a series of insulated winding of the wire, which forms a stationary cylinder. The cylinder surrounds the rotary shaft of the electromagnetic shaft; as the electromagnetic revolves, it usually induces the electric current in the wire on another coil. Every section of the wire winding becomes a small, separate conductor. Therefore, the small current of the individual section combines its current to form the large current. The currents are the electric power that is supplied through the wireline to the users.

In the power plant, the turbine is used to drive the generator. There are different types of turbines, including gas combustion turbines, steam turbines, wind turbines, and water turbines. Hence turbine converts the moving kinetic energy into mechanical energy. In the turbine's generator, there is moving fluid that pushes the series of blades mounted to the shaft that rotates the shaft connected to the generator. Based on the relationship between electricity and magnetism, the generator converts mechanical energy to electricity.

Type Of The Power Plant

Steam Turbine Power Plant

It is the traditional power plant that makes electric energy through the burning of fuel like coal and oil to release heat. It is also called a thermal power plant. In this power plant, fuels are burned to release heat energy that boils water, which produces steam that drives the steam turbine; then the turbine rotates the shaft in the generator to produce electricity.

Gas Turbine Power Plant

It is a natural gas plant work that uses the gas to rotate the turbine that, in turn, drives the shaft in the generator as it produces electricity.

Nuclear Power Plant

A nuclear power plant works similarly to a thermal plant, but the difference is that the atoms are smashed apart to produce heat energy. The heat produced here is used to boil water to produce steam that in turn drives the steam turbine that enables rotation of the shaft in the generator finally they produce electricity,

Hydroelectric Power Generation

It is the plant that is designed to funnel that vast amount of water past enormous water turbines. It is constructed at a point of the waterfall of the river. As the river flows, the water turbine constricts along the river and continues to spin, and the dam produces hydroelectric power. The generation of electric power fluctuates due to a fluctuation in the amount of water present in the water source, the decrease in the water led to low [power generation](#) unless there is reserved water for the generation of electricity.

Solar Power Plant Generation

In the solar plant, there are two means of generating electricity from the sun's radiation by use of the solar panel. They are the parabolic and photovoltaic troughs. Parabolic trough absorbs heat energy from the sun to heat up salts to their melting state, which enables them to move past the boilers where high-pressure steam is produced. The steam produced is then used to drive the turbine that is connected to the generator. On the other hand, photovoltaics normally use semiconducting solar panels to output electricity in the form of direct current. The direct current can then be changed to alternating current so that it can feed into the electrical system.

Wind Power Generation

It is fast fast-growing means of electric production where the wind-propelled turbines are used to give mechanical energy motion that is needed to turn the generator. The turbines can change depending on the direction and the speed of the wind. As the wind turns the turbines, then the turbines cause the movement of the shaft in the generator, cutting on the electromagnetic fields; hence, the current is induced to form electric power. The speed of the wind determines the power generated. That is, high-velocity wind blowing will generate high electric power generated due to an increase in the electromagnetic field that will result in high power generation. ("US Department of Energy", 1994)

In the generation of electricity in the power station, the amount of electric power generated cannot be distributed and transmitted with the same capacity for long distances. Therefore it's important that the capacity can be increased for better transmission and distribution of power for the long distance without reducing the original capacity generated. In this case, increasing the capacity of the electric power reduces the functions of the transformer. Therefore transformer is the device that manipulates the electric power taken and generates different capacities depending on the needs of the end-user base on the Faradays principle of induction. There are two main types of the transformer that control the flow of electric power on distribution. The two types are a step-up transformer and a step-down transformer.

Step up transformer is normally installed in the power station to increase the capacity of the electricity for the distribution or transmission of that energy. The transformer is made of two main windings or coils which are not directly interconnected. They are named the primary coil and the secondary coil, which are wound on the soft iron core. The primary coil takes electric power from the electric generator and induces that power to the second coil by the process of electromagnet induction. In a step-up transformer, the process there is an expectation of an increase in the capacity of the electric power taken and produced. The number of turns between the primary winding and secondary winding determines the reduction or increase in the capacity produced on the secondary coil. Therefore, in a step-up transformer, the number of turns in the primary coil is lower than those turns in the secondary coil. Hence, the current taken by the transformer on the primary coil increases with the increase of the turns on the secondary coil through the electromagnetic induction process. Step-up transformers are important in the power station plant. They increase the capacity of the current to be distributed or transmitted over a long distance without a problem. Also, this is the type of transformer that is built into the generator where they generate electricity as it multiplies the mechanical energy that is induced by the turbines on the shafts high capacity electric current generated.

The other transformer is the step-down transformer, which reduces the capacity of the current supplied to a relatively low current capacity. This is due to the reduction of the number of turns on the secondary coil as compared to the primary coil. The current that is taken by the transformer (primary coil) is more than that produced by the transformer (secondary coil). The number of turns on the secondary coil is less than that of the primary coil, which leads to a decrease in the current product

on the secondary coil. This type of transformer is installed in residential areas where it connects power to the community.

Maintenance Of Power Generating Equipment

There is a need to maintain the equipment that generates electric power. It is subdivided into main activities, which are mechanical maintenance and electrical maintenance. The electrical maintenance deals with the electric power interconnection in the power station and winding of the transformer to increase the smooth supply of electricity to the consumer. Mechanical maintenance deals with the installation of the machines in the power station. Therefore the skills of mechanical and electrical maintenance are important in the operation of the power station plant. The distribution of the electric power depends on the connection grid that is determined by the engineer in the power plant station. The transformers are connected based on the specified number of end users connected to that transformer. However, the overload of the transformer leads to transformer damage.

References

United Nations. "Energy Statistics Yearbook." New York: United Nations (1995).

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