A diesel power plant. What is it?

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Even though the global market for distributed energy technologies is growing at a rate of about 6-9% per year, solar and wind generation are actively developing, diesel power plants - the so-called "classics of Soviet energy" - remain one of the most popular autonomous power supply systems, especially in remote and Arctic territories.

And this is quite understandable: even now, more than half of the territory of our country has no centralized power supply, tens of thousands of settlements are supplied with electricity at the expense of diesel power plants.
In this review, we will try to figure out what a diesel power plant is, what tasks it is suitable for, what advantages and disadvantages it has, and what is the secret of its undying popularity.

photo of diesel power plant

What is a diesel power plant?

A diesel power plant is a stationary or mobile power plant consisting of two main elements: an electrical generator and an internal combustion engine running on diesel fuel. Connected by a common frame, these components complement each other and provide conversion of mechanical energy into electrical one.

It should be borne in mind that the terms "diesel power plant", "diesel electric unit", "diesel generator" are not identical definitions. These concepts have significant differences:

A diesel generator is a device consisting of a technologically combined diesel engine and generator;

A diesel–electric unit is a device that includes a diesel generator, as well as auxiliary devices (frame, control devices, fuel tank);

A diesel power plant is a full-fledged power facility that includes, in addition to a diesel-electric unit, many other elements: a device for distributing electricity, automation cabinets, a control panel, etc.
It is the diesel power plant that allows us to provide consumers with electricity of the right quality and in the right amount.
And in fact and makes this direction of autonomous energy one of the most demanded and popular in remote areas of our country.

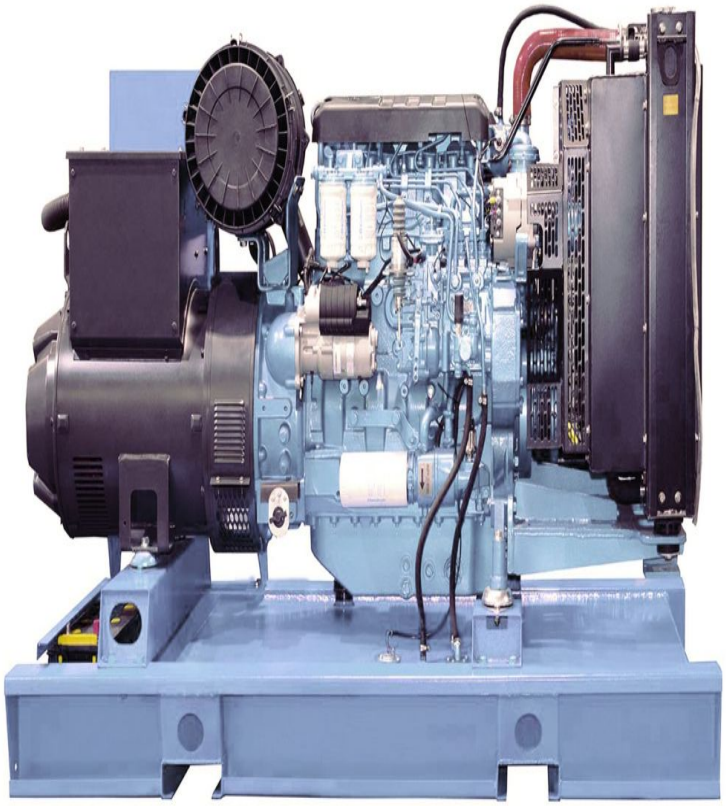
photos of energy complexes based on diesel power plants

The principle of operation of DPP

The diesel power plant operation principle is a conversion of mechanical energy into electrical one.
The following key stages can be distinguished:

1. Air is fed into the engine cylinders where it is compressed and heated to high limits
   Then diesel fuel enters the working chamber under pressure and ignition takes place.
2. The resulting combustion gases start the engine in operation. The crankshaft begins to rotate, starting the rotor of the electric generator.

3. Rotating generator rotor excites an electromagnetic field that creates an induction alternating current in the generator winding converting into electrical energy at the output.



diesel generator picture

Application of MKS diesel power plants

The diesel power plants are widely used in areas with no centralized power supply or where certain difficulties with electricity supply occur. As a rule, this are:

- small settlements located in remote and arctic territories;
- agricultural enterprises (farms, state farms), as well as suburban settlements and allotment societies located on the periphery;
- production facilities where oil, gas and other natural resources are extracted, located in hard-to-reach areas.

It is there that diesel power plants can be the only possible source of electricity.
It should be considered that diesel power plants can also perform auxiliary functions:

- a backup source of electricity, when diesel power station only complements the main sources of power supply – centralized networks;

an emergency source of electricity when diesel power station is installed at large enterprises in order to protect the consumer from possible accidents and organize uninterrupted power supply.

photo of the power station car-house

Types of MKS diesel power plants

There are several basic classifications of modern diesel power plants. Depending on the purpose, diesel power plants are distinguished:

- mobile (used as a portable or backup power supply source);
- stationary (integrated into a single system of the energy complex).

Depending on the constructive filling, diesel power plants are distinguished:

- open (not protected by anything, can only be in a specially equipped room);
- in a noise-proof casing (the casing reduces the noise level, which allows the use of such power plants in populated areas);
- containerized (for additional protection and noise reduction, it is placed in a special container or block module).

Depending on the number of phases generated by the equipment, diesel power plants are distinguished:

- single-phase (generates 220 volts);
- three-phase (generates from 220 to 400 volts).

Depending on the type of voltage, diesel power plants are distinguished:

- low voltage (up to 1 kW);
- high voltage (over 1 kW).

photo of the carriage house of the cabin

photo of a mobile diesel generator (on chassis)

Portable diesel power plants

In this review, we will separately focus on such a variety of modern diesel power plants, such as mobile (or mobile) DPP. Its main purpose is to generate electricity in the most inaccessible places with the ability to quickly change its location. Mobile diesel power plants are actively used in the mining industry (for example, at various deposits of natural resources), in the construction industry (when building roads and construction of remote settlements), in agriculture (on remote land), as well as to meet the needs of private consumers.

There are a lot of options for manufacturing mobile diesel power plants. The most popular are mobile DPP on their own self-propelled chassis; adapted for mounting on a car body; having a body like a "trailer".

As a rule, mobile diesel power plants are manufactured in a special durable container that protects the device from unfavorable weather conditions (rain) and mechanical damage. The main advantage of the mobile diesel power plant is a high degree of mobility, maximum ease of maintenance, the use of the power plant immediately after

purchase.

photo of a mobile diesel generator

photo of a mobile diesel generator

The pros and cons of diesel power plants

Diesel power plants certainly have their own remarkable advantages, making this direction of autonomous power supply popular for many years. Some of the main advantages include the following:

- high degree of mobility and portability;
- ease of installation and construction.

However, there are also significant disadvantages of diesel power plants, which every year gradually "displace" DPP from leading positions, including in remote and Arctic territories of the country. Among the main disadvantages are the following:

- low degree of reliability (diesel power plants often fail, the accident rate is quite high);
- low degree of environmental friendliness (diesel power plants are considered one of the most environmentally "dirty" sources of energy supply, which is why all DPP are carefully checked for compliance with international standards and norms, otherwise large fines cannot be avoided);

- need for constant maintenance (diesel power plants need constant inspection by experienced engineers to minimize the number of accidents);

limited choice of domestic diesel generators (the most reliable are foreign diesel generators of such brands as Cummins, NeuHaus, Wilson, Aksa - but their cost is significantly higher than their Russian counterparts).

Multi-energy complexes - an alternative to diesel power plants

Anyway, the above disadvantages of diesel power plants have become a significant incentive to search for alternative solutions for energy supply to remote and isolated territories of the Far North and Siberia. Today, multi-energy complexes constructed by the MKS Group are a worthy option for solving the problem.

photo of the wind-solar power plant of the ISS group of companies

Multi–energy complexes are energy facilities consisting of several alternative energy sources:

- microgas turbine (MGTU) or gas reciprocating unit (GRU);
- solar power plant (SPP);
- electric energy storage (EES with battery);
- wind power generation (WPG).

Consumers in remote and isolated areas of the Far North and Siberia are usually deprived of centralized power supply and powered by outdated diesel power plants. The cost of diesel fuel is about 60-70 rubles/t (excluding logistics). Multi-energy complexes from the MKS Group allow:

- reduce power generation costs by 3-4 times;
- increase the reliability and autonomy of power supply;
- introduce modern technology;
- use environmentally friendly fuels (CNG, CNG);
- reduce the cost of maintaining the facility.

Estimating the economic impact depends on the performance of the specific project.

The MKS Group is a leading engineering company in Russia, the main activity of which is the construction of small–scale energy facilities - turnkey gas piston power plants. In 19 years, it has commissioned 58 mini-thermal power plants in various regions of Russia and abroad. The total capacity of all commissioned facilities of the MKS Group was 300 MW. The MKS Group is the official Russian dealer and service partner of MWM Austria GmbH.