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MICRO ELECTRICAL NETWORKS AND THEIR TYPES

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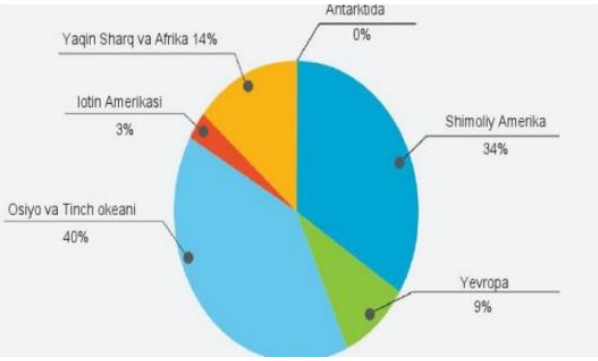
ANNOTATION

The article is about micro electric grids (microgrid), which is still considered a new network in the whole world, what is a micro grid, its functions, how it is structured and what types exist. Let's look at the advantages and disadvantages of different types of microelectric networks

Keywords: microelectric network, microgrid, conventional energy sources, renewable energy sources, common connection point, variable microgrid, fixed microgrid, Hybrid microgrids.

INTRODCUTION

Today, the year-by-year increase in the population and the development of technologies all over the world lead to an increase in energy consumption, and as a result, countries face energy shortages in the economic and social spheres. In order to solve these problems, mankind is putting a lot of emphasis on such areas as the study and practical application of new branches of energy. New types of renewable energy networks are being studied, efforts are being made to further develop and widen use of previously known and used types (solar and wind). However, Solar Power Station (QES) and Wind Power Station (SHES), which are renewable energy sources and have a high share on Earth, also have their disadvantages: aspects of solar and wind dependence, that is, solar and wind power lack of stability, low efficiency, output power is not considered stable and long economic payback period, and several other problems limit the widespread use of such energy sources. Maximizing the output power from renewable energy sources and increasing the efficiency, thereby reducing the economic payback period, is now microelectric grids are emerging, and developed and developing countries are giving great importance to the development of microelectric grids. When we study the microelectric grids in the world in terms of cross section, the region with the largest number of microelectric grids currently corresponds to the region of Asia and the Pacific Ocean, that is, 40% of the microelectric grid located on the whole earth is in this continent. that's right. In the next places, the continent of North America - 34%, in the Middle East and Africa region - 14%, in Europe - 9% and in the last places in the region of Latin America (South America) - 3% [1].



1 – picture. The amount of microelectric networks located across regions.

The integration of renewable energy sources in micro-grids can help reduce carbon dioxide emissions from fossil-fueled energy sources, reduce transmission line losses, reduce voltage fluctuations, reduce peak loads, and improve reliability. On the other hand, excessive input to distributed generation sources (especially in distribution networks) can cause problems such as voltage surges, voltage and frequency instability, and lack of coordination between protection. These problems are mitigated by combining several distributed generation sources and loads and applying a controller to them, and this is called a microgrid . In other words, a microgrid can be a small energy system, where it creates, distributes and adjusts the flow of electricity from local distributed energy sources to local loads, which allows grid connection or independent operation. Microgrid architecture and components are discussed in depth in this chapter. Most of the current systems are alternating current, but technological advances allow hybrid microgrid architectures to emerge. When we study the microelectric grids in the world in terms of cross section, the region with the largest number of microelectric grids currently corresponds to the region of Asia and the Pacific Ocean, that is, 40% of the microelectric grid located on the whole earth is in this continent. that's right. In the next places, the continent of North America - 34%, in the Middle East and Africa region - 14%, in Europe - 9% and in the last places in the region of Latin America (South America) - 3% [1].

Micro electric network and its structure.

A micro grid (Microgrid - ing) is a small-scale local energy system that can be disconnected from traditional utility networks and work independently. The ability to autonomously interrupt and resume operation. Microelectricity means that the grid (hereinafter referred to as Microgrid) can serve as a complex backup power system during repairs or other emergency situations that lead to widespread power outages. A microgrid can also combine various distributed energy sources, including clean energy sources . These dual functions- backup and stability - provide reliable energy to microgrids and helps balance the need to reduce carbon emissions. Therefore, the work of increasing the number and capacity of microelectric networks in the world is accelerating. Figure 2 shows a simplified view of a microgrid, where the solar power plant QES and the energy from the conventional grid are intelligently managed and delivered to the consumer.

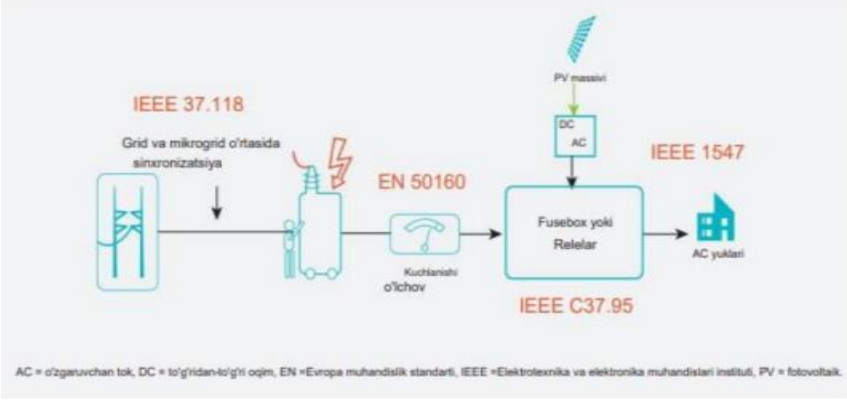
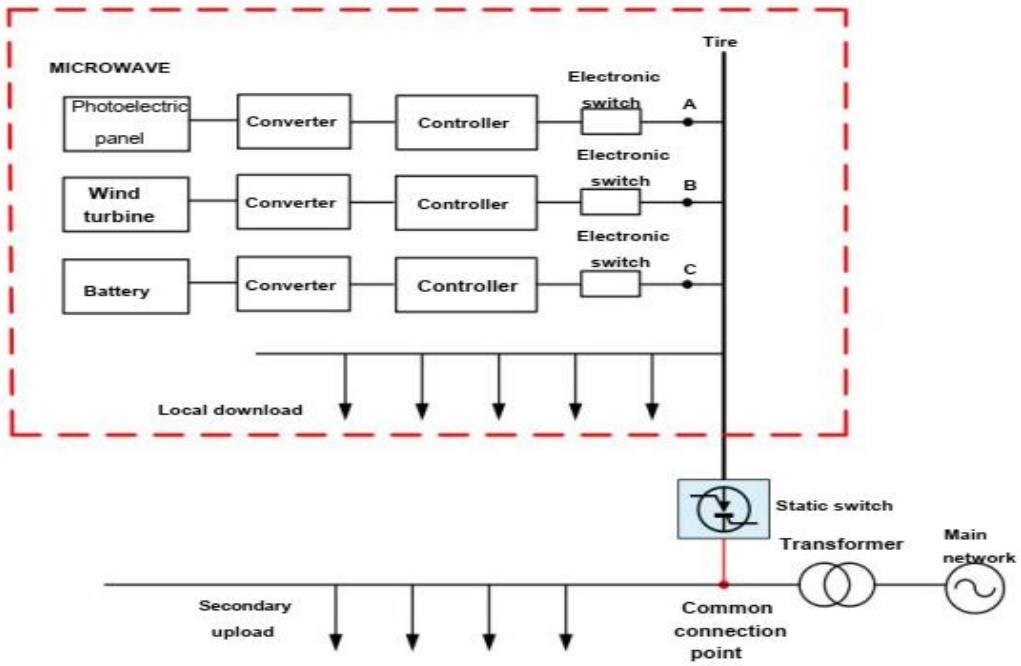


Figure 2 is a schematic view of a microgrid . Figure 3 shows a schematic diagram of a micro-electric network, in which the source of the micro-electric network is composed of converters, controllers and circuit breakers.



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Microgrid Architecture

The basic architecture of Microgrid is illustrated in Figure 4. This shows that microgrid systems usually consist of distributed generation sources, storage systems, distribution systems, communication systems, control and power sources. The microgrid's ability to operate independently and efficiently as needed to connect and disconnect the utility grid to the utility grid and support local power sources. From a grid perspective, the key feature of a microgrid is that it acts as a single load Important features of the microgrid system are; protection, monitoring, power converters, helps balance the need to reduce carbon emissions. Therefore, the work of increasing the number and capacity of microelectric networks in the world is accelerating. Figure 2 shows a simplified view of a microgrid, where the solar power plant QES and the energy from the conventional grid are intelligently managed and delivered to the consumer. communications and cyber security.

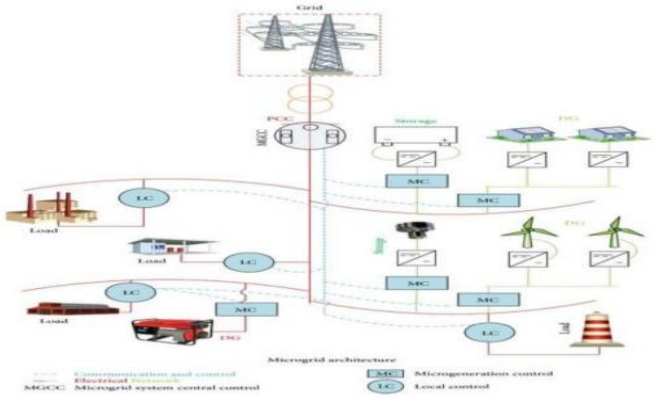

Figure 4 is microgrid architecture

Types of microelectric networks.

Microelectric networks (microgrids) are classified based on the general network and the distributed power of the Microgrid (constant (DC), alternating (AC) or a combination of alternating and constant (ACDC) - hybrid microgrids).

Alternating (AC) Microgrid Using existing alternating (AC) network infrastructure such as transformers, distribution and protection equipment, the implementation and design of an alternating type of Microgrid is easier. There are many microgrid projects developed around the world depends on the concept. A simple variable is described. A variable grid is usually used near a universal connection point (UBN), which is defined as a power interface between the microgrid and the utility grid. A microgrid can be connected in both modes depending on its operational needs. This type of microgrids offers the possibility of simple integration of distributed power into the grid without major changes. In addition, the wide range of protective devices on the market ensures a high level of fault management. In addition, the voltage level can be easily adjusted using low-frequency transformers. The minuses of this type are the constant to the variable at the point of connection to the network However, alternating current architecture has certain disadvantages, such as the requirement of synchronization by distributed generation power, as well as the fact that there is a loop of reactive power that causes some losses in the network.

DC (DC) Microgrid

Most distributed energy sources typically operate with direct current or have an intermediate direct connection at the electronic power interface, while the end point of energy storage systems is direct current only (alternating current).

In addition, many electrical consumer loads are supplied with constant current. Therefore, the integration of these devices into fixed microgrids through DC-DC converters is a good choice in terms of increasing efficiency, since fewer conversion steps are required and there is no reactive power generation.

In addition, no synchronization operation is required for additional load connection. depends on the concept. A simple variable is described.A variable grid is usually used near a universal connection point (UBN), which is defined as a power interface between the microgrid and the utility grid. A microgrid can be connected in both modes depending on its operational needs. This type of microgrids offers the possibility of simple integration of distributed power into the grid without major changes. In addition, the wide range of protective devices on the market ensures a high level of fault management. In addition, the voltage level can be easily adjusted using low-frequency transformers. The minuses of this type are the constant to the variable at the point of connection to the network However, alternating current architecture has certain disadvantages, such as the requirement of synchronization by distributed generation power, as well as the fact that there is a loop of reactive power that causes some losses in the network. Microgrids transfer request. Another problem is the protection part of the fixed microgrid network.

Hybrid (AC-DC) Microgrid

Current and alternating current networks, which are interconnected by a two-way basic ACDC basic converter. This structure allows the installation of loads on a fixed DC consumer along with loads installed on an alternating AC consumer. A hybrid microgrid combines the advantages of variable and non-variable microgrids and has an exclusive grid for each type. The disadvantage of this type of microgrid is that it poses a problem on the protection side of a fixed microgrid. In addition, the control of this structure is more complicated, because the hardware control requirements related to variable and fixed microgrids are different from each other .

SUMMARY

In the article, I studied the share of microelectric networks (microgrids) on a regional scale, what microgrids are and what their tasks are. We tried to find answers to questions such as how microgrids are structured, what they contain, and again, questions such as what types of microelectric grids exist and what advantages and disadvantages they have over each other, and we tried to find solutions to them.

USED MATERIALS

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