

UDC 621.31

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COMBINED OPERATION OF RENEWABLE ENERGY SYSTEMS AND RESPONSIVE DEMAND

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ІНТЕГРАЦІЯ СИСТЕМ ВІДНОВЛЮВАНИХ ДЖЕРЕЛ ЕНЕРГІЇ ТА ЇЇ ЕФЕКТИВНІСТЬ

Combined operation of renewable energy systems or hybrid systems is a topic of extreme importance, whenever the terms power and savings are mentioned. We will describe the functionality of combined systems of different sources of renewable energies such as: sun and wind energies, according to the main technological magazines that we came across with, these two types of systems are more likely to be combined to increase the efficiency and the responsive demand of energy consumption.

Solar photo-voltaic (PV) is the first step for the reduction of the electricity bills and getting paid for the electricity produced. As an incentive some governments, like the United Kingdom government has introduced the “Feed in Tariff” which pays for every kWh of energy produced by these home systems. Once you have a solar PV system fitted, you will then start to benefit from the electricity it produces immediately. The amount of energy produced depends directly on the size of the system. Solar Photo-voltaic panels have cells that are made up of special materials called semiconductor such as silicon, when the light strikes the cell a certain portion of it is absorbed within the semiconductors material. The energy knocks electrons loose allowing them to flow freely, this is called current and by placing metal contacts over the top and over the bottom of the PV cell we can draw the current off for external use in our homes. Typically solar panels have efficiency of 10%, the expensive ones can deliver 20% of efficiency.

Wind turbines are the most common form of using wind as a source of energy, they differ in size and the efficiency depends directly on the size of the systems.

They are qualified in two different types: Vertical Axes Machines (VAM) and Horizontal Axes Machines (HAM).

Vertical axis machines (wind turbines) normally have the working surface traveling in the direction of the wind and main components are located at the base of the turbine.

Horizontal axis machines (wind turbines) have the main rotor shaft and electrical generator at the top of the tower, and may be pointed into or out of the wind. This type of wind turbine has higher efficiency than the vertical axis machines but both type have advantages and disadvantages.

As a definition we say that wind turbines are machines that converts kinetic energy from the wind into electrical power.

For the production of energy a large set of components are used such as: blades, rotor generator, anemometer, gear box and so forth. Farmers are known as the most interested in developing this type of energy, using large size systems to generate large quantities of electricity. For smaller consumers there are several systems that can easily be managed, such as the rooftop windmills. Rooftop windmills are efficient and offers a promise of a clean energy in lower cost, these turbines are generally rated at 400W to 1kW. With 1kW turbine would generate 24kWh of energy each day (1kW * 24 hours), that would be true if the wind were blowing constantly at the rated wind speed. But the fact is, neither of those conditions are likely to occur on a rooftop.

A hybrid energy system usually consists of two or more renewable energy sources used together to provide increased system efficiency as well as greater balance in energy supply. With the rise in prices of petroleum products this type of systems are becoming popular in the remote areas, power generation applications due to advances in renewable energy technologies.

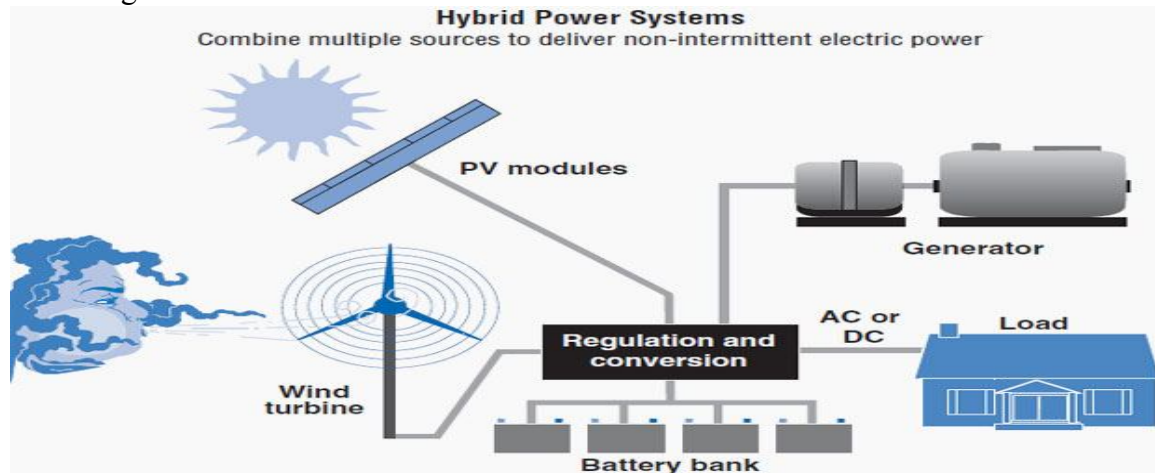


Figure. 1. Combined power systems or hybrid systems.

The functionality of the system is shown on the figure 1. It must be mentioned that a single solar energy system could reduce the bills of electricity in about 50%. Combined to the wind system this efficiency tend to reach 100%. So we can observe that 100% efficiency can be reached if all the conditions are favorable both technically and technically. This layout is mainly of farms usage is not common in urban areas, smaller systems are to be used in urban environments which helps the reduction of the electricity bills in about 50%. The rooftop windmills combined with smaller solar panels and some other components such as batteries are to be used.

There is more to say about this broad topic and is clear that the usage of this system will revolutionize the way energy savings are made, the sources are free and clean. We can assure that it has more advantages than disadvantages. A small profit can be made in case the system generates more electricity than needed for home use by selling to the nearest neighbors. We have been observing closely the evolution of one company called Windenergy7 LLC, based in United States of America they are developing this systems and making huge profits by promoting this environmental friendly energy production and helping thousands of people to save on bills payments and energy savings.