

Hardware Implementation of a Renewable Hybrid Power Generation

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Abstract— The importance of hybrid system has grown as they appeared to be the right solution and clean and distributed energy production. There is pressing need to accelerate the development of advance clean energy technologies in order to address the global challenges of energy security, climate change and sustainable development. This paper concentrates on the design and implementation of multi source hybrid solar, wind, and hydro system with proposed energy management strategy. This paper is implemented in accordance with available renewable energy sources. Battery in the system is charged by either solar, wind or hydro power via CCU.

Keywords - Hybrid energy system, battery, renewable energy sources, CCU

I. INTRODUCTION

Energy is an important input in all sectors of our country's economy. Today whole world is facing energy crises because fossil fuels like petrol, diesel, etc is used as main fuels for various transportation vehicles. There is a fear that they will be exhausted eventually in the next century. Among all the renewable energy sources solar energy has the greatest potential. Its potential is 178 billion MW which is about 20,000 times the world's demand. Wind turbines are used to convert the wind power into electric power. Electric generator inside the turbine converts the mechanical power into electric power. Wind turbine system is available ranging from 50 W to 2-3 MW. The energy production by wind turbine depends on the wind velocity acting on the turbine. Wind power is used to feed both energy production and consumption and transmission lines in the rural area. Renewable energy technologies offer the promise of clean, abundant energy gathered from self-renewing resources such as the sun, wind, water, earth, and plants. Virtually all regions of the world have renewable resources of one type or another.

Renewable energy technologies offers important benefits compared to those of

convectional energy sources. Worldwide, 1000 times more energy reaches the surface of earth from the sun than is released today by all fossil fuel consumed. Photovoltaic and wind generation are also an attractive source of energy because of their benign effect on the environment.

VARIOUS INPUTS FOR POWER GENERATION

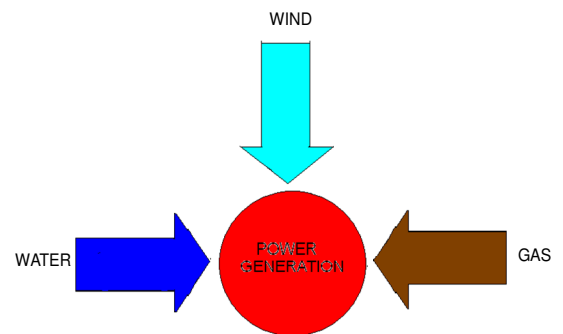


Figure 1 Various Inputs For Power Generation

1.1 Energy Resources

Since the invention of first engine in 17th century, energy consumption has been highlighted due to different causes, such as political, economic, world population based, requirements of new technologies in use. Persistent increase in the energy demand has caused to seek new energy resources in the world. New alternative energy resources have been also utilized to minimize the energy deficit.

1.2 Renewable Energy Resources

Renewable energy resources are the ones that are persistently available and renewing itself with the time. Industrialization and increasing world population has remarked the use of renewable energy resources. Solar power, wind

power, biomass, tide power, wave power, geothermal power is known ones.

1.3 Solar Power

Solar panels are the medium to convert solar power into the electrical power. Solar panels can convert the energy directly or heat the water with the induced energy. PV (Photo-voltaic) cells are made up from semiconductor structures as in the computer technologies. Sun beam is absorbed with this material and electrons are emitted from the atoms that they are bounded. This release activates a current. Photovoltaic is known as the process between beam absorbed and the electricity induced. With a common principle and individual components, solar power is converted into the electric power. Solar batteries are produced by waffling p-n semiconductors. A current-volt characteristic of the PV in the darkness is very similar to that of diot. Under beam, electron flow and current occurs. In closed-loop, PV current passes

1.4 Wind Power

Wind turbines are used to convert the wind power into electric power. Electric generator inside the turbine converts the mechanical power into the electric power. Wind turbine systems are available ranging from 50W to 2-3 MW. The energy production by wind turbines depends on the wind velocity acting on the turbine. Wind power is used to feed both energy production and consumption demand, and transmission lines in the rural areas. Wind turbines can be classified with respect to the physical features (dimensions, axes, number of blade), generated power and so on. For example, wind turbines with respect to axis structure: horizontal rotor plane located turbines, turbines with vertical or horizontal spinning directions with respect to the wind. Turbines with blade numbers: 3-blade, 2-blade and 1-blade turbines.

1.5 Hydro Power

Water from the reservoirs flows due to gravity to drive the turbine. Turbine is connected to

a generator. Power generated is transmitted over power lines. Water represents the most important renewable energy resource. An inventory of micro-hydro potential is required for the studies concerning the location of future micro hydro power plants.

2. ELECTRICAL MEASUREMENTS OF SOLAR PANEL

Solar panels were placed stationary. Therefore, measurements were carried out in different time of day since the incoming sunlight has different angles during the day. The input and output of C.C.U. and function of control card investigated for output voltage of solar panels and different output voltage.

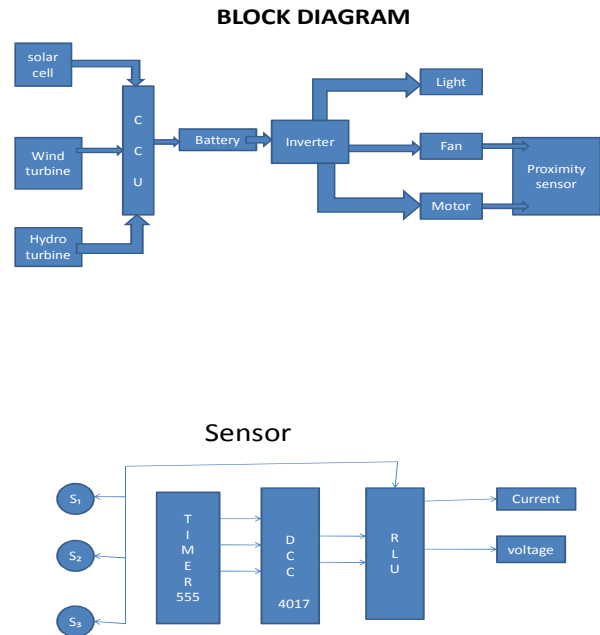


Figure 2

EXPLANATION

Figure shows the block diagram of the project model. It contains three renewable energy sources like solar, wind, and hydro. Solar cell is of 3watt, 12V, 1A. These sources are connected to

CCU which prevent from CCU to battery of 12V, 6A. This connected to inverter which converts DC to AC power. This AC power is used to run the loads, like fan, light, and motor.

Figure 2 shows the sensors. These three sensors are used for three different loads to show the various parameters like voltage and current. The special type of sensor used called as proximity sensor to measure the parameter torque and speed.

3. DIFFERENT MODELS OF RENEWABLE ENERGY SOURCES

- Wind Model
- Solar Model
- Hydro Mode

Each of the renewable energy technologies is in a different stage research, development and commercialization and all have difference in the current and future expected costs, current industrial base, resources availability, and potential impact on greenhouse gas emission. Hybrid power system consist of a combination of renewable energy sources such as: photovoltaic (PV), wind generators, hydro etc. To charge batteries and provide power to meet the energy demand, considering the local geography and other details of the place of installation.

These types of system, which are not connected to the utility grid, are also used in stand-alone applications and operate independently and reliably. The best applications for these systems are in remote places such as rural villages, in telecommunication etc. The importance of hybrid system has grown as they appeared to be the right solution for a clean and distributed energy

production. It has to be mentioned that new implementations of hybrid systems require attention on analysis.

Conclusion

Renewable energy resources are abundant in nature. They have to be wisely used for effective energy generation. A sustainable future requires this. The theoretical calculation of power available proves that if hybrid technologies are made available at low cost, power can be generated even in residences.

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COMPONENT NAME	DIAGRAM	SYMBOL
1. SOLAR PANEL		
2. WIND TURBINE		
3. CHARGE CONTROLLER		
4. BATTERY		
5. DECODED COUNTER		
6. TRANSFORMER		
7. RELAY		
8. INVERTOR		
9. TIMER 555		