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Renewable Energy Connected with Smart Grid in Rural Area Electricity

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Abstract – *This paper is based on renewable energy connected with smart grid in rural area electricity. The proposed system is designed by the two types of renewable energies which are available in the rural areas in our country India. In the future generation, the non-renewable energies are going to exhale day by day. So, the renewable energies are very much needed in our future. There are many types of renewable energies such as solar energy and wind energy. In this paper this types of renewable energies will be connected through the smart grid which can transfer the excessive energy from the renewable source to the city or one place to another place in the rural area. The smart grid can control electricity distribution with its smart characteristics manually from the power development authority of the state or country.*

Key Words: **Solar inverter, Wind turbine, IOT energy meter, IOT weather reporting system, smart grid**

1. INTRODUCTION

Renewable energy is the energy which is generated from the natural sources such as solar, wind and hydro energy. The renewable energy connected with smart grid in rural area electricity is the paper where solar and wind energy is discussed with the smart grid electricity network system. In this paper the smart grid is designed as IOT based which become cheapest as well as the grid concept. The smart grid is become very small which also can connect with the main power grid. In this paper the weather reporting system is externally connected with the small grid to get the weather report of the locality and it also can send the report to the main power grid.

Solar inverter:

Solar inverter converts the direct current (DC) to the alternating current(AC) using the solar power.

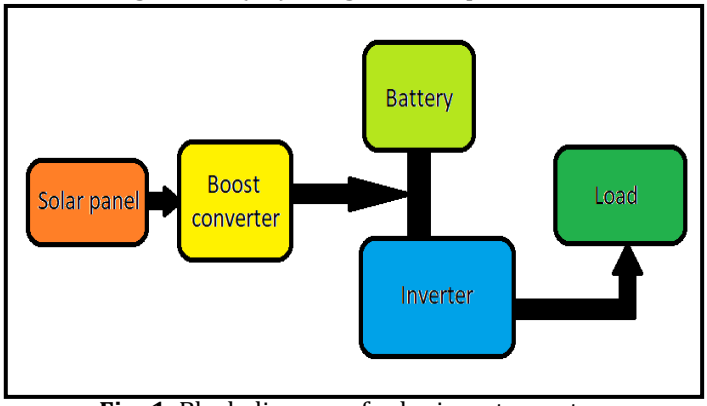

Fig -1: Block diagram of solar inverter system

The solar photovoltaic cell which is called solar panel is very necessary in the solar inverter. Solar panel generate the DC with the help of the photons which is coming from the solar rays. The DC converts in AC in the solar inverter.

In the solar inverter electronic equipment which is used to generate AC power from the DC power[1].The solar inverter is very important in the solar power system.

Wind turbine:

In the wind power system there are used wind turbine to produce the electricity. Wind turbines work on a simple principle. There are fan which is placed on the top of tower. The shaft of a DC generator is connected with the fan. When the wind blows the fan is rotated. With the rotation of the fan the shaft the DC generator is rotated and the DC power is generated by the DC generator [2].

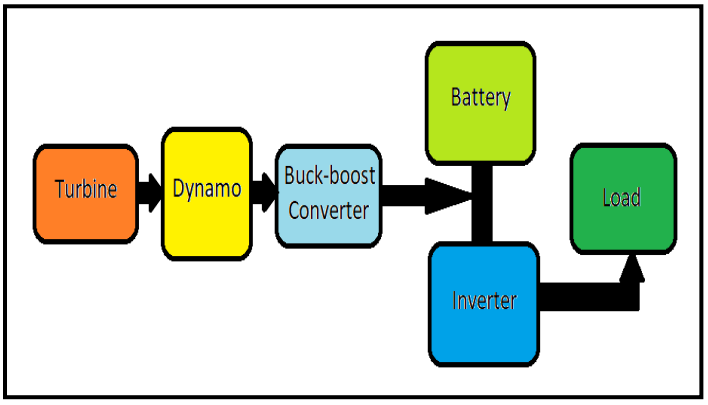

Fig -2: Block diagram of solar inverter system

The generating current goes to the inverter and the inverter inverts the DC power to the AC power. Next the power is transmitted to the area.

IOT Energy meter:

Internet of things (IOT) is developing in the new generation of technology. In the new technology the hardware system develops with the internet is increasing. In the domestic and industry there are used the energy meter to measure the energy which is used. In this paper the IOT based energy meter is discussed. The energy meter which is connected with the internet and which is measured the energy and show the measuring value using the IP address of the meter. It measures the energy anywhere in the world. Nodemcu ESP 8266 is an electronics module which is mostly used in IOT platform. A low cost Wi-Fi is enabled in it. It has

GPIO, PWM, UART pins for communication and controlling other external devices. Its hardware is based on the ESP 12 module. In the nodemcu ESP 8266 board there are connected cp2102 ic which provide the USB to TTL functionality [3].

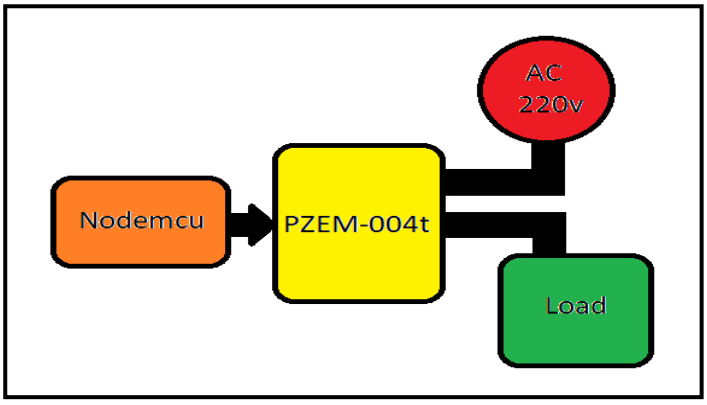

Fig -3: Block diagram of IOT energy meter

IOT weather reporting system:

In our country there are various seasons in a year. So the weather depends on the season and the electricity development board is also follow the load capacity and load demand on the based on weather report. There are many power station connect with a power grid. So every power station located in different area. So the weather is also different. So the weather reporting system is very important.

In this paper we will discuss about the IOT based smart weather reporting system which can deliver the report in every minutes and it is fully internet based system. The rain sensor, Humidity sensor, Pressure sensor are connected with the weather reporting system.

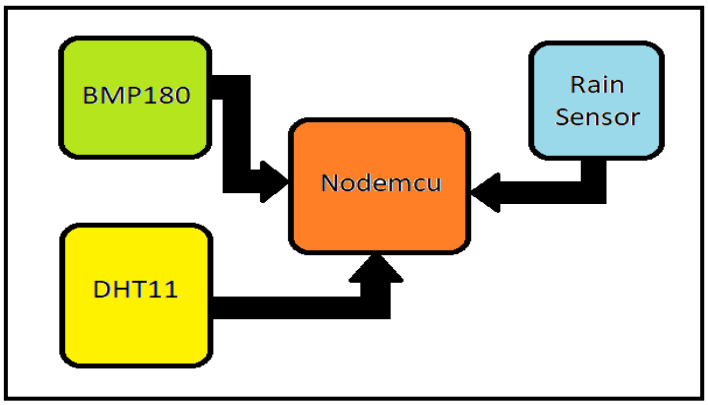

Fig -4: Block diagram of IOT weather reporting system

Smart grid:

Smart grid is an electrical grid which control electricity with the smart technology. The smart grid is connect with the automation, communication and IT system which can monitor power flows from points of generation to the points of consumptions [4]. The smart grid is efficient in transmission and distribution system.

2. WORKING PRINCIPLE

In this paper the renewable energy is connected with the smart grid which is located in the rural area. There are two types of renewable energy (a) Wind energy, (b) Solar energy. In the rural area there are many home. Every home is connected with the electricity. The power development board controls the power distribution depends on the load demand of the rural area.

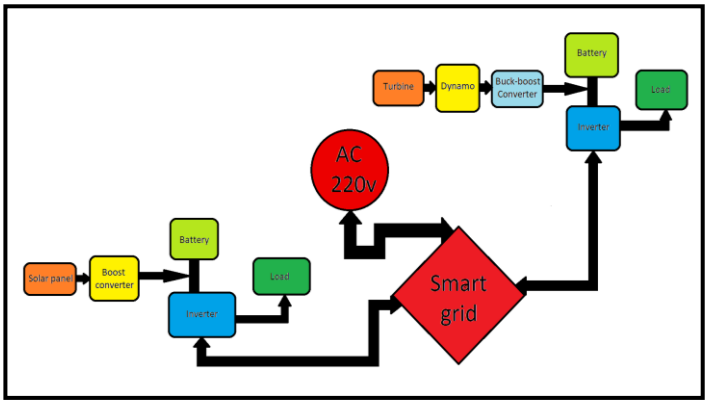

Fig -5: Block diagram of smart grid system

There are three systems in the smart grid. Every system is connected in parallel connection.

A. When the wind flows in the area the wind turbine is rotated and the electricity is generated in the mini wind power generation station which is located in the rural area. The power is distributed to the every home in the area. If the load demand sudden increase in this time, the grid will be deliver the electricity from the mini solar power generation station which is located in the area. If the load demand is very high, the grid will be delivered the electricity from the non-renewable power generation station. If the load demand is very low, the generating power is distributed to the city through the smart grid of the rural area.

B. In the day time, the mini solar power generation station is generated the electricity from the solar. The power is distributed to the every home in the area. If the load demand sudden increase in this time, the grid will be deliver the electricity from the mini wind power generation station which is located in the area. If the load demand is very high, the grid will be delivered the electricity from the non-renewable power generation station. If the load demand is very low, the generating power is distributed to the city through the smart grid of the rural area.

C. If both the renewable energy generation station is needed to maintenance in the same time, the electricity is distributed through the smart grid to the every home in the rural area. The consumers

monitor the energy consumptions in the IOT based energy meter which is placed every home in the area.

3. CONCLUSIONS

In this paper we have come to know about the renewable energy connected with smart grid in rural area electricity. The power grid concept is very popular in the electricity. The non-renewable energy is connected with the power grid. The frequency synchronization is very important in the power grid. We will synchronize the frequency of the renewable energy generation stations and connect this power with the smart grid in rural areas. The smart grid is connected with the large sub grid and the sub grids will be connected with the main power grid. In this paper the concept is related to the renewable energy with the smart grid.

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BIOGRAPHIES

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