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WIRELESS CHARGING OF EV THROUGH RENEWABLE GRIDS

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ABSTRACT

In this paper we are introducing an updated version of charging of batteries through renewable energy grids. The major sources of this charging by solar panels and wind turbine. A voltage regulator is used to produce a constant voltage at the output side. Buck-Boost converter is used to convert the low voltage DC[LVDC] to high voltage DC[HVDC]. A rectifier circuit is used only at the output of wind turbine which rectify the harmonics produced. This power is stored in the battery. The output of this battery can be used for any type of electrical components. However, we are using a switching mechanism used at the battery side which makes sure that output from the batteries will be continuous. This project also presents wireless charging of electric vehicle [EV] mainly focusing on resonant technology. The main goal is to transmit power using wireless power charging with the maximum efficiency at a low cost. The power is transmitted through resonance coupling. This technology uses mutual inductance which is standard. The energy sources of this system are solar and wind energy. Use of Buck-Boost converter, voltage regulator with C smoothing. Finally transmitting coil coupled with battery at both the end of these coil.

Keywords: Solar Panels, Wind Turbine, Buck-Boost Converter, Resonance Coupling, Mutual Inductance.

I. INTRODUCTION

As we move toward the next generation where each and every machine or some other things which makes human work easy will work only on electrical energy. If that is the case, then production of this energy and storage of these charges will be a major task for the humans. Though this project, we have come up with production of this energy by renewable energy. These two major renewable energies by renewable energy. These two major renewable energies is easily available in our nature. Even people living in urban area can easily find this out. Till now the major production of electrical charges were from thermal power plant, But the pollution produced by these power plants is very harmful to the nature. By the latest research, deforestation is increased from 11.5% to 22.5% in last 15 years. These woods actually go for burning. By this way, we make sure that production of electrical energy ill increase day by day and also make sure that we are not harming the environment. According to World Health organization report, India ranks 13th out of 20th highest polluted countries in the world. The implementation of this project can help us to reduce the carbon dioxide emission by about 50%. Battery charging from renewable energy system is possible with the hybrid wind-solar energy. Sustainable development is development that meets the needs of the present without compromising the ability of future generation to meet their own needs. Moving towards energy sustainability will require changes not only in the way energy is produced. In this project, we have proposed the design and development of the battery by renewable energy grids. Recently we have got to know through media that the capital city of India and one of the most rapidly developing cities in the world that is New Delhi and other major capital cities across the whole country is covered with dense atmosphere and the reason behind is because of the air pollution caused by the people over there. As of total research papers, 41% to 43% of the total air pollution is caused due to vehicle emission i.e., by petrol and diesel engine. To overcome this situation, the Indian government has taken major decision and reform on placing EV's on the Indian road. Certainly, if the number of charging station would also increase across the country. The method of charging the EV would be an important criterion. Through our project, we have introduced the charging of EV.

II. METHODOLOGY

The two modes of renewable energy sources used in this project is solar energy and wind Energy. Starting from solar PV cell and wind turbine which are the components which convert the natural phenomenon into electrical energy. Using of Buck-Boost converter is common for both solar PV cell and wind turbine, this converter make sure of increasing the low voltage into require high voltage which can be used to charge the battery. A rectifier with C smoothing is used only at wind energy source, as this circuit converts AC to DC only in one direction. After regulating the supply, this electrical energy is directly sent to the microcontroller in order to switch from



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one battery to another battery which is having higher potential using a relay and the supply is given to charging port. Then the battery connected to the wireless transmission, here mutual inductance is adopted as the major principle. The receiving coil is connected to the car's battery which results in charging of battery.

SOLAR PV PANELS

Photovoltaic [PV] is the conversion of light into electricity using semiconducting materials. Solar cell is made up of two types of semiconductor materials called P type and N type. When sunlight strikes a solar cell, electron in the silicon is ejected, which results in the formation of holes. The electron will travel from the ntype to the p-type layer by crossing the depletion zone and then go through external conductor producing electricity.

VOLTAGE REGULATOR

A simple voltage regulator can be made from a resistor in series with a diode. The basic voltage regulator used are IC 7800 series voltage, apart from this we can use IC 7805 and IC 7812.

WIND TURBINE

A wind turbine is a device that converts the wind's kinetic energy and the turbine gains just as much. Then, it is transferred to gear box in which the gears convert the relatively slow rotation of spinning blades into the higher speed motion. The gear, immediately behind the gear box takes the kinetic energy from spinning drive shaft and turns into electrical energy.

RECTIFIER

A capacitor input filter circuit in which the first element is a capacitor connected in parallel with the output of the rectifier in a linear power supply. The capacitor increases the DC voltage and The capacitor increases the DC voltage and decreases the ripple voltage component at the output side.

BUCK-BOOST CONVERTER

It is a DC-DC converter of the required voltage. Buck converter coupled with Boost converter gives Buck-Boost converter. The principle of this component is the inductor in the input circuit which resists sudden variation in input current. There are two modes of operation, continuous conduction mode and discontinuous conduction mode. This type of converter offers most efficient solution with smallest external components and is less expensive compared to most of the converter.

CONTROLLER

Here in this project, we will be using the Arduino. It is an open-source electronics platform based easy to use software and hardware. It is designed to make electronics more accessible to innovators. The users can develop their own kit using the components owing to its opensource hardware feature. This is basically used in communications and in controlling or operating many devices. Here we also use AT mega 168 which is an 8bit AVR microcontroller that comes with 32 pin interfaces. Another factor is, it is inexpensive compared to other microcontroller platforms and works with all the common operating systems. This microcontroller is used in this project in order to switch the power source to lower potential battery and the higher potential battery is directly given to charge point by using a relay.

BATTERY

There are many types of battery system, but in this project, we go with Li-ion battery because of the advantages like energy-weight ratios. High open circuit voltage, slow loss of charge. Even the life span of these battery is having long span. The working of this battery can be explained as the electrolyte carries positive charged lithium ions from anode to the cathode by vice versa through the separator. The movement of the lithium ions creates free electron in the anode which creates charge at the positive current collector.

RELAY

It is an electrically operated switch. They commonly use an electromagnet to operate their internal mechanical switching mechanism. In here, this relay is used at the battery side were switching of output power of the battery is controlled by this relay. This relay is coupled with micro controller chip, where the programming is done in such a way that battery with 100% charged till we switch it ON towards it, on the other side the other battery will be connected to B. B converter for charging.



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CHARGE PUMP

It is a DC-DC converter which uses capacitors to raise or lower the voltages. Capacitor is a major component in charge pump, where the functions of a capacitors is to store or charge and discharge the charges. The advantages of using this device is by low cost, which occupies less area and is compatible. J. CHARGING POINT The output of the battery system is given to the charging points where these points are capable of producing voltages which is varying from 10v-240v with 50 Hz frequency. These charging points, basic home appliances and other electronic devices.

WIRELESS CHARGING

The wireless electricity transmission is based on the inductive coupling techniques, the circuit consists of transmitter and receiver. Properties of coil are the inductance and power capability must meet the category requirements including the working frequency and transferring power. The mechanical dimensions must fit to the target applications, including the coil area, turns and thickness.



Figure 1: Block diagram of complete process of Recharging of EV through Renewable Grids.

IV. RESULTS AND DISCUSSION

We have successfully conducted the wireless charging of EV through renewable energy grids, it was observed that the voltage induced was 82% with a distance of 10mm. The voltage reduce is 64% when the distance is increased to 30mm. The induced voltage is reducing to half with 50mm distance. The experiment was conducted with coils wound for several turns each in primary and secondary. However, if there is not proper alignment of primary and secondary coils the charging time of battery will increase.

V. CONCLUSION

By developing this project, it looks forward to change all mechanical works into a purely electrical base, it is because of high efficiency and long span of the products. Eventually if number of electrical and electronic goods increases, the source which to provide the energy will also increase, and by this project, providing of electrical energy is successfully conducted. With above terms we find it easy to change their EV's without affecting



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environment. By this way encouraging people to be a part of improving economy and supporting the environment. The wireless charging supports for modern technological reforms. By this way, assist government is building up new reforms and the policy for the betterment of citizens

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