Design Development Hybrid Charging Station for EV/HOME Appliances

Shubhangi Hase[1], Suraj Padalkar[2], Sushant Pende[3], Tushar Jadhav[4], Pravin Thorat[5],
Department of Mechanical Engineering, SRTTC Kamshet, Pune.

***Abstract*—The demand for electricity power is increasing day by day, which cannot be met with the satisfied level without non-renewable energy resources. Renewable energy sources such as wind, solar are universal and ecological. These renewable energy sources are best options to fulfill the world energy demand, but unpredictable due to natural conditions. The use of the hybrid solar and wind renewable energy system will be the best option for the utilization of these available resources.**

If we combine these two it will help each other to overcome losses. Like when sunshine hour's solar PV systems will generate electricity and wind turbine systems will extract energy from wind sources. When wind conditions are not strong enough to produce power that time it's have backup to fulfill load demand & that will generate from the solar system

Compared to the traditional one-turbine wind-solar hybrid system, a new type of hybrid system—multi-turbine wind-solar hybrid system with eight 50 W turbines on a tower was designed and investigated. Experimental and simulated methods were used to study the power production of the hybrid systems, results show that eight-50 W turbine wind-solar hybrid systems have more power production than the traditional hybrid system, and the reliability of the new hybrid system also improved.

***Index Terms*—EV Home Appliance,Wind-Solar Hybrid Station,Charging Station.**

I. INTRODUCTION

For the development of any country, energy plays an important role. It is a very essential part of the growth and economy of a country. Our primary source of generating energy is from coal, oil and natural gas. We all know that energy is needed for industrial, agriculture, commercial& domestic purposes. World's energy demand is increasing day by day. There are many sources of generating energy from coal, fossil fuels, oil & other gases. But all these sources are harmful to the environment so there are limitations of using these sources and they are limited.

Hybrid power is combinations between different technologies to produce power. Variability of renewable sources like solar and wind remains a major concern, despite a substantial decrease in the capital cost of their power conversion devices. One of the methods to improve the reliability of power is to combine more than one renewable power source and storage systems together, as per the local renewable potential, which is called Hybrid Renewable Energy System (HRES).

Most of us already know how a solar/wind power generating system works, but all these generating systems have drawbacks of some kind. Solar panels, for example, are expensive to set up, and peak output is not obtained during the night or cloudy days.

Similarly, Wind turbines can't operate safely in high wind speeds, and low wind speeds produce little power.

So, if both are combined into one hybrid power generating system the drawbacks can be avoided partially/completely, depending on the control units. As one or more drawbacks can be overcome by the other.

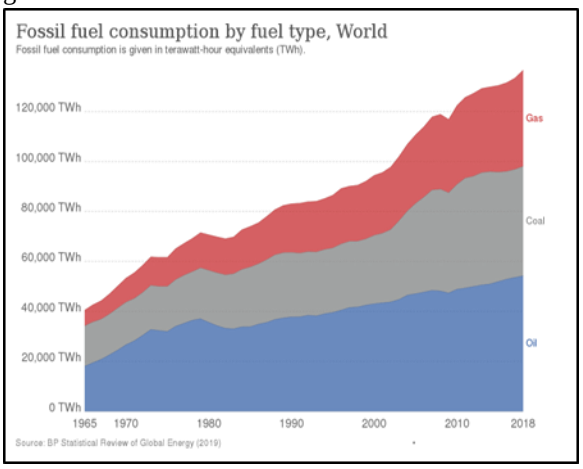
II. OBJECTIVE

1) To develop a hybrid energy system consisting of Solar and Wind energy for electronic device charging.
2) To increase consumption of Renewable sources of energy.
2) The combination of wind and solar has the advantage that the two sources complement each other because the peak operating times for each system occur at different times of the day and year.
3) The power generation of such a hybrid system is more constant and fluctuates less than each of the two component subsystems.

4) To provide a framework for promotion of large grid connected wind-solar PV hybrid systems for optimal & efficient utilization of transmission infrastructure and land, reducing the variability in renewable power regeneration & achieving better grid stability.
5) Instead of charging your phone, tablet, or another device from a wall outlet, you charge it from the power stored in the portable charger by inserting the charger (or charger cable) into the device that needs.

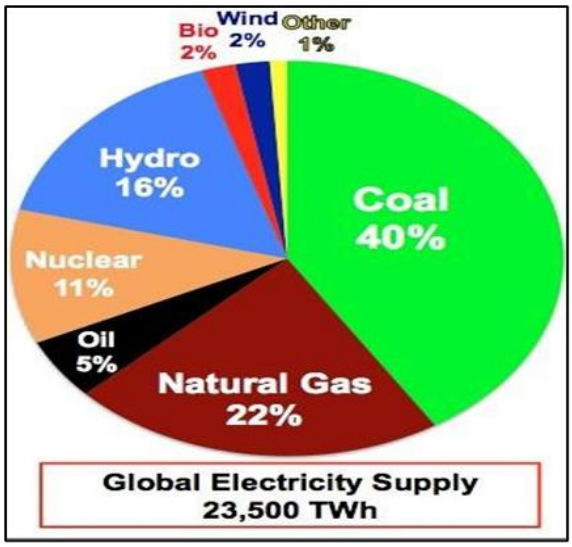
III.PROBLEM STATEMENT

Energy is recognized as a critical input parameter for national economic development. Modern day energy demands are still met largely from fossil fuels In 1980, the global primary energy demand was only 7228 million tons of oil equivalent (mtoe) but this had increased to 11429 mtoe by 2005 (WEO 2007). Further increases can be expected, mostly in connection with increasing industrialization and demand in less developed countries, aggravated by gross inefficiencies in all countries.



Graph of fossil fuel consumption by fuel type

Fossil fuels provide energy in a cheap and concentrated form, and as a result they dominate the energy supply. In the worldwide total energy demand, the share of fossil energy is around 80%, while the remaining 20% are supplied by nuclear and renewable energy (Rout 2007). In 2005, a total of 26.6 billion tons of CO2 emissions were generated world-wide of which more than 41% was from power generation based on fossil fuels (WEO 2007). The CO2 emissions from power generation are projected to increase 46% by 2030 (WEO 2007). In 1980, total global electricity generation was 8027-terawatt hour (TWh), which had increased to 17363 TWh by 2005. The installed capacity of power generation was 1945 gigawatt (GW) in 1980 and had increased to 3878 GW by 2005 (EIA 2010) of which almost 69% was from conventional fuels.



IV.NEED FOR PROJECT

Like any human activity, all energy sources have an impact on our environment. Renewable energy is no exception to the rule, and each source has its own trade-offs. However, the advantages over the devastating impacts of fossil fuels are undeniable: from the reduction of water and land use, less air and water pollution, less wildlife and habitat loss, to no or lower greenhouse gas emissions.
In addition, their local and decentralized character as well as technology development generate important benefits for the economy and people.
Renewable energy emits no or low greenhouse gases. That's good for the climate.
The combustion of fossil fuels for energy results in a significant amount of greenhouse gas emissions that contribute to global warming. Most sources of renewable energy result in little to no emissions, even when considering the full life cycle of the technologies.
Renewable energy emits no or low air pollutants. That's better for our health. Worldwide increases in fossil fuel-based road transport, industrial activity, and power generation (as well as the open burning of waste in many cities) contributes to elevated levels of air

pollution. In many developing countries, the use of charcoal and fuelwood for heating and cooking also contributes to poor indoor air quality. Particles and other air pollutants from fossil fuels literally asphyxiate cities. According to studies by the World Health Organization, their presence above urban skies is responsible for millions of premature deaths and costs billions.

Renewable energy comes with low costs. That's good for keeping energy prices at affordable levels.

Geopolitical strife and upheavals often come with increasing energy prices and limited access to resources. Since renewable energy is produced locally, it is less affected by geopolitical crisis or price spikes or sudden disruptions in the supply chain.

V. LITERATURE REVIEW

Literature review is one of the scope studies. It works as a guide to run this analysis. It will give ideas to operate the test from the earlier stage of the project, various literature studies have been done. Research journals, books, printed or online conference articles were the main source in the project's guides. This part will include almost all operations including the test, history, machining properties and result. Literature review sections work as reference, to give information and guide based on journals and other sources in the media.

1.REVIEW ON WIND-SOLAR HYBRID POWER SYSTEM

Sumit Wagh Dr. P.V. Walke [2] this author in the present paper, gives a brief description of the general features of hybrid energy. In this paper, wind and solar hybrid systems have been designed for travelers and remote areas where electricity is not easily available. Since, this charger is based on a non-conventional source of energy and hence, the running cost of this charger is very low.

2.SOLAR POWER OPERATED TABLE FOR CHARGING ELECTRONIC GADGETS

Dinesh KelothKaithari, Amira Khamis Salim Al Ismaili,M. Achuthanthis author gives a brief description of the solar table taking advantage of the sunlight. Solar table will collect all the energy from the sunlight to help the people to charge the electronic gadgets. This will be an eco-friendly solar panel table. The solar table also eaturees recharging connectivity for many electronic gadgets such as laptops and smartphones. The solar panel needs to pull power from the battery which works like source power backup at night.

There is a USB port to charge the phone.

3.Solar Roller – Solar Powered USB Charging Station:AaronBartfeld,TannerMjelde,KaylanNaicker[3]

The obvious benefit of solar power over fossil fuels is that they are essentially 100% clean energy, producing zero emissions that directly contribute to climate change and environmental concerns.

Extracting and using fossil fuels is expensive and harmful to the environment. Greenhouse gases, which are produced when fossil fuels are burned, lead to rising global temperatures and climate change. Climate change contributes to serious environmental and public health issues, including extreme weather events, rising sea levels, and ecosystem changes.

4.Wind Turbine Blade Design:Peter J. Schubel, Richard J. Crossley this author gives a detailed review of the current state-of-art for wind turbine blade design, including theoretical maximum efficiency, propulsion, practical efficiency, HAWT blade design, and blade loads. The review provides a complete picture of wind turbine blade design and shows the dominance of modern turbines' almost exclusive use of horizontal axis rotors. The aerodynamic design principles for a modern wind turbine blade are detailed, including blade plan shape/quantity, aerofoil selection and optimal attack angles. A detailed review of design loads on wind turbine blades is offered, describing aerodynamic, gravitational, centrifugal, gyroscopic and operational conditions.

5.Recurrence for the wind tree model

A.Avila & P. HubertIn this paper, we give a geometric criterion ensuring the recurrence of the vertical flow on Z d- covers of compact translation surfaces ($d \geq 2$). We prove that linear flow in the wind tree model is recurrent for every pair of parameters and almost every direction.

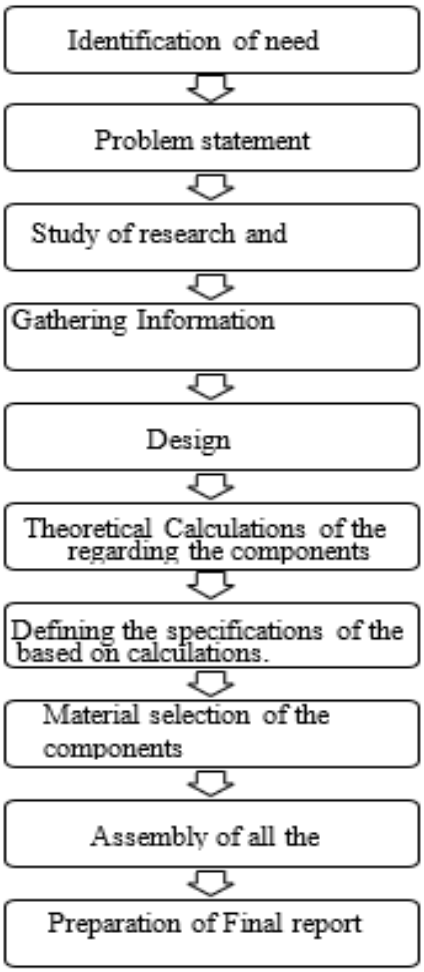
6.Feasibility analysis of a new tree-shaped wind turbine for urban application: A case study Mostafa Rezaei, Mehdi Jahangiri, Mojtaba Qolipour. In this study, feasibility of a new wind power generation

system for urban application in Hormozgan Province of Iran is investigated. The wind turbine system in this study is a novel, aesthetically pleasing, noiseless, pollution-free, potentially cost effective, and high efficiency design called tree-shaped wind turbine (TSWT). Techno-economic evaluation is performed on eight urban areas in the province using the software HOMER. Multi-criteria decision-making approaches are used to prioritize the areas in terms of the best location for installing such a new system. The results of techno-economic analysis examining a wind power system consisting of 25 TSWTs show that the most electricity production would occur for Jask city which is 529,450 kWh/yr. Also, the least amount of electricity which is 339,275 kWh/yr belongs to Bandar Abbas. Considering the most important criteria including electricity production, levelized cost of electricity, population, land price, environmental impact, and frequency of natural disasters, data envelopment analysis, and the fuzzy technique for order of preference by similarity to ideal solution are employed to rank the cities. The results are validated by two different methods. Finally, it is suggested that Sirik is the best location for using the aforementioned wind turbine.

7.Generation of Electricity by Wind Tree

Shekhanabi B Chalageri, Akash M Deshpande, Manjunath S Banad, Anoop S Pavate, Prof. Sujata Eresimi.In this project we considered wind as a renewable source of energy to generate electricity. Wind energy is a source of renewable power which comes from air current flowing across the earth's surface. Wind power plants can make a significant contribution to the regional electricity supply diversification. Wind energy system transforms the kinetic energy of the wind into electrical energy that can be used for practical use. Wind electric turbines are employed to generate electricity. And there are two basic designs of wind electric turbine, Horizontal axis wind turbine and Vertical axis wind turbine. Vertical axis wind turbine can further be classified into two types Darrieus type and Savonius type. Darrieus type rotor wind mill needs much less surface area. It is shaped like an egg beater and has two or three blades shaped like aero foils. Savonius turbine is S-shaped if viewed from top. This turbine turns relatively slow, but yields high torque. It is used for grinding grains and for pumping water.

VI.METHODOLOGY



VII.FUTURE SCOPE

1.This being a prototype, small scale project that can be implemented in large scale.

2.We can install this set up beside roads, as there is an open unused space along the road where wind energy from the movement of vehicles can be utilized.

3.We can install this set up on terraces of buildings to supply continuous, clean energy for household purposes.

4.For commercial use, we can install this set up on unused land and produce energy.

5.As the world is moving towards Electric Vehicles, the need for charging stations is increasing which can be fulfilled by using this concept.

6.We can increase the number of trees for more output.

VIII.CONCLUSION

Many hybrid systems are stand-alone systems, which operate "off-grid" -- that is, not connected to an electricity distribution system. For the times when neither the wind nor the solar system are producing, most hybrid systems provide power through batteries and/or an engine generator powered by conventional fuels, such as diesel. If the batteries run low, the engine generator can provide power and recharge the batteries.

Adding an engine generator makes the system more complex, but modern electronic controllers can operate these systems automatically. An engine generator can also reduce the size of the other components needed for the system. Keep in mind that the storage capacity must be large enough to supply electrical needs during non-charging periods. Battery banks are typically sized to supply the electric load for one to three days.

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