Wind Turbine and Solar Operated Electric Car-A Review

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Abstract— Energy and environmental issues are among the most important problems of public concern. Wind and solar energy may be one of the alternative solutions to overcome energy shortage and to reduce greenhouse gaseous emission. Using electric cars in cities can significantly improve the air quality there. Through our analyses and modeling on the basis of the National Centers for Environment Prediction data we confirm that the amount of usable solar and wind energy far exceeds the world's total energy demand, considering the feasibility of the technology being used. Storing the surplus solar and wind energy and then releasing this surplus on demand is an important approach to maintaining uninterrupted solar- andwind- generated electricity. This approach requires us to be aware of the available solar and wind energy in advance in order to manage their storage. Solar and wind energy depends on weather conditions and we know weather forecasting. This implies that solar and wind energy is predictable. In this article, we demonstrate how solar and wind energy can be forecasted. We provide a web tool that can be used by all to arrive at solar and wind energy amount at any location in the world.

Key words: Frame, Solar Panel, Wind Turbine, Battery, Motor and Pulley Assembly

I. INTRODUCTION

Total carbon dioxide (CO2) emission from fossil fuel burning reached 28 billion metric tons in 2005 and the emission has resulted in the increase of CO2 concentration in the atmosphere [International Energy Agency, 2008]. CO2 is called a greenhouse gas because it traps long- wave radiation escaping to space and may be responsible for the increasing global mean surface temperature [Cotton and Pielke, 1995; Kiehl and Trenberth, 1997]. Recent decrease of snow and ice quantities over the Arctic [Oelke et al., 2004] and the collapse of a huge ice chunk in western Antarctica in March 2008 have brought more public attention to climate change [Houghton, 2001]. Fossil fuel burning has also led to acid rain and atmospheric pollution. Air quality of cities is mainly affected by vehicle emissions. When Beijing restricted the use of personal vehicles (a car with an even- numbered tag may be used on even dates) during the 2008 Olympics, air quality was significantly improved [Wang et al., 2010]. We can imagine how good air could be if everyone used electric vehicles. A shift from gasoline to electric cars would greatly boost the economy if we speed up the switchover to electric cars. Certainly, more electric cars would mean fewer gasoline cars needed. In addition, a faster shift to electric cars will need more new cars than before, so more new jobs will be added. This article discussed a future perspective of zero- emission electric vehicles derived by solar and wind energy. Solar and wind energy resources can meet the world's demand. The total annual downward solar energy at the surface is 6800 times more than the world annual energy consumption. The global wind within 200 m of the surface provides much more power than current global power consumption. Accurate estimation of global wind power is complex because the capture of wind power in one place may affect wind power in another place.

Solar and wind energy has been used for a long time. Solar heat has been used to dry foods, cook food, and heat water. Solar electricity has also become a unique energy resource on spacecrafts. Photovoltaic (PV) cells can convert sunlight into electricity. Solar thermal technologies use concentrator systems to heat a working gas or fluid for running a conventional power plant [Forsberg et al., 2007]. Windmills have been used to convert wind energy into mechanical energy for more than 1000 years. However, renewable energies are still highly underutilized. A paper [Turner, 1999] in Science Magazine outlines the future of renewable energy. The technology for solar and wind energy is now ready for applications [Grimes et al., 2007], but the cost is very challenging if environmental issues caused by fossil fuel burning are ignored and the Earth's treasury is never paid. In addition, to provide uninterrupted cost-effective energy supply, the storage of solar and wind energy is necessary.

In this study, we analyzed 65 years (1948–2012) of reanalysis data from the National Centers for Environment Prediction (NCEP) and the National Center for Atmospheric Research (NCAR) [Kistler et al., 2001]. It is a 2.5° × 2.5° in latitude and longitude gridded data set. The data set is used for studying the global trend. The NCEP T384 (~50 km resolution) analysis data set that is of a higher spatial resolution and used for imaging is used in our web tool. The downward solar radiation flux is obtained from the data sets. Air temperature, surface pressure, and wind speed are used to calculate the surface wind power.

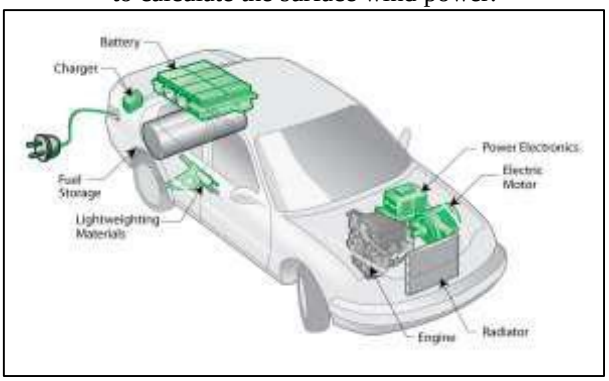

Fig. 1.1: General diagram of electric car

II. LITERATURE REVIEW

A. M. A. Spina, R. J. de la Veg

The conception and assembly of an experimental Hybrid Electric Vehicle based on the combination of human energy contribution and photovoltaic solar energy is presented in this manuscript. The vehicle has a battery for storing the energy provided by both systems. The application's aim is to achieve the lowest possible energy consumption for the vehicle's

movement, with photovoltaic modules as the main electricity source. The development of the solar vehicle was motivated by a Latin-American solar vehicles race about 1000km across the Atacama Desert in Chile, South America. The main constructive aspects, energy issues and experimental results are presented. The main aspects of the design of an experimental solar vehicle based on hybrid system that combines photovoltaic solar energy and human energy contribution was presented and described in this manuscript. Special emphasis has been stressed to the photovoltaic solar energy as main electricity source of the solar vehicle. Excellent results related to transmission, weight, and flexibility were obtained using styrene base polymer to encapsulate the solar cells. The final cost of the solar panel is smaller than the commercial solar modules. The research in different stages of the project led to the utilization of LiFePO4 batteries because of its relevant characteristics for its use in electric vehicles.

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Due to scarcity of fossil fuel in future and its detrimental effect on the environment, an alternative energy has to be discovered. Wind power is clean and sustainable natural resources that has yet to be fully utilized in the automotive industry.Also the sun is probably the most important source of renewable energy available today. The hybrid system has been designed and installed to generate power which combines wind turbine and solar panel. The hybrid model system is renewable energy system, which helps conserve energy by reducing the use of fuel in vehicle. Hence developing a new method for the economical evaluation of Hybrid Systems for electricity production. After making the final completion of project it is found that project is in working condition.It is found that prototype captured the solar energy through solar panel and wind energy through fan induced on it.There are huge potential for producing electricity from renewable sources. This paper gives a clear idea that vehicle powered with the help of solar energy and wind energy is more effective than fuel vehicle.

C. Mr. Swapnil M.Dorle1, Mr. Ameya V.Borgaonkar2

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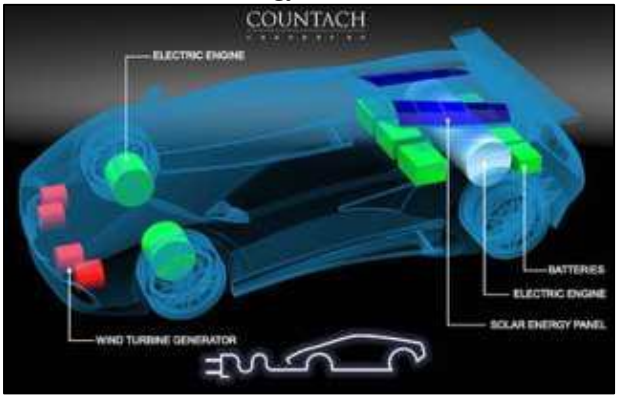
D. Mr. Ravi Shankar, Ms. Shneha Moni

The conventional electric car finds the difficulty of charging it after few kilometers but the wind and solar powered car helps to eliminate this drawback as this car has the facility to be charged on board due to wind and solar energy. Taking into account air resistance, the design of the car is such that maximum aspects are taken into consideration. The sun and the wind energy are utilized to charge battery and generate the energy to run the car smoothly. Super capacitor helps for ripple free torque during motion. The wind and solar powered car has high efficiency and is a maintenance free car. The car works on the concept of charging and discharging of the battery on board. When the car runs, the motor consumes power from battery and after certain kilometers it needs to be recharged. In this car power is generated from wind turbines and the solar plates and are directed to the battery for the charging. The battery is recharged on board and the car doesn't need to be standby for charging.

III. PROBLEM STATEMENT

Calculations in the United Nations show that the world population will increase to about 10 billion people by 2050. Parallel to the population growth, the global energy requirement will rise considerable despite all further efforts concerning the rational use of energy. According to calculations by the World Energy Council (WEC), the worldwide primary energy consumption of currently about 12 billion tonnes coal equivalent per year will grow to a level of between 16 and 24 billion tonnes coal equivalent per year depending on the economic, social and political developments by the year 2020. This growth will mainly be based on fossil energy carriers which presently cover hardly 90% of the requirement. Hydrodynamic power and nuclear power cover at present about five percent each of the remaining 10 percent. The world total annual energy consumptions amount to 17 billion coal equivalent. So we have to use renewable energy sources.



IV. OBJECTIVES

1) Survey and study the solar and wind energy for powered the car.
2) Design the car for solar and wind energy.
3) Increases the renewable energy source use and reduce the loses of the petrol and diesel.
4) Achieve the maximum speed of the car.

A. Scope of the Project

We have the more scope to develop the solar and wind operated car because this are available for 8-9 months in India. So we can catch the maximum energy. Also the solar panel, battery, motor and turbine design are modifying every day and improve the efficiency. So we can develop high speed car.

The National Electric Mobility Mission Plan 2020 was released by the Ministry of Heavy Industry and Public Enterprises, Government of India with a view to enhance national energy security, mitigate adverse environmental impacts (including CO2) from road transport vehicles and boost domestic manufacturing capabilities for electric vehicles (GoI, 2012).

Urban transport planning in India has to address numerous challenges: deteriorating air quality, rising greenhouse gas emissions, and adverse rising energy security risks. There is increasing consensus among planners that a range of additional measures will be required, beyond the existing policies, to mitigate the adverse impacts of transport on these sustainability indicators. Electric vehicles (EVs) offer alternate mobility options that can help to redress these adverse impacts.

EVs so far have remained on the fringe. However, technology and battery advancements are making EVs more attractive to the consumer due to increasing convenience and affordability. EVs have already started to penetrate the market in several Indian cities. Given the established auto manufacturing industry in India, the expected growth in transport demand, and the recent interest in electric vehicles, India has the opportunity of creating domestic EV industry and emerging as a global leader in EV manufacturing market.

REFERENCES

[1] B.Sivaprasad, O.Felix, K.Suresh, G.Pradeep Kumar Reddy And E.Mahesh, "A New Control Methods for Offshore Grid Connected Wind Energy Conversion System using Doubly Fed-Induction Generator and Z-Source Inverter", International Journal of Electrical Engineering & Technology (IJEET), Volume 4, Issue 2, 2013, pp. 305 - 323, ISSN Print: 0976-6545, ISSN Online: 0976-6553.

[2] Pallavi M. Mankar*, Atul A. Ghute * M.E.[EE] student," Solar Powered Battery Operated Electric Vehicle As An Option For Fuel Vehicle", International journal of engineering sciences and research technology (IJESRT) [Mankar, 4(4): April, 2015] ISSN: 2277-9655

[3] "A Method for Generating Electricity by Fast Moving Vehicles" by S.Bharathi, G.Balaji, and M.Manoj Kumar Angel College of Engineering & Technology/ECE, Tirupur, India

[4] "Study of Solar Energy Operated Hybrid Mild Cars: a Review" by Ranjeet Singh, Manoj Kumar Gaur, Chandra Shekhar Malvi (International Journal of Scientific Engineering and Technology). Volume No.1, Issue No.4, pg: 139148(ISSN: 2277-1581) 01 Oct. 2012.

[5] Book -"Renewable Energy Technologies" a practical guide for beginners by Chetan Singh Solanki.

