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Research Article

Combating the Pollution with the Usage of Solar Energy for Vehicles

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Author Details

Yusnidah

Authors Affiliations

Politeknik Adiguna Maritim, Medan of Indonesia

Corresponding Author*
Yusnidah

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Abstract: Many studies have been conducted to reduce the usage of fossil energy due to its effect on pollution. This paper reviews the research findings of solar energy and is to find the benefits of using solar energy for vehicles. A review method was conducted to seek the data on solar energy. Data analysis shows that a solar electricity system does capture the sun's energy by the photovoltaic (PV) cells. Thus the cells convert the sunlight into electric power. Solar PV cells reduce pollution ; they save the environment such as land areas, ecosystems, and biodiversity. It concludes that the solar energy is one of the energy sources that are environmentally friendly and very promising in the future. It concludes that the solar PV cells make no pollution during the energy conversion process.

Keywords: *Solar energy; vehicles; pollution; save the planet; environment.*

BACKGROUND

The Solar Mobility concept is viable and strongly relies on the Energy Management System. The demonstration realized with more than ten electric vehicles shows the reduction of pollution (Merten *et al.*, 2012) if they are compared to bio-fuel energy. Solar electricity system captures the sun's energy with photovoltaic (PV) cells. The cells convert the sunlight into electricity which provide power to household appliances and lighting (Ansari & Rafique, 2011). Solar photovoltaics (PV) cells reduce the natural ecosystem destruction because they donot produce pollutants. Solar PV cells save the ecosystems and biodiversity (Gunerhan, 2009) from pollution like bio-fuel energy produces. Thus, solar energy is relatively affordable and it is appropriate for rural and urban regions (Ahmadi *et al.*, 2018). Big resource of solar energy available makes it has no capacity for electric power (Shuchi *et al.*, 2017). Solar cells produce direct current (DC) which could provide energy for household appliance and to charge a battery as well as stored energy (Rhodes, 2010). So solar energy is converted into electricity directly using devices based on semiconductor materials (PV).

This paper sought the data of the effectiveness of solar PV cells to reduce the pollution and pollutants and how the they save environment. Many studies and experiments have indicate that solar energy need to develop with high technology to replace the bio-fuels source. Pollution in big cities and industrial complex have the high air pollutants of bio-fuels usage for mechinary. The use of bio-fuels for vehicles and industry over the tolarate threshold. Based on the NREL report, several solar modules generate electricity on a utility scale (NREL, 2013). The application of solar energy for boiling water, moving steam and powering turbines (Traube *et al.*, 2013). They work based on the solar PV array capacity factors (Rhodes, 2009).

METHOD

This research used a review method to seek the studies that have done in developing the solar system as alternative energy. A procedure of reviewing the usage and benefits of solar energy as an alternative to bio-fuels to reduce pollution and save environment based on the experiments that have been conducted in many countries. Data collection was to seek the solar energy benefits over other conventional power generators. It analyzed the use of the smallest photovoltaic (PV) solar cells (Shaikh *et al.*, 2017). It collected data of pro-types and models of solar energy which would be ready to implement in future; applications of solar energy for the single houses and large electrical grids to vehicles.

Findings and Discussion

Findings

Solar energy uses the *phos* and *volt* cells. The term of photovoltaic consists of the Greek word *fwV* (phos), which means light, and -volt, which refers to electricity. An Italian physicist Alessandro Volta (1745-1827) invented the battery (Jäger *et al.*, 2014) as the pioneer of solar energy. Now the modern appliances and vehicles have the solar energy to replace the bio-fuels. It reported that the solar-driven vehicles has the arrangement and angle of silicon photocells. This systemmakes a new energy usage. In the usage, the changing solar radiation has a great impact on energy usage (Yang

et al., 2014). In clear weather conditions, it found about 1000 watts of solar energy per square meter. Solar energy is extraordinary; it is non-polluting, inexhaustible, trustworthy and non-purchasing. Solar or solar energy has been utilized in many parts of the world and if properly exploited, this energy has the potential to provide the world's current energy consumption needs for a longer time.

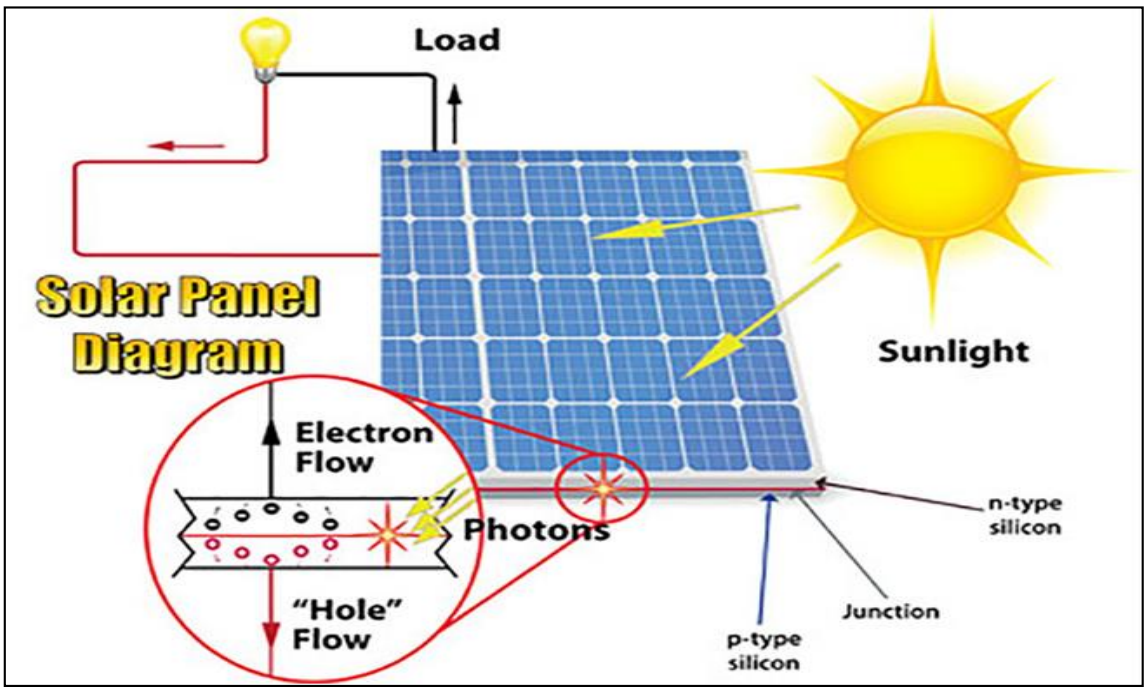
The sun can be used directly to produce electricity or to heat or even cool. The future potential of solar energy is limited only by our desire to seize opportunities. Thus, the PV panels have been added to the hybrid cars and it found be even more cost-effective than PV panels added to buildings. The low cost of solar PV panels on hybrid cars may displace the gasoline; it obtained a payback period much shorter than the payback for solar PV panels on buildings and displacing electricity (Rizzo *et al.*, 2010). It found 3 units of solar panel only contribute nearly 2 % of the total power consumption of the induction motor. The usage of simpler and lighter of body structure for EV, instead of using MBOV (Proton SAVVY); it makes a lighter body needs a smaller motor to run and less power consumption (Hussin *et al.*, 2011).

The solar panels contribution is significantly improved by adopting suitable Maximum Power Point Tracking (MPPT) techniques. Its role is more critical than in fixed plants. The recourse to an automatic sun-tracking roof to maximize captured energy (Rizzo *et al.*, 2010 and Mahajan, 2012). The solar energy does not result in the environmental pollution and health issues related to the living habitats (Hudedmani *et al.*, 2019).

Finally, data obtained show that the economic and emission impacts of EV charging better (Chowdhury *et al.*, 2018). The EV charging management to better align EV charging demand with PV output is valuable; it is to maximize benefits and minimize costs for EV projects and PV penetrations for industry (Vithayasrichareon, 2015). It found that for long period the EV projects can give significant benefits for the high cost and saving the planet from pollution. The government and industry could invest for the solar energy to have the long term benefits economically and environmental.

DISCUSSIONS

Many benefits from the usage of solar energy as an alternative of bio-fuels. Utilization of solar energy could be a pollution-free and renewable resource. Solar energy can be used either directly or indirectly. Solar energy can be used as direct heating, heating water and air with solar collectors, and providing electricity with PV cells. It proves that solar energy is one of the energy sources that are environmentally friendly. It is very promising in the future; it does not realizes pollution during the energy conversion process, and also the energy source is widely available in nature. Solar energy is the energy obtained by converting solar (solar) heat energy through certain equipment into other forms of power. Solar energy is one of the sources of power generation besides water, steam, wind, biogas, coal and petroleum.



Source:*https://etap.com/renewable-energy/photovoltaic-array-fundamentals/design-analyze-operate-photovoltaic-power-systems-with-etap*

A renewable energy program made; firstly the countries 'overall infrastructures should be analyzed to see the availability of natural resources and whether it is possible to produce and export to other countries as intended. That effort refers to an assessment of renewable resources. Various types of renewable resources such as hydrothermal, geothermal, solar, wind, marine, and bio-energies are available and they give the possibility to produce consistent power. Renewable sources of energy come in an unlimited supply, they do not emit greenhouse gasses into the atmosphere, or only a negligible amount thereof, and they are less expensive than the conventional sources; the renewable energy resources are classified into two categories based on their prime cause; solar-driven and non-solar driven. Finally, it shows that solar energy is one of the sources of power generation besides water, steam, wind, biogas, coal and petroleum. But benefits for a long time could be the comparative benefits in the future.

CONCLUSIONS

Data analysis gives two conclusions:

- Solar energy is one of the electricity sources that are environmentally friendly and very promising in the future, because no pollution is produced during the energy conversion process, and also the energy source is widely available in nature. Solar power is the energy obtained by converting the heat energy through certain equipment into other forms of power.
- Solar energy is one of the energies that is being actively developed at this time; Indonesia as a tropical country has made Indonesian government and private companies to consider its solar energy potential. The enormous energy in the Indonesian's earth's surface has some benefits.

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