

The Brief study on the Solar Energy

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ABSTRACT: Solar energy, Sun radiation capable of creating heat or producing electricity, inducing the chemical reaction. The whole quantity of occurrences of solar energy on Earth exceeds the present and future energy demand worldwide. This review article concentrates on solar energy and provides all the facts on solar energy, for example, why solar energy is significant in different industries. This assessment also gave the varied statistics from and usage of solar energy in different nations for different years. This research article also provides a comparison of the various forms of renewable energy and conversion, benefits and downsides of solar energy. Solar energy storage is crucial to the development of future energy systems because it makes it possible to use extra power produced day by day when the sun is less abundant (for example in night). Solar power plants store and sell extra energy later for a range of applications, including disaster preparation, grid stabilization and load levelling.

KEYWORDS: Energy, Electricity, Power, Renewable, Solar.

INTRODUCTION

Solar energy is defined as Sun heat and radiant light that are used by the continuously increasing array of technologies, such as solar heating, photovoltaics, solar-thermal energy molten salt, solar architecture and photo synthesis of power plants[1]. The sun generates 1.8 times a total of 1.0 to 22 J of the energy in 1.6 days. Its flexibility matches the tremendous quantity of energy of the sun. As seen in figure 1 the energy of the sun is utilized mainly in three ways[1].

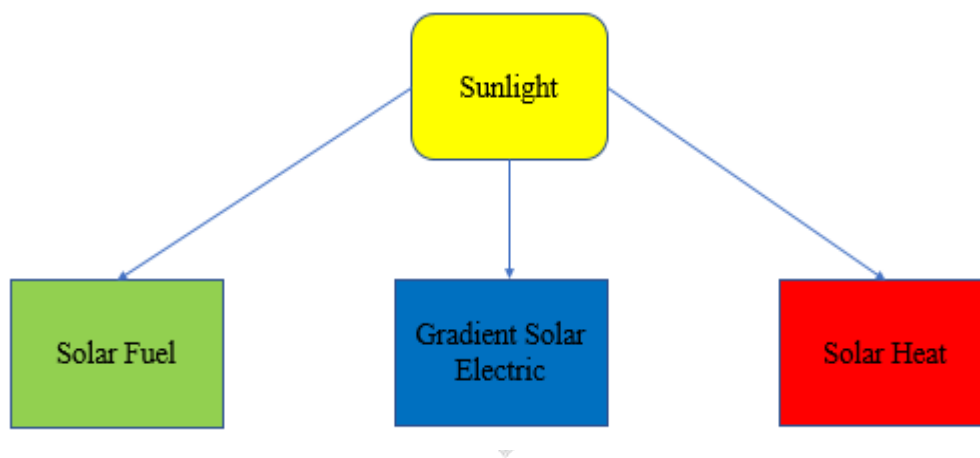


Figure 1: Three way to adjust solar energy to another kind of energy creation by artificial photosynthesis, generating electricity via solar cell exciting electron, and intentions to produce heat by sunlight.

Table 1 provides the yearly growth rate in percentage (geothermal, hydro power, PV solar, solar, wind, solar, solar heat and biological production) capacity in renewable energy sources in 2013. Table 1 illustrates the annual growth rate in % renewables[2].

Table 1: Yearly Growth Percentage of the Renewable-Energy Capacity in year 2013.

Types of Renewable Power	Values of Production of Renewable Energy (in Percentage)
Wind	12
Geothermal Power	3
Hydro Power	4

Ethanol Production	5
Biological Production	12
CSP(Concentrating Solar Power)	35
Solar Heating	16
Solar PV	38

Figure 2 displays renewable energy production values (in percentage) in 2013 and therefore clearly indicates that hydropower that contributes 4 percent energy provides the greatest production value via photovoltaic solar that contributes 38 percent of energy and the lowest value of production[3].

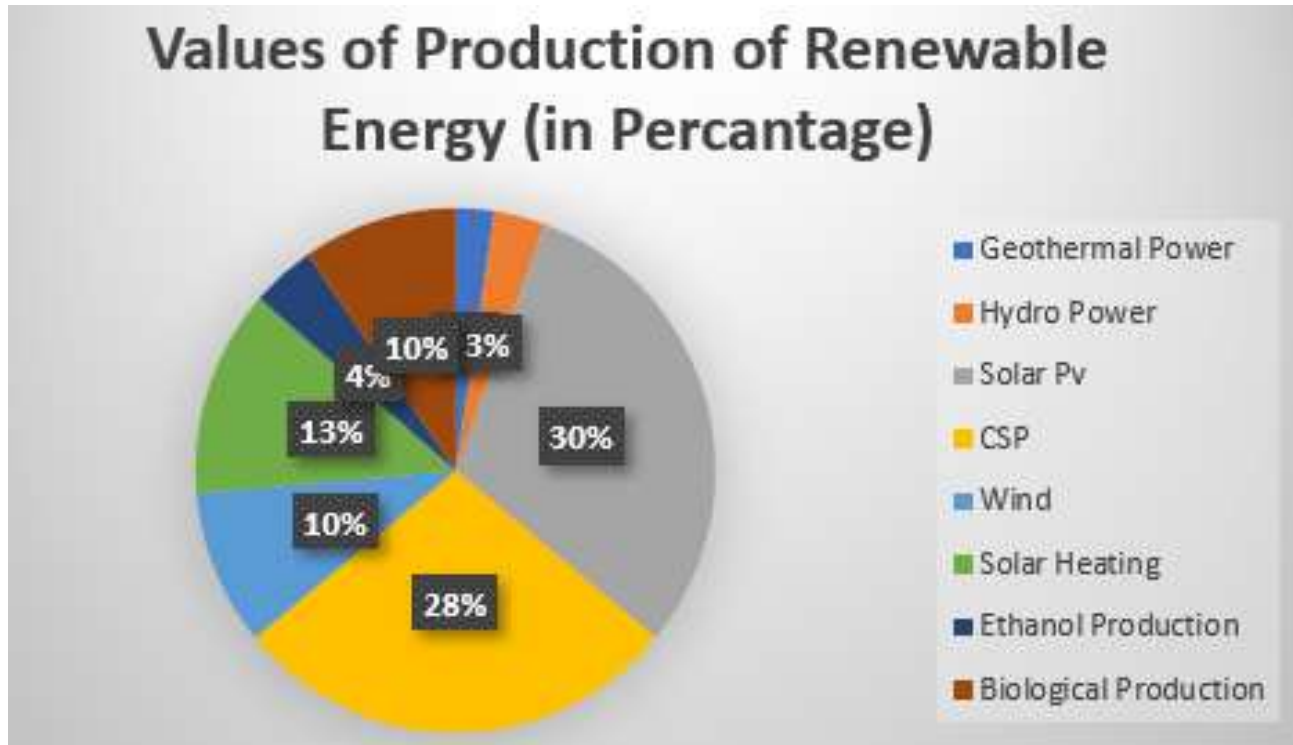


Figure 2: Graphical Representation of Value of the Productions of the Renewable-Energy (In Percentage) in 2013.

Figure 3 shows the simple solar systems consisting of PV modules, inverters, loads and converters (Direct Current-Direct Current DC). This is intended in all circumstances to provide maximum power transmission for loads or loads. This structure has two phases of power conversion, therefore 2 phase systems are termed[4]. The MPP track and adjust the DC load voltage for DC-DC converters [2].

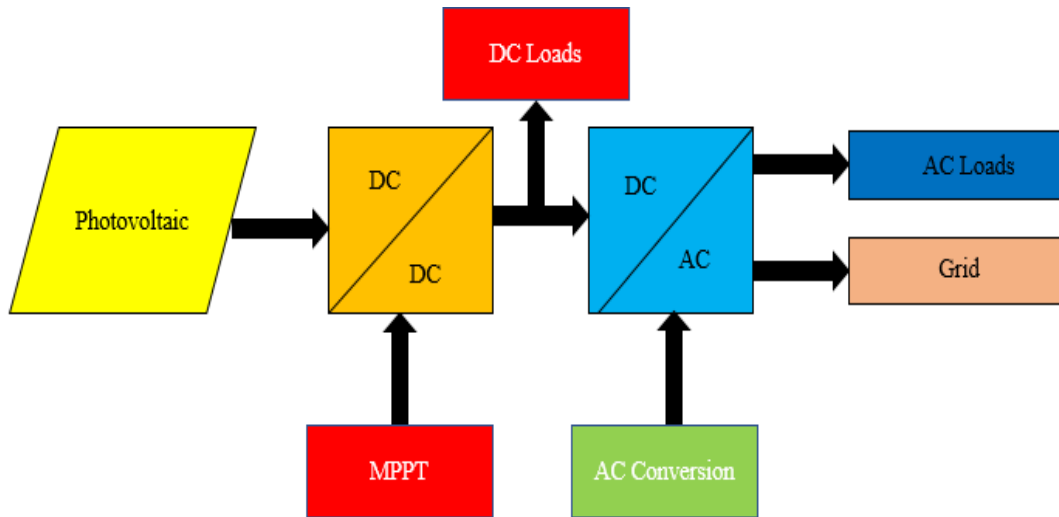


Figure 3: Block-Diagram of the Solar-Energy Translation System.

Table 2 displays the major nations' photovoltaic facilities in 2014 (China, Japan, United States of America, United Kingdom and Germany). Those nations employ solar energy as a renewable energy and have made photovoltaic systems for the production of electricity, cars and so on[5].

Table 2: Photovoltaic Installation in Year 2014 for the Top Countries.

Countries	Photovoltaic installation (in Gigawatt)
Japan	10
China	11
Germany	2
United States of America	6
United Kingdom	3

The installations for key nations (China, Japan, the United States, the United Kingdom and Germany) are shown in Figure 4 during 2014. It is obvious that China has made 11 photovoltaic installations more in Gigawatt and that there are only 2 photovoltaic installations in Gigawatt, Germany.

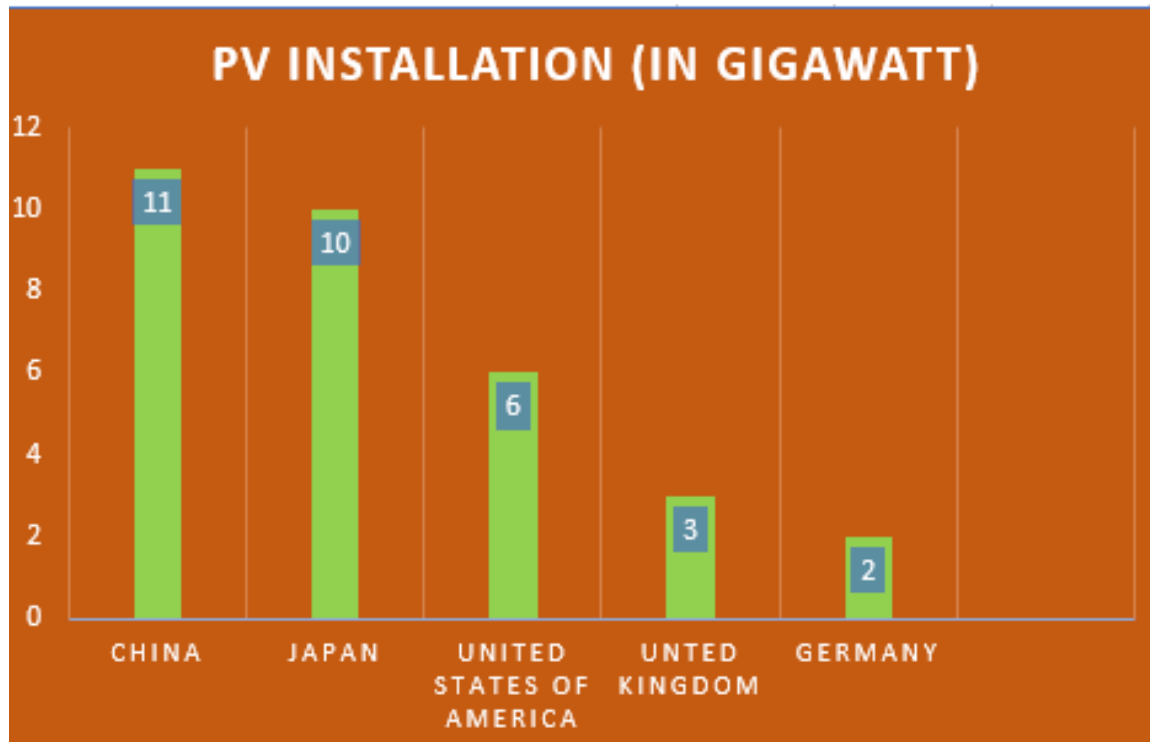


Figure 4: Graphical Representation of the Photovoltaic Installation in the Year 2014 for Top Countries.

Table 3 displays five major nations' 2014 proportion of solar power generation (China, Japan, United States of America, United Kingdom and Germany). These are the top five nations in 2014 for the generation of solar power. Using solar energy the countries gain several advantages[6].

1. Disadvantages And Advantages Of The Solar Energy

Solar energy is the heat and radiant light from Sun that is captured by the ever-changing technologies such as solar heat, photovoltaics, thermal salt, solar architecture and photosynthesis [3]. Solar energy is also a radiant light.

1.1. Advantages:

1.1.1. Reduce Electricity Cost:

The annual electricity cost may be easily reduced by up to 40,758.35 Indian rupee by creating own power via the solar panel. Moreover, if you create more electricity than usage, you may get money from selling it via Guarantee to the grid. The utilization of solar energy is therefore crucial in order to reduce energy costs.

1.1.2. Reduce Carbon Footprints:

Solar energy is an alternative for renewable energy, but it will assist the UK reach its emission goals and is a key step in combating climate change. Reduce carbon emissions in the protection of climate change threatening industries, ecosystems and animal settings[7].

1.1.3. 1.3 Renewable Sources of the Energy:

The objective of renewables such as solar is not only to combat climate change, but also to decrease air pollutants, which are one of the biggest issues in the world. The utilisation of the solar energy environment is therefore a saving from many kinds of environmental pollution and sickness.

1.1.4. Easy for Installation:

Solar panels are easy to put on the rooftop. It usually takes only days or two to power the solar energy at home. However, remember to impact the quantity of energy produced by the panels, the angle and orientation of the roover. You may customise your solar system to suit your unique demands using a number of systems.

1.1.5. Technologies Development:

Technologies are steadily increasing in the solar power sector, and this trend will continue in the future, with the progress in nanotechnology as well as quantum physics likely to increase solar panel efficiency and to double, if not treble, solar energy inputs[4].

2. Disadvantages:

2.1.No Electrics if Grid Go Downs:

Solar systems may shut down when the electricity grid goes down when they include battery storage. While a solar panel generates grid electricity, power cannot be supplied unless a battery back up is purchased in the event of a power loss. Grid Strung In order to avoid energy flows into the grid, Solar's systems have to be fitted with rapid shut-off modules under security law. This implies the machine will shut down before the grid is restored, when the electric grid is offline for whatever reason. This is mandated by law to safeguard anybody operating on electricity lines[5].

2.2 Land Usage:

Another problem is that solar power can devour more soil, leading to damage of the land or loss of animals. Even if the current infrastructure can be fitted to the solar photovoltaic system, a bigger photovoltaic system can require up to 11 acres in a megawatt, but a CSP can take up to 17 acres per megawatt. However, the impact can be mitigated by placing plants in small regions or along existing transmission and transport corridors[5].

2.2.Geographic Limitation:

Solar companies are increasing, but generally cover extremely tiny parts of the region. If you reside outside the service region of a solar provider, you will find someone who comes home tough. Living in remote locations is a difficulty as customer service might have trouble finding a solution if something goes wrong[6].

LITERATURE REVIEW

The following are the many scientists and their investigation on the subject of solar energy: As a consequence of the population and technological developments, global energy demand studies N. Kannan et al. have increased significantly. Therefore, a reliable, cost efficient and everlasting source of renewable energy is crucial for future energy needs. Solar energy is a feasible and easily available energy source for tackling long-term energy crises, like other alternative energy sources. The solar business is expanding fast throughout the world because of high demand for power because the supply of primary energy, fossil fuels, is limited and alternative options are expensive [7].

\Muhammad Badar Hayat et al. studies the complete renewable systems and the thorough examination of indirect and direct ways to solar power generation and of direct solar energy applications [8].

Mehreen Gul et al. Studies Solar photovoltaic technology is one of green technologies capable of forming a future, efficient, adaptable, cheap and clean energy system. Their paper contains a detailed review of solar-PV technologies including the performance of photovoltaic materials and the world's top countries [9].

Ashok Upadhyay et al. studies in recent years, options for solar energy have surged in popularity. This intensive curiosity has been contributed to and maintained by the comprehension of technical developments, the increasing public awareness of environmental issues, the current economic position, and the availability of several policies[10].

DISCUSSION

There are certain things lacking in their article which are presented in this paper after analysis and studies on solar energy from the above-mentioned literature review. In this review article, solar energy is highlighted and all information on solar energy is provided, including the reasons why solar energy is vital for usage in many

industries. This assessment also gave the varied statistics from and usage of solar energy in different nations for different years. This review article also includes a comparison of several renewable energy forms (e.g. geothermal power, hydro, photovoltaic (Photovoltaic) energy, CSP, wind, sun heating, ethanol production, and conversion to biologics).

CONCLUSION

We studied the solar energy issue in this review and give all necessary data like what is solar energy and why it is important to utilise in different sectors. This research also contained information about many nations, their progress and their various years' utilisation of solar energy. The study will also confront different kinds of green energy as well as solar energy conversion, benefits and disadvantages. Solar energy storage is crucial to the development of future energy systems because it makes it possible to use extra power produced day by day when the sun is less abundant (for example in night). Solar power plants store and sell extra energy later for a range of applications, including disaster preparation, grid stabilisation and load levelling. While the solar battery storage system doesn't seem to be a brainer, much effort is still needed to lower the cost of these systems, mostly composed of pricey batteries of lithium ion. In future, the installation of battery storages should become additional, as both prices and dependability drop.

REFERENCES

- [1] BP, "BP Statistical Review 2011," *Nucl. Energy*, 2011.
- [2] A. Habte, M. Sengupta, and A. Lopez, "Evaluation of the National Solar Radiation Database (NSRDB Version 2): 1998-2015," *Nrel/Tp-5D00-67722*, 2017.
- [3] R. Bryce, I. Losada Carreño, A. Kumler, B. M. Hodge, B. Roberts, and C. Brancucci Martinez-Anido, "Consequences of neglecting the interannual variability of the solar resource: A case study of photovoltaic power among the Hawaiian Islands," *Sol. Energy*, 2018, doi: 10.1016/j.solener.2018.03.085.
- [4] M. Jung *et al.*, "Recent decline in the global land evapotranspiration trend due to limited moisture supply," *Nature*, 2010, doi: 10.1038/nature09396.
- [5] J. E. Faust and J. Logan, "Daily light integral: A research review and high-resolution maps of the United States," *HortScience*, 2018, doi: 10.21273/HORTSCI13144-18.
- [6] D. K. Perovich, "On the aggregate-scale partitioning of solar radiation in Arctic sea ice during the Surface Heat Budget of the Arctic Ocean (SHEBA) field experiment," *J. Geophys. Res. C Ocean.*, 2005, doi: 10.1029/2004JC002512.
- [7] M. A. Dayeh, M. I. Desai, G. M. Mason, R. W. Ebert, and A. Farahat, "Origin and Properties of Quiet-time 0.11–1.28 MeV Nucleon -1 Heavy-ion Population Near 1 au," *Astrophys. J.*, 2017, doi: 10.3847/1538-4357/835/2/155.
- [8] M. B. Hayat, D. Ali, K. C. Monyake, L. Alagha, and N. Ahmed, "Solar energy—A look into power generation, challenges, and a solar-powered future," *Int. J. Energy Res.*, vol. 43, no. 3, pp. 1049–1067, 2019, doi: 10.1002/er.4252.
- [9] M. Gul, Y. Kotak, and T. Muneer, *Review on recent trend of solar photovoltaic technology*, vol. 34, no. 4, 2016.
- [10] A. Upadhyay and A. Chowdhury, "Solar Energy Fundamentals and Challenges in Indian restructured power sector," *Int. J. Sci. Res. Publ.*, vol. 4, no. 1, pp. 2250–3153, 2014.