Utilization of Solar Energy in Mahendergarh District, Haryana

Rishi Kumar[1], Dr. Kheraj[2]
[1]*Research Scholar, Department of Geography, Central University of Haryana, Mahendergarh, Haryana, India*
[2]*Assistant Professor, Department of Geography, Central University of Haryana, Mahendergarh, Haryana, India*

***Abstract*- The requirement for energy grows at a faster rate for less-developed nations. In developing countries like India, the energy problems are very serious. The use of traditional fossil fuels has serious and negative impacts on the environment. The pollutant emission in the atmosphere can be reduced by using renewable energy sources. Especially the use of solar energy plays a crucial role in developed and developing countries. Solar energy is renewable and sustainable because it is accessible as long as the sun shines. This study intends to analyze solar energy utilization and the awareness about solar energy in the rural area of Mahendergarh district of Haryana state. In this study Quantitative method, Qualitative method, and Simple Random Sampling methods are used. This study is based on primary data and secondary data. Primary data is collected through a Primary field survey in three villages by taking 99 samples. In rural areas of the Mahendergarh district, the breakdown of regular electricity supply is a major problem. That is why people have chosen the solar panel system. In the Rural area, most people have awareness about Solar energy but do not have awareness regarding government subsidies related to the use of solar energy, also nobody has taken government subsidies during the installation of solar panel systems. Most people have installed two solar plates in their households. People use many solar energy appliances like LED bulbs, fans, TV, Cooler, Washing machine, etc. By using Solar energy, people are also taking Economic benefits. As the awareness about the use of solar energy among the peoples is increasing day by day. It is observed in the study area that a large number of persons have no planning to increase the power of the installed solar panel system. It seems that they are satisfied with the current power of the solar panel system.**

***Index terms*- Renewable Energy, Solar Energy, Utilization of Solar Energy, Awareness about Solar Energy.**

1.INTRODUCTION

As the world population is increasing continuously and evolving consumer habits are the main reasons for an increase in energy requirement and electricity consumption. The requirement for energy grows at a faster rate for less-developed nations (Prasad et.al., 2017). The use of traditional fossil fuels has serious and negative impacts on the environment. Also, fossil fuels are not infinite or renewable. The pollutant emission in the atmosphere can be reduced by using renewable energy sources. Especially the use of solar energy plays a crucial role in developed and developing countries. Solar energy technologies offer energy independence and sustainable development (Prasad et.al., 2017).

Solar energy is the sun's radiation that reaches the earth's surface (Prasad et.al., 2017). Solar energy is largely utilized as Solar Water heaters, Solar Lamps, Solar Cookers, and Solar pumps in agriculture. In India, there are wide areas like deserts, rivers, and lakes and lakhs of acres of area available for setting up of solar power plants. Also, Solar energy is carbon-free energy.

In India, currently, many villages are unelectrified. These villages can be advanced by the use of solar energy. In a year with around 300 pure sunny days, over India, the everyday average solar energy occurrence varies 4-7 kWh/m^2, which is supplementary to the present total consumption of energy. Due to geographical location states like Bihar, Haryana, Punjab, Rajasthan, Gujarat, MP, Maharashtra, Orissa, West Bengal, and Andhra Pradesh have large potential for tapping solar energy. In India, a number of solar parks are mounted in many states like Gujarat, Maharashtra, Andhra Pradesh,

Rajasthan, Madhya Pradesh and the Ladakh region of J&K.

The Government of India has set targets of 175 GW total renewable capacity by the end of 2022. In developing nations, PV projects have delivered optimistic change in rural people's lives. Solar Photovoltaic Technology changes the sunlight into DC electricity using solar cells. The produced electricity can be utilized either straight during the day or stored in batteries for use at night for several purposes.

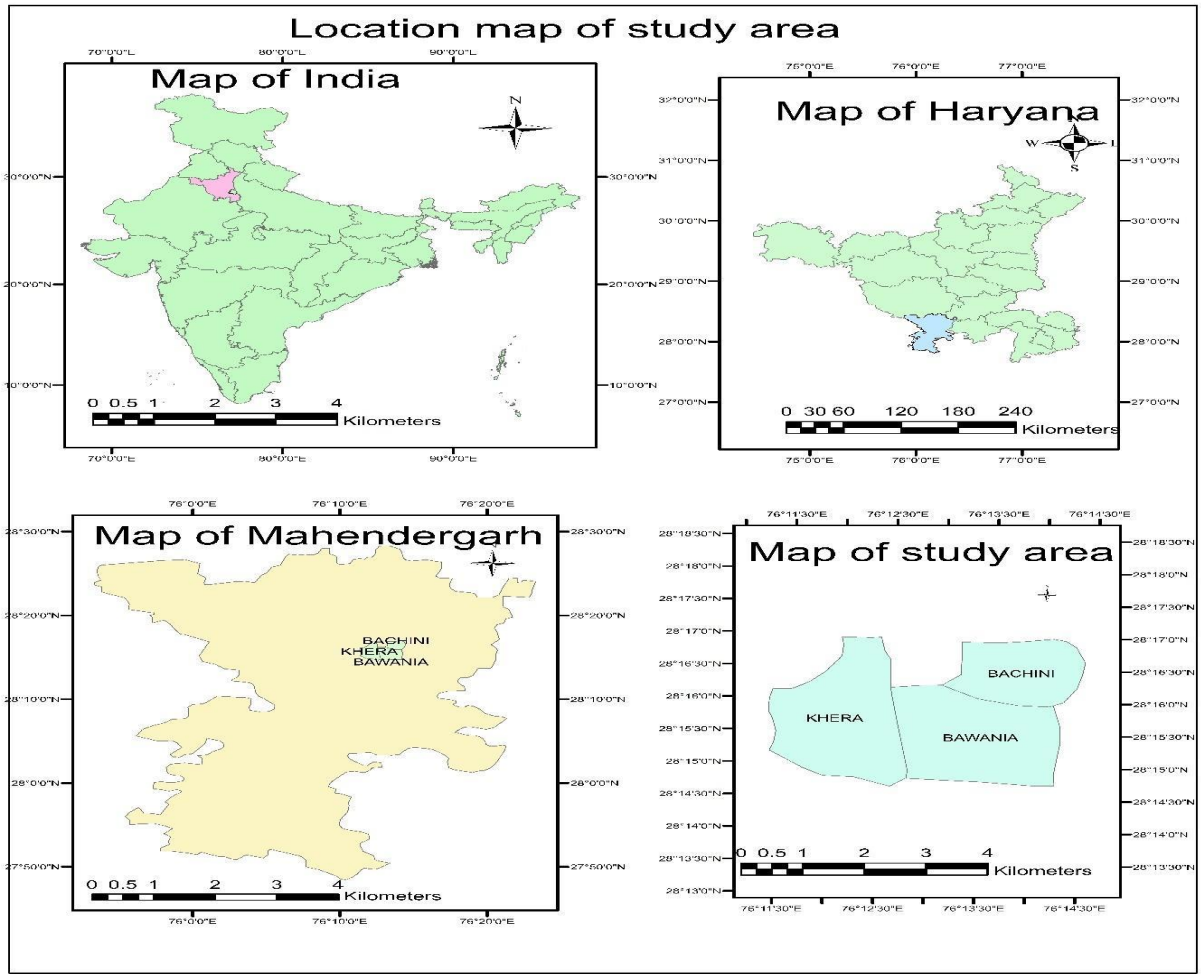
Haryana Renewable Energy Development Agency (HAREDA) is sponsoring SPV- solar photovoltaic devices for use of tube lights, TV, and fans, etc. These SPV devices are Solar Lantern, LED home and street lighting system, Solar cookers, and Solar Power Plants. In Haryana, districts like Gurgaon (11.78 GW) and Mahendragarh (6.13 GW) have maximum SPV potential (Mahtta et.al., 2014). In June 2011, Haryana's Sirsa district became the first solar street lights powered district of India.

2. OBJECTIVES OF THE STUDY

1. To find out the Utilization of Solar energy in Rural areas in Mahendergarh District.
2. To find out the Awareness about Solar energy among the people in the Rural areas in Mahendergarh District.

3. STUDY AREA AND METHODOLOGY

Bawania, Khera and Bachini villages are located in Kanina Block of Mahendergarh district in Haryana state. The total geographical area of Bawania village is 750 hectares, Bachini village is 326 hectares and Khera village is 209 hectares. There are about 699 households in Bawania village, 357 households in Bachini village and 311 households in Khera village (Census 2011). Bawania village has a total population of 3541 peoples, Bachini village has 1801 peoples and Khera village has 1575 peoples (Census 2011).



4. RESEARCH METHODS

In this study, Primary data and Secondary data are used. Primary data is collected through a Primary field survey in the study area. Primary data is collected through interviews with the help of a Schedule which was filled with persons who own solar panel systems in their household. Secondary data is taken from District Census Handbook, Census of India (2011). Sample size is 99 households of three villages Bawania, Bachini and Khera of Mahendergarh District. Samples are taken from the General, OBC and SC category. From each category, 33 samples are taken. These 33 samples are selected through simple random sampling.

5. RESULT AND DISCUSSION

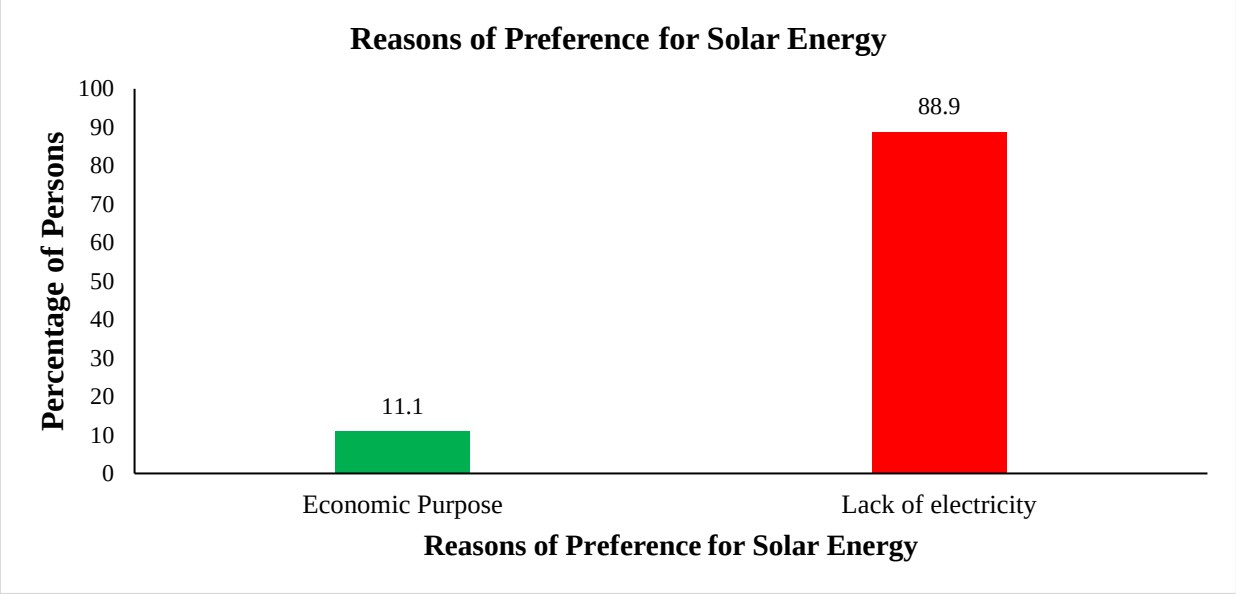


Fig. 1. Reasons of Solar Energy preference in Rural area of Mahendergarh district.

The above-mentioned diagram (figure 1) shows that people use both the sources of energy at household i.e., regular electricity supply and solar panel system. This diagram indicates the reasons for preference for solar energy in the rural area of Mahendergarh district. From this diagram, it is evident that most people, that is, 88.9 % have preferred solar energy due to the lack of electricity problems in the study area. And more than ten percent, that is, 11.1 % of people have preferred solar energy for economic purposes because they think that after solar panel system installation, they have minimized their electricity bill.

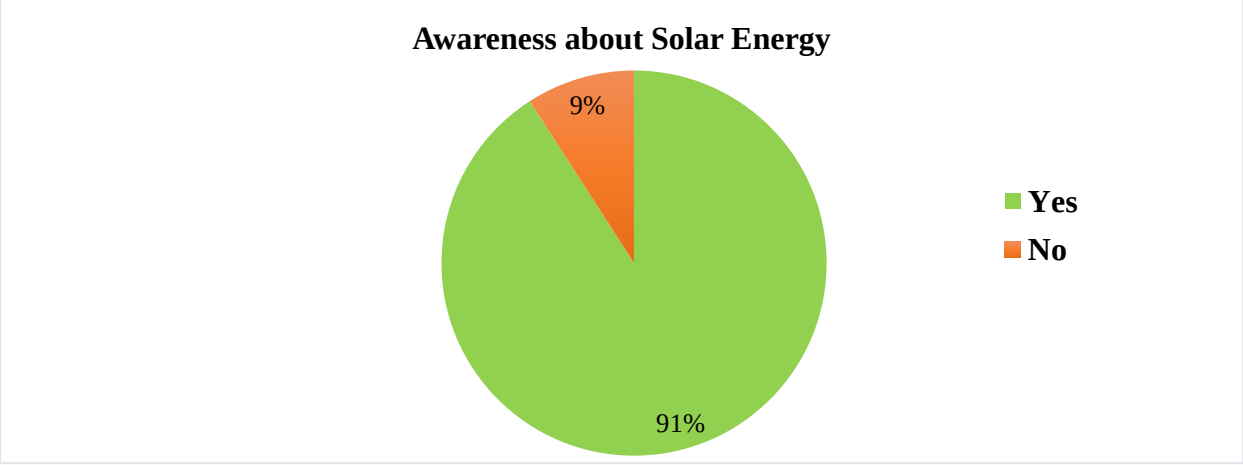


Fig. 2. Awareness about Solar Energy in Rural area of Mahendergarh district.

This diagram (figure 2) tells us about the awareness of Solar energy in the rural area of Mahendergarh district. From the diagram, it is evident that more than ninety percent of people in the rural area are aware of the use of Solar energy, and a majority of people are using solar energy, mostly in their households. And nine percent of people do not have awareness about the use of solar energy.

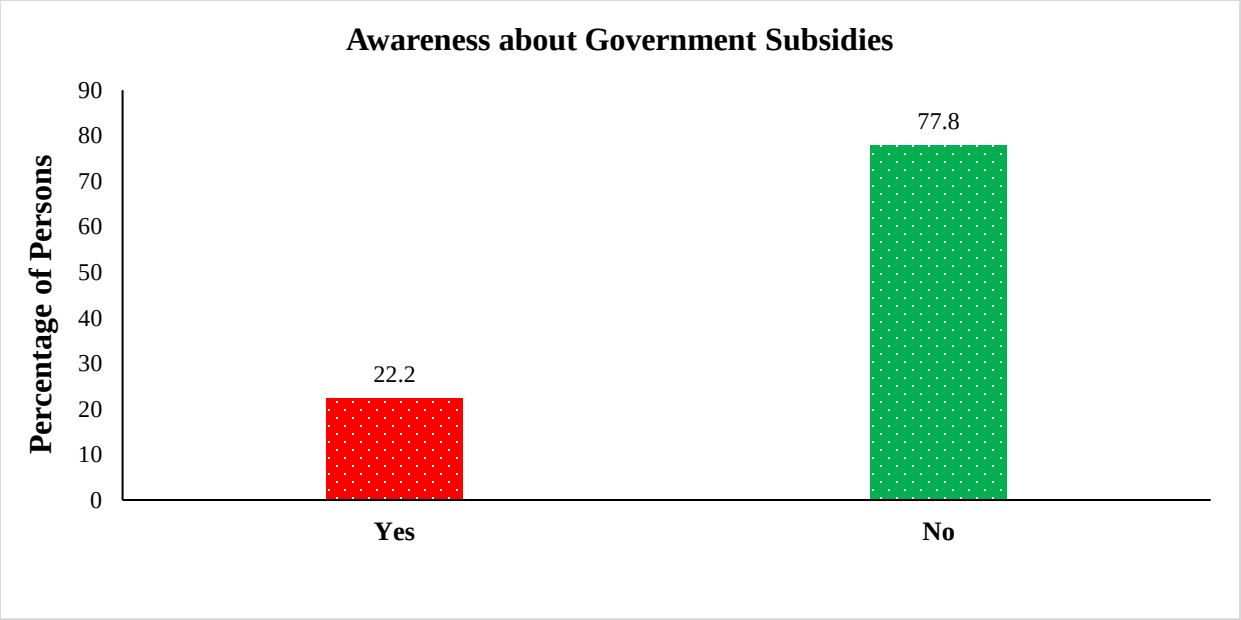


Fig. 3. Awareness about Government Subsidies in Rural area of Mahendergarh district.

This diagram (figure 3) is regarding the awareness about government subsidies in the rural area of Mahendergarh district. Through the field survey, it is observed that many people are using solar panel systems or solar energy in the study area, but the point of concern is that majority of people don't have awareness about government subsidies that are provided in installing the solar panel system. Only twenty-two percent of people know about the government subsidies regarding solar panel system installation. But after having awareness regarding government subsidies of solar energy, no one has installed the solar panel system using or taking government subsidies in the study area, because people think that installation of solar panel system through government is a very time-consuming process.

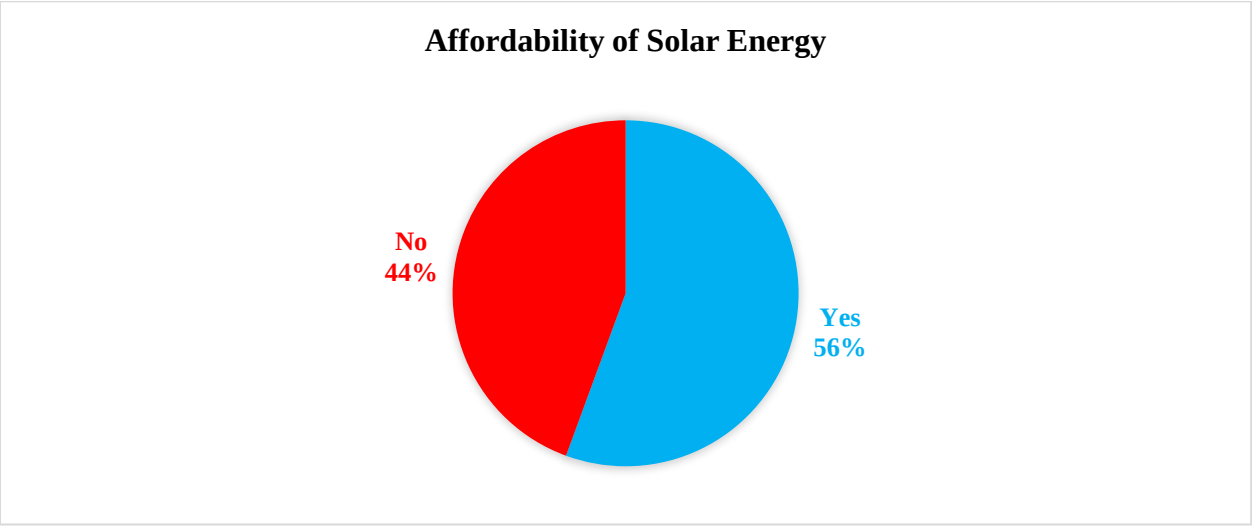


Fig. 4. Affordability of Solar Energy in Rural area of Mahendergarh district.

This diagram (figure 4) shows the affordability of solar energy in a rural area in the Mahendergarh district. More than fifty percent of people (56%) think that solar energy is affordable because they have enough money to buy solar energy and forty-four percent of people think that solar energy is not affordable as it takes a very high investment to purchase solar energy. For installing the solar panel system at home, a variety of appliances must be purchased like solar plates, solar batteries to store the energy, solar inverter, etc., and these appliances are having to be very costly nowadays. For a middle-class family, it becomes impossible to install a solar panel system.

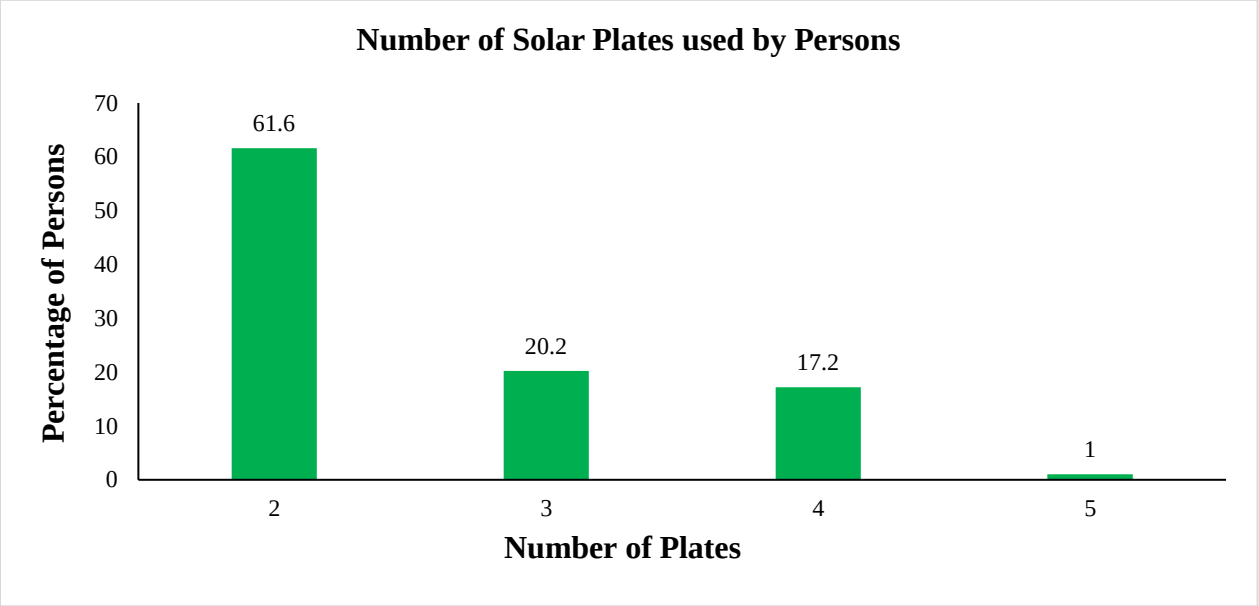


Fig. 5. Number of Solar Plates used in households in Rural area of Mahendergarh district.

In the study area, from figure 5, it is observed that most people have installed 2 Solar plates in their households as per their requirement. Generally, people use appliances like Bulb, Fan, TV in their household. The persons using more than 2 solar plates are less in numbers because a greater number of solar plates demands high investment in purchasing and in their installation. The persons use 4 or 5 solar plates because they own a shop like a general store or grocery shop in their household and for that, they require more energy.

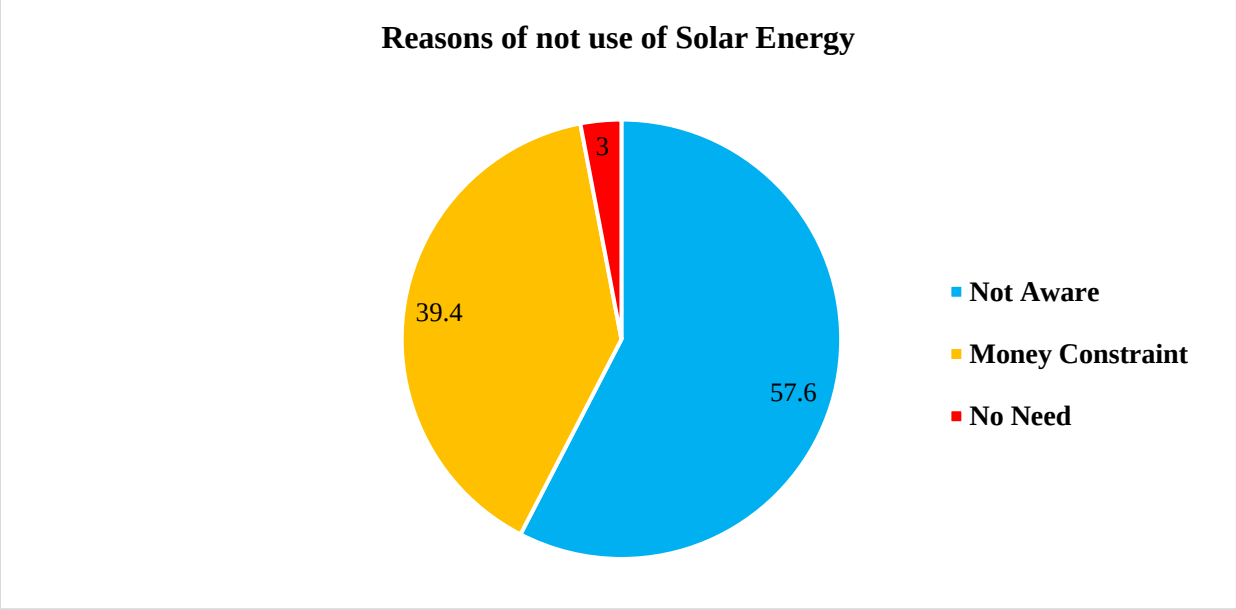


Fig. 6. Reasons of no use of Solar Energy in Rural area of Mahendergarh district.

In the study area, people have three main reasons for not using solar energy. More than half of the people were not aware of the utilization of Solar Energy, that is why they did not use solar energy. While less than half of the people think that they have need more electricity or energy but they had money problems, they did not have enough money to install a solar panel system because the solar panel system demands high investment in installation and others think that they do not have any need for solar energy, as they are satisfied with the regular power supply because they do not possess any high energy-consuming electric appliances.

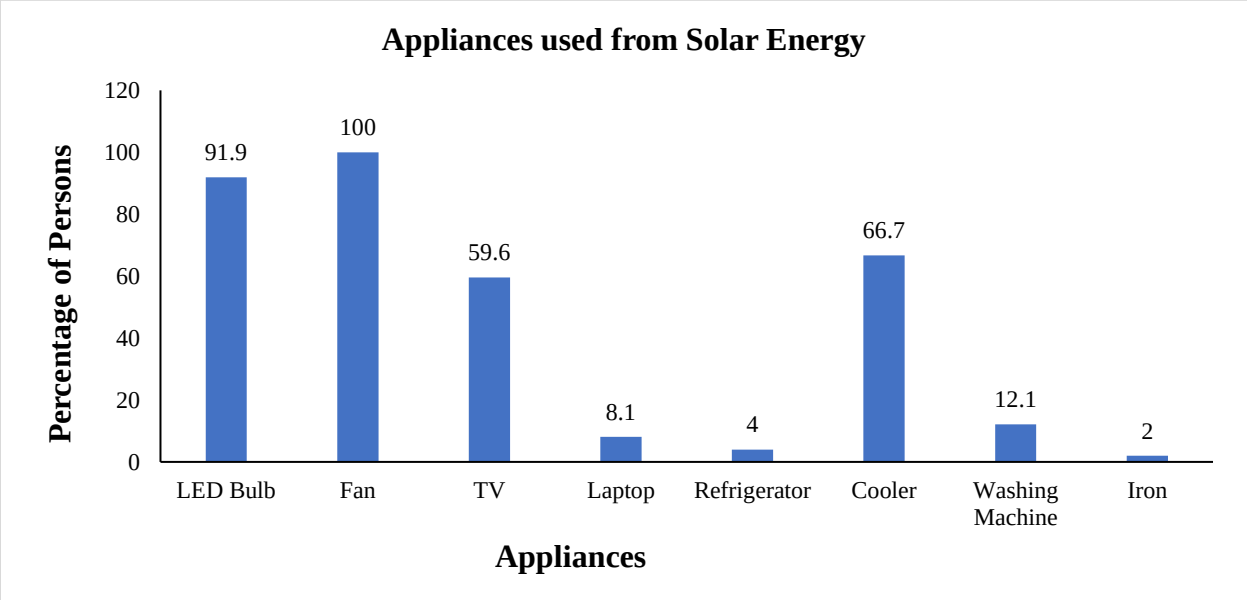


Fig. 7. Appliances used from Solar Energy in Rural area of Mahendergarh district.

The above-mentioned diagram (figure 7) shows that various appliances like LED Bulb, Fan, TV, Laptop, Refrigerator, Cooler, Washing Machine, and Iron are used from Solar energy mainly during day time. It is observed that most people use LED Bulb, fans, TV, and Cooler from Solar energy because these appliances do not consume so much energy. And a smaller number of persons use Laptop, Refrigerator, washing machine and Iron from Solar energy because these appliances consume a very high energy or electricity. This shows that most solar energy is utilized in the summer season by using Fan and Cooler.

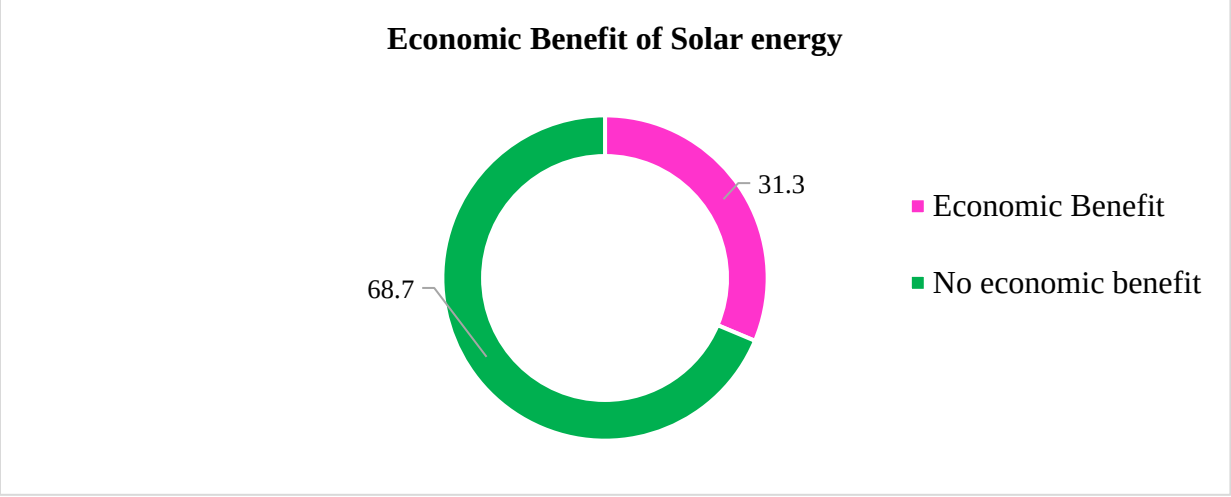


Fig.8. Economic Benefit of Solar Energy in Rural area of Mahendergarh district.

From the diagram (figure 8), it is evident that more than thirty percent (31.3%) people think that they have the economic benefit of using solar energy, as they have minimized their electricity bill because they use solar energy in charging the batteries and to store the energy, so that they can use the stored solar energy during the night also instead of using main electricity to charge the batteries. Sixty-eight percent of people do not have the economic benefit of using solar energy, because, after the use of solar energy, their electricity bill is increased. The economic benefit of the use of solar energy depends on the way of the use of solar energy. Through field survey, it is come to know that people are using the main supply of electricity during the day in their households and charging the batteries through the main electricity instead of solar energy. And this way they are consuming the main electricity during the day and thus their electricity bill is increased. This shows that people do not know how to use solar energy.

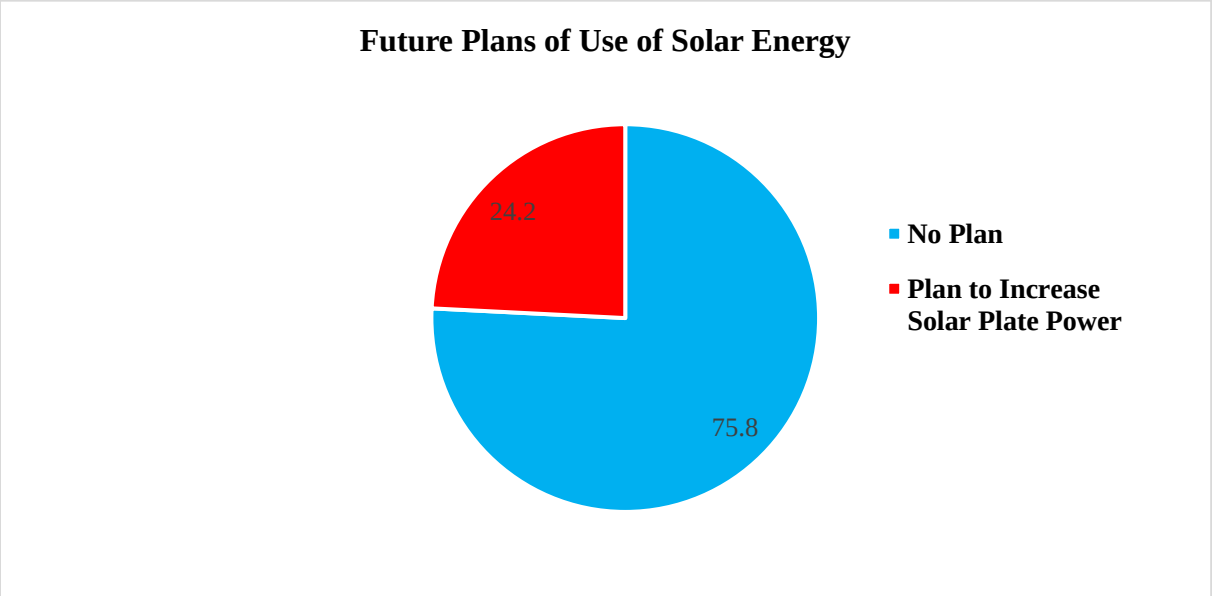


Fig. 9. Future Plans regarding Solar Energy Utilization in Rural area of Mahendergarh district.

The awareness about the use of solar energy among the peoples is increasing day by day. Plans regarding solar energy utilization at a large scale are necessary for rural areas. It is observed in the study area that a large number of persons, around 76 percent, have no planning to increase the power of the already installed solar panel system. It seems that they are satisfied with their current power of solar panel system, as currently generated electricity from solar panel system is enough for them. And a smaller number of persons, more than 24 percent, have plans to increase the power of their installed solar panel system. The current electricity generated from the solar panel system is not enough for them, as they consume more solar energy. So, they have plans to increase the load or power of their Solar Panel System.

6. CONCLUSION

In this study, it is concluded that people have faced a lack of electricity problem in rural areas of Mahendergarh district, that is why they chose Solar panel system for electricity generation and power supply to their household. As the education level is increasing, people are also becoming aware of the use of Solar energy and Government subsidies. Presently, the use of Solar energy in the Mahendergarh district is increasing day by day. The government also promoting the use of Solar energy and also providing subsidies regarding Solar panel systems. But in the study area, nobody had taken subsidies on the Solar panel system due to unawareness or they think that a lot of time is wasted in solar panel installation through government agencies or vendors. Regarding the affordability of solar energy, people have both kinds of thinking. The high-class family thinks that solar energy is affordable while the middle-class family thinks that solar energy is not affordable because solar

panel system demands a high investment in installation. The majority of persons have installed two solar plates in their household for use of appliances like bulbs and fans. The major reasons for not use of solar energy in the study area is the unawareness about solar energy use and the lack of money problem. People use many appliances from Solar energy as per their requirement like an LED bulb, Fan, Cooler, Refrigerator, TV, Iron, and Washing machine. By using Solar energy, people also take Economic benefits and all-time power supply in their household. In the future, people have plans to increase the use of Solar energy and use more Solar appliances like Solar lighting systems, Solar Cookers, Solar Fan and Solar Pumps for farming.

7. SUGGESTIONS

Following are the suggestions for the use of Solar Energy in the study area:

1. There is a large wasteland present in Mahendragarh district, so on this wasteland, Government should start and establish many solar power plants or solar projects for complete use of the solar potential of this area and to make India a global leader in solar energy.
2. There are various kinds of solar products available like Solar lanterns, Solar water pumps, Home lighting systems, Solar lamps, Solar fan, Solar cooker etc. People should use these Solar products to contribute to the utilization of solar energy and for the completion of Government schemes and policies regarding the use of solar products.
3. The government institutions and buildings like Universities, colleges, schools, hospitals, municipal corporations, etc., and the private buildings should install solar power projects and solar water heating systems on the rooftops of the buildings for electricity generation and water heating.
4. Mahendragarh district is an agricultural area. In this area, Solar energy can be widely used by the use of solar water pumps for irrigation in agricultural fields. Unfortunately, there is negligible use of solar water pumps in this area. Government should aware the farmers and provide necessary information to them regarding the use of solar water pumps.
5. Government should support more in the forms like subsidization, regulation, public awareness, import duties, campaigns, Learning and awareness-raising activities, proper training in areas of installation, operation, and maintenance. These are the key factors to develop the local awareness needed for effective and sustainable Renewable Energy Technology use.
6. Government should support the rural area electrification programme through making new schemes and policies and implementation of schemes and policies like JNNSM - The Jawaharlal Nehru National Solar Mission**,** DDUGJY – Deendayal Upadhyaya Gram Jyoti Yojna etc.
7. Solar plates are made of Photovoltaic cells, due to these solar plates are very costly. Government should decrease the Solar PV costs, so that people can install solar panel systems at large scale in rural areas also. Because in rural areas, people do not have enough money for installation of solar panel systems.

REFERENCE

[1] Renuka Prasad, D. S. (2017, July). Importance of Solar Energy Technologies for Development of Rural Area in India. *International Journal of Scientific Research in Science and Technology, 3*(6), 585-599. Retrieved from www.researchgate.net/publication/319535349

[2] Ehsanul Kabir, P. K.-H. (2017, September). Solar energy: Potential and future prospects. *Renewable and Sustainable Energy Reviews, 82*, 894-900. doi:10.1016/j.rser.2017.09.094

[3] Gautam Raina, S. S. (2019, April 24). Outlook on the Indian scenario of solar energy strategies: Policies and challenges. *Energy Strategy Reviews, 24*, 331-341. Retrieved from www.elsevier.com/locate/esr

[4] Guney, M. S. (2016, January). Solar power and application methods. *Renewable and Sustainable Energy Reviews* (57), 776-785. doi:10.13140/RG.2.1.3329.5447

[5] Kanudia, P. B. (2012, December 10). Off-Grid Solar Power in Rural India. *ETSAP meeting, Lisbon*.

[6] Naveen Kumar Sharma, P. K. (2012, October 20). Solar Energy in India: Strategies, Policies,

perspectives and future potential. *Renewable and Sustainable Energy Reviews*(16), 933-941. doi:10.1016/j.rser.2011.09.014

[7] Richa Mahtta, P. J. (2014). Solar power potential mapping in India using remote sensing inputs and environmental parameters. *Renewable Energy, 71*, 255-262.

[8] Salma Rehman, Z. H. (2017, January 26). Renewable energy governance in India: challenges and prospects for achieving the 2022 energy goals. *Munich Personal RePEc Archive*. Retrieved from https://mpra.ub.uni-muenchen.de/79361/

[9] Singh, B. R. (2016, July). Future Scope of Solar Energy in India. *ResearchGate*, 21-30. doi:10.18090/samriddhi.v8i1.11408

[10] Supriya, S. G. (2015, March). Adoption of Renewable Energy Technologies by Rural Population: Impact on Quality of Life. *Journal of Energy Research and Environment Technology, 2*(2), 136-139.

[11] Swami Prakash Srivastava, S. P. (2013). Solar Energy and it's future role in Indian Economy. *International Journal of Environmental Science: Development and Monitoring, 4*, 81-88.

[12] Vikas Khare, S. N. (2013). Status of solar wind renewable energy in India. *Renewable and Sustainable Energy Reviews, 27*, 1-10. doi:10.1016/j.rser.2013.06.018