



Feasibility of Solar Power Plant in Kathua District, J & K

Simran Gupta, Birinderjit Singh Kalyan

Abstract- As the non-renewable sources of energy are depleting day by day, the world is turning towards renewable sources like solar, wind, hydro for fulfilling their power requirement. Solar is one of the major sources of renewable energy which is used for electricity generation in India and its installed capacity has been increased from 2.6 GW to more than 42 GW in the last 7 years and India also acquired 5th position in solar power deployment. Solar power can be harnessed in India using proper techniques providing huge scalability and it also has capability of power generation on distributed basis which helps in additional capacity with short lead times. Jammu and Kashmir has vast amount of solar potential and government is also taking some steps to maximize the use of renewable resources than non-renewable resources in UT but people are still unaware of how to use these renewable resources efficiently. In this paper, the feasibility study of solar power plant installation in Kathua, Jammu and Kashmir has been carried out using NASA LARC so that in future maximum number of solar power plants can be installed in Jammu and Kashmir and people can rely on renewable sources. The solar irradiance parameter has been used for assessing the feasibility of this area and the data is collected with the help of NASA LARC website.

Keyword: NASA LARC So That In Future Maximum Number

I. INTRODUCTION

The power requirement in the UT of Jammu and Kashmir is increasing and it is difficult to fulfill those requirements using traditional methods of power generation or using conventional sources of energy as it is harmful for the environment. Jammu and Kashmir has a lot of renewable energy potential and is rich in hydro energy, solar energy, geothermal energy etc. which can be used for electricity generation. But these resources are not yet harnessed properly. There are many hydro power plants in Jammu and Kashmir and the whole UT is highly dependent on this renewable source but hydro energy also has some consequences like lives of animals and humans are at risk. So it is high time to move the focus from hydro to other potential renewable sources found in J&K. According to the National Institute of Solar Energy, the UT of Jammu and Kashmir has solar potential of 111.05GWp which is second highest after Rajasthan in India but still there are no major solar power plants in the UT.

At the start of 2019, the total installed capacity of J&K was 3393.74 MW but solar has very little contribution to this. The only solar power plant in J&K is set up in the Katra railway station and its generation capacity is 1 MW. The government of Jammu and Kashmir also needs to formulate some solar policies which promote solar power plants installation in the UT. The feasibility analysis of solar power plants in Kathua district of Jammu and Kashmir is done in this paper. The monthly data of all sky insolation clearness index and all sky normalized insolation clearness index is obtained for the year 2020 using NASA LARC website for this area. The analysis carried out below helps in finding out whether this area is suitable for installation of solar power plants in future or not.

II. ANALYSIS

The table below shows the annual data of all sky insolation clearness index for Kathua, Jammu and Kashmir.

Table1: Annual all Sky Insolation Clearness Index

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.476	0.605	0.511	0.594	0.602	0.568	0.537	0.433	0.633	0.738	0.612	0.587

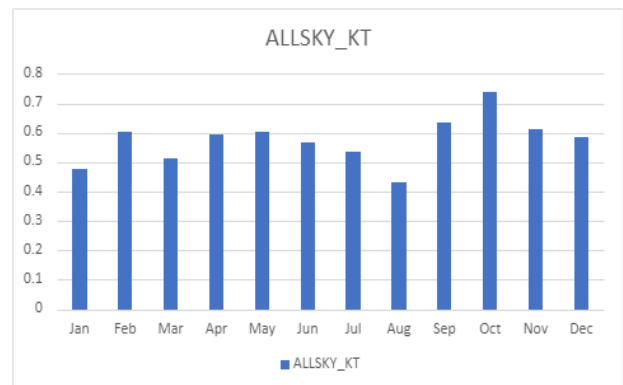


Figure 1: Annual all Sky Insolation Clearness Index

The month of August has the least value of solar production in the year 2020 and the month of October has the highest value as shown in the graph of all sky insolation clearness index shown above which makes October the most productive month in terms of solar production. The table below shows the annual data of all sky normalized insolation clearness index for Kathua, J&K

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Table 2: Annual all Sky Normalized Insolation Clearness Index

Ja n	Fe b	M ar	Ap r	M ay	Ju n	Ju l	Au g	Se p	Oc t	No v	De c
0.691	0.819	0.641	0.708	0.697	0.649	0.618	0.511	0.779	0.971	0.867	0.874

The all sky normalized insolation clearness index is maximum in the month of August which is .511 and minimum in the month of October which is .971. The graph for the same is shown below where ALLSKY_NKT represents all sky normalized insolation clearness index.

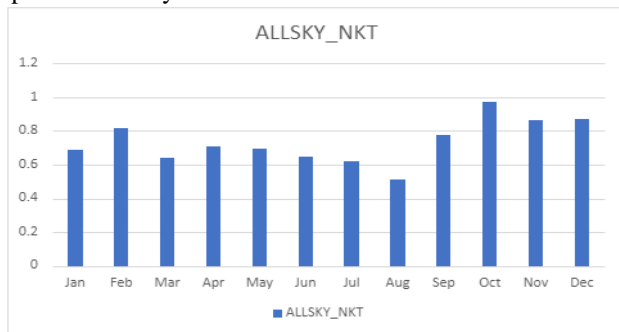


Figure 2: Annual all Sky Normalized Insolation Clearness Index

The graph of all sky insolation clearness index and all sky normalized insolation clearness index together is shown below.

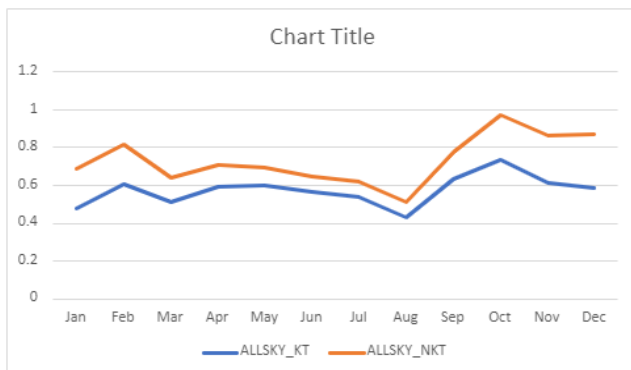


Figure 3: All Sky Insolation Clearness Index and All Sky Normalized Insolation Clearness Index

The optimal tilt angle for PV panels differs throughout the year depending upon the region where solar panels are installed and also on different seasons. At solar noon, the sun reaches its peak each day and generates maximum energy. The sun is due south at solar noon in the northern hemisphere and so to generate maximum energy the optimal tilt angle for PV panels required to be accordingly adjusted. The tilt angle also depends upon the seasons, the optimal tilt angle of summer & winter months are different. In summer months, the direction of PV panels is adjusted according to the height of the sun in the sky. The table below shows the optimal tilt angle of PV panels in Kathua district of Jammu and Kashmir.

Table 3: Optimal tilt angle of PV panels in Kathua

Ja n	Fe b	M ar	A pr	M ay	Ju ne	Ju ly	A ug	Se p	O ct	N ov	D ec
49°	41°	33°	25°	17°	10°	17°	25°	33°	41°	49°	56°

III. RESULTS

The analysis done above for Kathua shows that the highest value of all sky insolation clearness index in this area is .738 and lowest value is .433 and the average value is .574. The highest value of all sky normalized insolation clearness index for this area is .971 and the lowest value is .511 and the average value is .735. For feasibility of solar power plants, the value of all sky insolation clearness index should lie between 0-1. Therefore, it is possible to install solar power plants in Kathua district of Jammu and Kashmir for generation of electricity.

IV. CONCLUSION

Solar energy in Jammu and Kashmir is present in abundance and it can be used to fulfill the power demand of the UT. For generating electricity using solar energy, solar power plants need to be constructed in different areas of Jammu and Kashmir and for installation of these plants, it is important to check whether the specified location is feasible for installation of solar power plants or not. The analysis done above shows that the area of Kathua is feasible for PV power plants and the government should take some steps for installation of these power plants in future so that UT of Jammu and Kashmir can rely more on renewable sources than non-renewable sources of energy.

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