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SUSTAINABLE RENEWABLE ENERGYAND COST REDUCING BY USING SOLAR ENERGY IN THE STATE OF JHARKHAND

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Abstract: **Solar power plants are an essential component of the landscape of renewable energy sources because they capture the sun's rays and use them to create electricity via the use of photovoltaic cells or solar thermal systems. The following brief offers a summary of the operating principles, different kinds, and positive effects that solar power plants have on the surrounding environment. This introduction emphasises the significance of solar technologies in the generation of sustainable energy as well as the continuous shift towards cleaner energy sources all over the world. It does so by highlighting the breakthroughs in solar technology as well as its economic feasibility and future possibilities.**

Keywords: **Cost minimization, Renewable, Non-renewable and sustainable.**

1. INTRODUCTION

A solar power plant is a facility that harnesses solar energy in order to create electricity. Its primary objective is to lessen dependency on fossil fuels while also serving as a source of power that is both clean and renewable. Solar power plants make a positive contribution to the fight against climate change, as well as to the improvement of air quality and the strengthening of energy security. Photovoltaic panels, often known as PV panels, or collectors for solar thermal energy, are primarily what make up a solar power plant. PV panels use semiconductor materials to convert sunshine immediately into electricity, whereas solar thermal systems absorb the sun's rays to produce steaming that runs mills and generates electricity. PV panels are one type of solar energy technology. The placement of a solar power plant is of the utmost importance. [1] In order to maximise the amount of energy that is produced, it should get an adequate amount of sunshine throughout the whole year. Solar panels are often installed on roofs, open ground, and other areas that are not being used. Solar power plants make use of a variety of different technologies, including Crystalline Silicon PV, Thin-Film PV, Parabolic Troughs, Monopoly, and many others. Some solar power plants make use of energy storage options such as batteries in order to save any extra power that is produced during the sun's hottest parts of the day. When there is not enough sunshine, this stored energy can still be put to use. Solar power plants generate clean electricity while emitting relatively few greenhouse gases into the atmosphere. They help reduce the number of pollutants in the air, how much water is used, and how dependent we are on fossil fuels. The upfront expenditures of installation, the inconsistent availability of sunshine, issues over land usage, and the possibility of an adverse aesthetic impact are all challenges. In order to stimulate the development of sustainable energy sources and to boost the use of solar farms, several governments provide financial incentives in the form of credits for taxes, grants, and subsidies. The proliferation of renewable energy facilities across the world may be attributed to several factors, including the falling prices of solar panels as well as their rising levels of performance. It is anticipated that they will play a key part in the accomplishment of the objectives for renewable energy.

2. SOLAR POWER PLANT AND ITS WORKING

A solar energy plant is an assembly made up of different solar parts, such as solar panels, which collect ultraviolet rays and transform the energy into electrical power; solar power inverters, which change the energy produced from direct current to alternating current whereas continuously monitoring the entire system; solar battery packs as well as other solar accessories,

which are required to set up a system that is capable of producing power; and so on.[2] The primary objective of a photovoltaic power plant is to achieve 100 percent independence from fossil fuels and simultaneously reduce the amount of money spent on energy. It encompasses both low- and high-power solar arrays, with capacities ranging from one kilowatt to many megawatts. Photovoltaic systems, solar plants, solar energy systems, and solar farms are all names that can be used interchangeably to refer to a solar energy system. Solar power plants make use of a variety of technologies, the most effective of which is solar photovoltaic technology. This type of technology allows for the greatest possible quantity of sunshine to be collected and converted into energy.

A collection of PV panels is known as array.For construction solar power plant some major points are very important to know. first ofall, see that weather the land is suitable in good place or not. Sun sunshine how many hours per day month or year.For 1mw it takes about 2.5 Acre to 5 acre.it is depend upon which type of solar panels areused.Todays date mono perc is the advance solar panel. its take only 2.5 to 3acre of land to produce 1mw energy.to construct 1-5mw its take time up-to 2 months. mounting structureof the solar panel are fixed. but if we use the tracking sun in single axis thus its cost be increase. For 1mw power plant takes 3- 3.5 crore approximately budgetary. The life of solarpanel is generally up to 25years.and today date mono perc solar panel are more popularitythen poly crystal, mono crystalline and bi-facial solar panel. Mono perc is the advance version of mono crystalline. Bi-facial Its generating power from both side but still this technology is not suitable for Jharkhand.There are four types of solar panels they are. Mono Crystalline, Poly Crystalline, Mono Per, Bi-facial and Thin film also categories as (ASI (Amorphous silicon, CDTE (Cadmium telluride, CIS (Copper indium diselenide, GAAS (Gallium arsenide). Photovoltaic cell or we called solar cell both are same name.[3] any types of devices or solarcell.which converted direct light energy into electrical energy called photovoltaic cells.it has been Used for consumers such products like electronics toys, calculator radio etc. Photovoltaic cell or we called solar cell both are same name. any types of devices or solarcell.which converted direct light energy into electrical energy called photovoltaic cells.it has been Used for consumers such products like electronics toys, calculator radio

Etc.Poly crystalline has single crystal of silicon and it has 72 cells. its market efficiency is 8 – 9.Mono – perc has multi crystal of silicon and it has 72 cells. its market efficiency is 13 – 17Poly – perc has 144 cells and its market efficiency is 10 – 13.Mono perc has 144 cells and its market efficiency is 13 – 15.All these four solar cell (or) (p. v) photo voltaic cell has 20 – 25 years of life. each solar cells or we can say each solar panel price is dependent on design, product quality and materials.

P.V cells has three generation such as:

Table 2 (a) Types of solar generation's.

First Generation	Second Generation	Third Generation
(a) Amorphous silicon (b) CIGS (Copper indium gallium selenide)	(a) Amorphous silicon (b) CIGS (Copper indium gallium selenide) (c) Cadmium telluride/ Cadmium sulphide	(a) Cu zinc tin sulphide PVC (b) Dye – sensitized PVC (c) Organic (P.V) PVC (d) Perovskite PVC (e) Polymer PVC (f) Quantum dot PVC

2.1 TYPES OF SOLAR POWER PLANT

1) Solar power plant for Home

A. Off Grid Solar System (Transmission import and savings from an on-grid photovoltaic system)

B. On Grid Solar System (Solar Panels Off-Grid - Economical + Storage)

2) Commercial Solar power plant

C. Hybrid Solar System (On-grid plus off-grid hybrid solar energy system)

3) Other types of Solar power plant

D. Commercial Solar power plant

E. Ground Mounted Solar plant

A. Off Grid Solar System

All the Solar panels are Operate on the same principle, but each different panel have different function and Specification. Being connected to the energy system is the key distinction across on-grid, far & hybrid photovoltaic facilities. Off-grid solar systems do not interact via the electricity supply in a comparable way that on-grid photovoltaic systems operate. Additionally, mixed technology partially requires it.

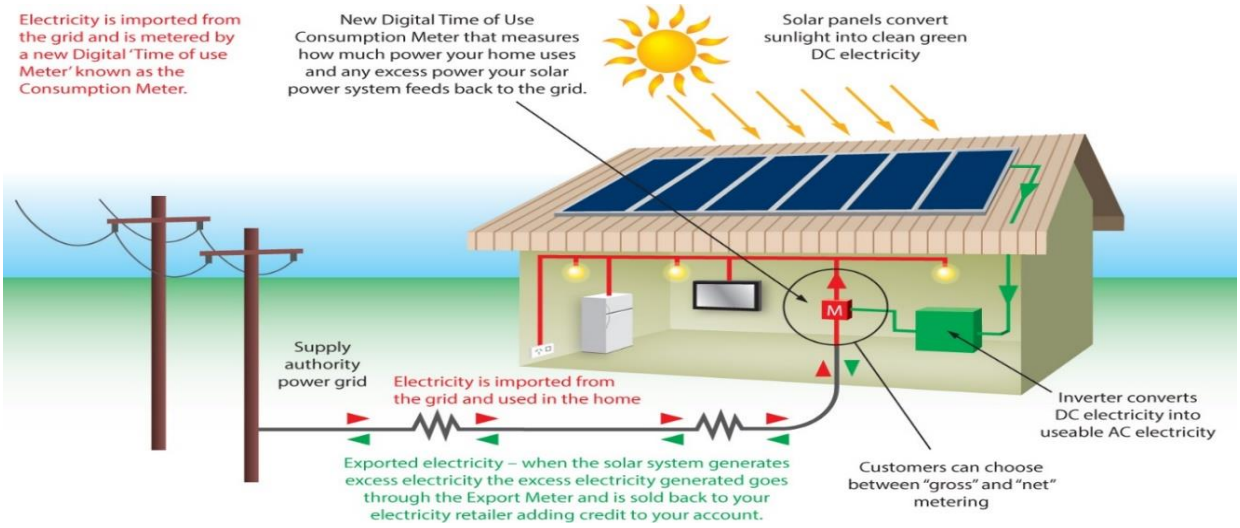


Fig (a) working of Off grid power plant.

Additionally, hybrid technology partially is dependent upon connectivity. Such situations will be covered in greater depth throughout following sections There are remain lots of rural places across the nation without any power. There remain many houses that face the difficulties frequent blackouts. Additionally, there are several locations in which the availability of energy seems irregular or insufficient. The off-grid photovoltaic structure is a blessing to those who live there because it does not depend on an electrical network to run. In addition, yet technology continues to offer dependable and adequate power practically every moment of the entire year.Unused electricity from this particular type of solar powered generation facility can be saved inside storage and Converted Direct current into Alternating Current an arrangement including a lithium-ion store acts as an off-grid solar power plant. It has the capacity to preserve system electricity to be utilised at later date When there isn't any sunlight, a photovoltaic battery can offer a continuous supply of electricity, to supply energy to any interconnected load, this photovoltaic system converts sunshine towards energy. The additional energy will be immediately preserved in solar battery packs. so there will not be an energy shortage if there isn't sunshine (at night or during a dark sky).

B. On Grid Solar System

The power supply produced throughout the course of the day may be utilised right away or transmitted into the regular network. Whenever the photovoltaic cells are overproducing, such a type of photovoltaic system is going to transmit additional electricity to the electrical network. The transferred energy is taken away through the electrical system throughout an electrical outage. You make money when you feed the electrical system with any extra energy

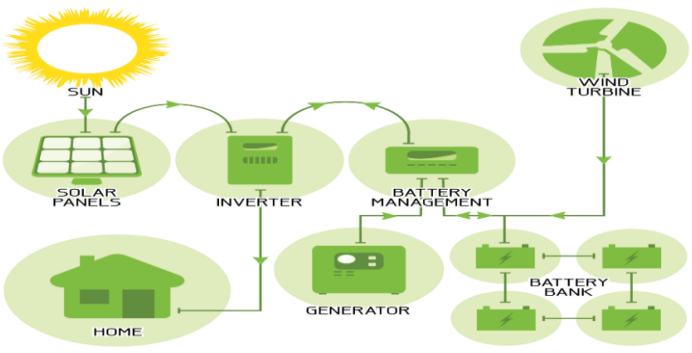


Fig (b) Working of On grid power plant

C. Hybrid Solar System

Hybrid power plants integrate a minimum of two distinct forms of energy. The integration of diesel gensets with renewable energy sources, either with or without storage, is a frequently observed practice. The current setup is very dependent on the unique site and corporation. The outcome is contingent upon factors such as irradiation and wind characteristics, as well as considerations related to funding and the specifications of the current gensets in the event of a refit.

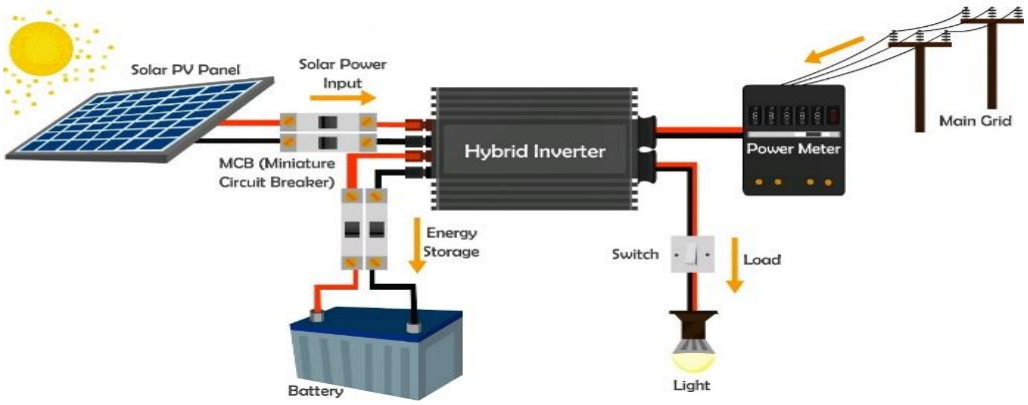


Fig (c) Working of Hybrid Solar System

The combined photovoltaic system is a mixture of the two solar power plants that were discussed previously. It makes utilisation of a bank of photovoltaic banks which are at a position to communicate via the main electricity network. Because of this, it has a substantial impact on your monthly power bill and, when some time has passed, it will return more money than it cost. We are able to say that, The combination of a solar power system that is on-grid with a system that is off-grid is referred to as a mixed photovoltaic system.During daytime, photovoltaic cells may be used to create power to keep your residence's electrical needs met. Also, the photovoltaic battery is going to be charged with the additional power that has been generated.It is outfitted with an integrated solar power inverter that converts direct current (DC) from the batteries to alternating current (AC). When it is necessary, the inverter follows the flow of alternating current (AC) between your residence & the electrical grid. When the photovoltaic batteries have been completely energised, the excess power will be sent back to the electrical network immediately.Since it utilises both a battery and a grid, a hybrid solar power facility is an arrangement which is more amenable to expansion and is prepared for tomorrow. You are able to maximise power usage with a hybrid configuration, while at the same time utilising fewer resources through the electricity supply. As a result, this technology keeps your power supply stable while simultaneously lowering the amount of money you spend on power. It is also divided into two parts

(a) Hybrid power plant without storage

(b) Hybrid Solar power system with storage

D. Commercial Solar power plant

Commercial solar generators are high-capacity photovoltaic, or PV, systems, which are often erected for the goal of lowering the cost of energy or for financial reasons. The vast majority of business solar installations are grid-connected systems that only produce electricity while the utility's electrical network is operational. Using a technique known as "net metering," the batteries are able to transfer all energy produced by the photovoltaic cells that are over surplus of what is needed returned to the grid's electrical system. In future generations, credit may be given to you as a result of possessing such authority.

The installation of a commercial solar energy system is an once-only massive expenditure, thus meticulous planning is required before beginning the process. Careful consideration needs to be given to the variables that are essential. The list of such criteria is provided in the following paragraphs.The load necessary to operate the equipment is what will decide the number of photovoltaic cells that are required.

- AC and DC, single-face, or three-face power supply is necessary depending on the application.
- Rechargeable for preserving the electricity that's created; batteries made from lead acid is the most common type of batteries used today.

- An inverter that changes alternating current (AC) power into direct current (DC)
- Network that guarantees the correct flow of electricity
- Renewable energy plants of a particular type

E. Ground Mounted Solar plant

Typically, such kinds of initiatives are developed to offer energy to the government or private companies. Recent research indicates that concentrated solar energy may offer enough power whenever customer demand is high. These green energy facilities are extremely powerful. You may have witnessed a vast expanse of ground clad in photovoltaic cells. These include massive power facilities located on Earth. The objective of such plants is to provide energy for enterprises, business sectors, and sustainable growth. Additionally, these initiatives are created to sell energy to the government or any business.

3. SURVEY OF SOLAR POWER PLANT

Jharkhand has a total of 24 districts in which out of 13 districts, electricity is being generatedeasily with the help of solar energy. Those districts are KHUTI, SAHEBGANG, GHARWA, SIMDEGA, CHATRA, RAMGHAD, KODERMA, LATEHAR, JAMTARA,PAKUD, GODDA, SARAIKELA- KHARSAWA AND JAMTARA. There are some other districts where electricity can be made easily and there is no problem of sunlight like the rest of the 13 districts. that district is DEOGHAR, BOKARO, ASANSOAL AND GIRIDHI. Jharkhand renewable energy development agency (JREDA) Claims that solar plants or we can say solar panels at these districts produce 1380kw and also saves large number or trees in three years. renewable energy acts a great role in our life.The first solar power plant in Jharkhand was established in Ranchi Khunti district, it was established on 15 October 2015. Since then, 3322 trees have been saved and have been ableto prevent 4,89,847 kg of carbon dioxide emissions. that maintains a clean environment. Now it seems that the day is not far away when we can have clean air in the open sky, thereis no longer any shortage of fossil fuels in the coming future. The life of solar panels is about 25 years. Maintains all the expenses incurred in the power plant within about 6 years,the remaining years have full profits. The study is still going on in the rest of the districts of Jharkhand so that it can be found out whether those districts are the path to generate electricity or not. Selected 13 district courts of Jharkhand are completely running on solar energy. And generating 1380 kw. The cost of setting 1mw solar power plant cost is about 1.5 crore rupee. The country's largest solar power plant is going to be set up in Jharkhand,which has a capacity of 150 MW.

Table. 3 (a) In this table its shows pv panels working and its capacity

PARAMATER	MONO CRYSTALLINE	POLY CRYSTALLINE	MONO - PERC
Reflection lightback to the cells	It is not possible	It is not possible	Possible
Electron recombination	Exists	Exists	Possible to reduce
Heat obsorption	It is not possible	It is not possible	Possible to reduce
Possible backlayer	It is not possible	It is not possible	Possible to exists
Conversionefficiency	Very less	Very less	Its more
PID resistance	Very low	Very low	Very high
High power output	It is not increases	It is not increases	It is increases

Selected 13 district courts of Jharkhand are completely running on solar energy. And generating 1380 kw. This is done for districts where power cuts are faced throughout the year. (JBVNL) said as per the estimate it will be cost around 600crore for installing floatingpower plant in two dams and around 1000 of people can get jobs. Ranchi has 11.48 hours of sunshine in a day in the month of May. Whereas in this month overall I get 355.92 hours of sunshine. In the month of January, there is sunshine for 5.91 hours in a day. Whereas in this month, I have a total of 183.1 hours of sunshine. By my studies, I came to know that every month's sunshine temperature is different-different. Afterseeing all these things, I came to know that in a whole year, the total temperature of Ranchi sunshine is about 3253.05 hours, Hazaribagh3294.62hours, DEOGHAR 3208.3hrs, BOKARO 3329.37hrs, JAMSHEDPUR 3386.18hrs,ASANSOAL 3261.62hrs, GIRIDHI 3251.33hrs and CHATRA 3441.11hrs sunshine for whole years. By my studies, I came to know that every month's sunshine temperature is different-different. After seeing all these things, I came to know that in a whole year, the total temperature of sunshine is about 3386.18 hour

4. HYDRO POWER PLANT

Hydropower plants use water to generate electricity.Through the use of a water turbine, it transforms kinetic energy into mechanical energy and generates electricity. The cleanest method of producing electricity is through hydropower plants, which don't pollute the air like thermal power plants that use gas or coal. The categories and types of it are shown below. When discussing renewable sources, hydropower plants may provide electricity around the clock, with the exception of non-renewable ones.

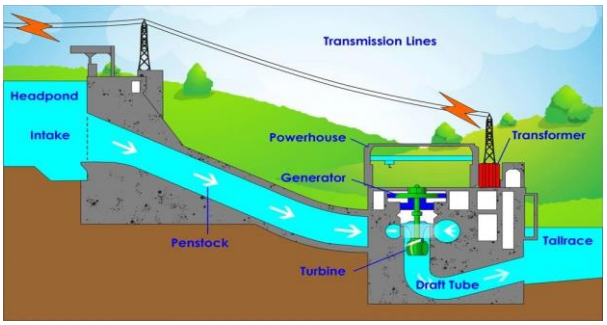


Fig. 4(a) Working of hydro power plant

Hydroelectricity operates by converting the heat generated through a stream of fluid to power via a rotating device attached to a machine. Many hydropower facilities hold liquid inside a reservoir, and is regulated by an entry or exit valve that measures how much water comes out. More energy may be created as the dam's elevation increases.When the river runs through the barrier, it acquires a potential energy, that transforms to momentum as it travels downward. The running water powers a rotating device, then connects to an electrical converter that provides electricity to end consumers.

Table. 4 (a) Dams in Jharkhand

	DAMS	ESTABLISHED	CAPACITY	TECHNOLOGY
1	TILAIYA DAM	1953	60mw	
2	KONAR DAM	1955	40mw	UNDERGROUND HYDRO POWERPLANT
3	MAITHAN DAM	1957	63.2mw	GSA TURBINE HYDRO POWERPLANT
4	PANCHET DAM	1959	80mw	
5	SWARNREKHADAM	1989	130mw	
6	AYAR DAM	-----	45mw	
7	BALPAHARIDAM	-----	20mw	

Table. 4 (b) Types and categories of hydropower plant

Types of Hydropower plant	Categories/Size of Hydropowerplant
• Run - of - river hydropower	• 1kw - 100kw Micro
• Storage hydropower	• 100kw - 1mw Mini
• Pumped storage hydropower	• 1mw - 10-30mw small
• Offshore hydropower	• Above 10 – 30mw Large

4.1 ADVANTAGES AND DISADVANTAGES'

Table. 4 (c) Connections of photovoltaic panels

ADVANTAGES	DISADVANTAGES
Very Safe and Emission Free	Drought Potential
Cleanest Renewable Energy Source	Limited Reserves
Very Reliable	Expansive
It will be never run out unless the waterstops falling	Environment Consequences

Table. 4 (d) Advantages and Disadvantages

ADVANTAGES	DISADVANTAGES
Very Safe and Emission Free	Drought Potential
Cleanest Renewable Energy Source	Limited Reserves
Very Reliable	Expansive
It will be never run out unless the waterstops falling	Environment Consequences

5. RESULTS AND CALCULATIONS

Polycrystalline Half Cut Project Example of 10KW

On Grid System = 10KW

Project = Polycrystalline Half Cut Project

Each panels = 250 Watts

Area = 750 Square Feet

Warranty period of = 25 Years

Structure = High risk structure

Plant Cost = 6 Lakh Approx

In this setup we are using high quality of everything like, Polycrystalline half cut panels, towers/Stand, Components, Installation Charge is Included there etc.in this setup we are using three earthing such as. Lightning arrester, Solar panels earthing, and AC Load earthing

Today Current Production Power = 5.85 KW

Today Unit Production = 13.70

Today Current Production Power = 123.30 INR

Anticipated yield This Month/ Saving = 3.61K INR

Real Time Production = 5.85 KW

Statistics (Running Days) = 363

Annual Production = 401.50

Total Production = 14.07 MWH

Total Anticipated Yield = 126.64 K INR

Total planted Trees = 766.65

Coal Saved = 5.62 Ton

CO_2= 8.17 TON

Table 5 (a) On grid, Off grid and Hybrid Solar power plant price list

Sl/N	(PVM) Off Grid	Selling Prices	Rs(PW)	(PVM) Off Grid	Selling Prices	Rs (PW)	(PVM) Hybrid	Selling Prices	Rs (PW)
1	1KW	83200	83.20	1KW	78300	78.30	1KW	107000	107.0
2	2KW	161400	80.70	2KW	114200	57.10	2KW	180100	90.05
3	3KW	207500	69.16	3KW	143900	47.96	3KW	231000	77.00
4	5KW	352200	70.44	5KW	232300	46.46	5KW	384000	76.80
5	6KW	445266	74.22	6KW	288000	48.00	10KW	705300	70.53
6	7.5KW	518000	69.06	8KW	379700	47.46	15KW	1019999	67.99
7	10KW	641099	64.10	10KW	437500	43.75	20KW	1299999	64.99

Table 5 (b) On grid, Off grid and Hybrid Solar power plant price list

Particulars	Description	Des	Des	Des	Des	Des	Des	Des
S-Power P	1KWp	2KWp	3KWp	4KWp	5KWp	6KWp	8KWp	10KWp
S-Panels W	250W	250W	250W	250W	250W	250W	250W	250W
S-panels q	4Nos	8Nos	9Nos	12Nos	15Nos	18Nos	24Nos	30Nos
Solar Stru	1KW	2KW	3KW	4KW	5KW	6KW	10KW	10KW
On Grid Inv	1KW	2KW	3KW	4KW	5KW	6KW	10KW	10KW
MC4 Conn	2 Pair	2 Pair	2 Pair	2 Pair	2Pair	2 Pair	2 Pair	2 Pair
DC Jun-Box	1 Nos	1Nos	1 Nos	1Nos	1 Nos	1Nos	1 Nos	1Nos
AC Jun-Box	1 Nos	1Nos	1 Nos	1Nos	1 Nos	1Nos	1 Nos	1Nos
DC Cable	30 Metre	30m	30m	40m	40m	50m	50m	90m
AC Cable	20 Metre	20m	20m	30m	30m	30m	40m	40m
Area Req	100 SF	200 SF	280 SF	340 SF	450 SF	500 SF	700 SF	850 SF
Accessories	Cables Tie, Earthing,Fasteners, Crimping Tools, lightning Arresstor	Same	Same	Same	Same	Same	Same	Same
Price	65000 Rs	110000	165000	220000	250000	300000	400000	480000

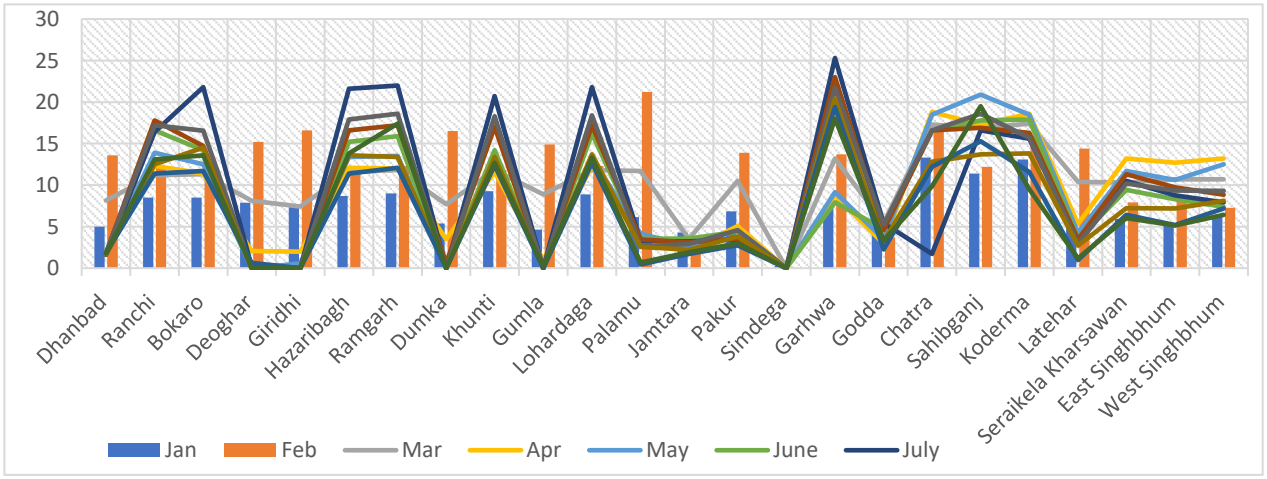
6. WIND POWER PALNT

Wind power plant which can generate an electric from wind which can convert mechanical into electrical energy. wind turbine has two types Horizontal-axis turbine and Vertically-axis turbine also it is categories in three types where we can setup the wind power plant (Land bases wind turbine , offshore wind turbine and distributed wind turbine. this date is taken from Vol. 9, Issue 3, July 2021 – September. Total five years of data is taken here in the table from year's 2017-2022.In Jharkhand there are total 24 districts which is shown in the table.out of which only few districts which can generate few amount of electricity.[5]

Fig 6 (a). Onshore, offshore and distribution wind power plant is shown.

Table 6 (a) Monthly v/s yearly wind speed average data of five years which is shown in table

Districts	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Dhanbad	4.98	13.6	8.16	1.89	1.61	1.74	1.61	1.79	1.80	1.64	1.84	1.78
Ranchi	8.49	12.2	11.2	12.3	13.9	16.6	16.4	17.8	17.2	12.5	11.4	13.1
Bokaro	8.49	12.5	11.3	11.4	12.5	14.2	21.8	14.7	16.54	14.5	11.7	13.6
Deoghar	7.90	15.2	8.13	2.06	0.00	0.24	0.17	0.00	0.00	0.00	0.64	0.00
Giridhi	7.33	16.6	7.41	1.99	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hazaribagh	8.70	12.1	11.6	12.1	13.4	15.2	21.6	16.6	17.9	13.6	11.4	13.8
Ramgarh	9.00	12.3	11.8	12.0	13.5	15.9	22.0	17.2	18.6	13.4	12.1	17.4
Dumka	5.38	16.5	7.70	3.47	0.24	0.00	0.00	0.64	0.00	0.00	0.00	0.00
Khunti	9.28	11.8	11.8	11.6	13.3	14.2	20.7	17.0	18.3	13.4	12.4	12.7
Gumla	4.63	14.9	8.90	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Lohardaga	8.87	12.3	11.8	12.3	13.2	16.2	21.8	17.2	18.4	13.7	12.7	13.3
Palamu	6.13	21.2	11.7	4.07	4.14	3.52	3.25	3.46	2.61	2.57	0.44	0.69
Jamtara	4.28	3.47	3.51	2.18	2.69	3.55	3.20	3.09	2.92	2.22	1.71	1.92
Pakur	6.86	13.9	10.5	5.08	4.57	4.37	3.48	3.55	4.56	3.81	2.77	2.97
Simdega	0.28	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Garhwa	7.48	13.7	13.2	8.75	9.15	7.93	25.3	23.0	21.7	20.4	19.4	18.0
Godda	4.40	3.72	5.44	2.96	3.48	4.73	5.42	4.56	5.23	3.25	2.27	3.31
Chatra	13.3	16.5	17.3	18.8	18.5	16.5	1.7	16.6	16.6	12.8	12.2	9.84
Sahibganj	11.4	12.2	16.9	17.3	20.9	17.8	16.6	16.9	18.6	13.7	15.3	19.5
Koderma	13.1	15.9	17.4	18.6	18.5	17.9	15.6	16.3	15.7	13.8	11.6	9.51
Latehar	5.53	14.4	10.4	5.34	4.24	3.53	3.26	3.46	2.94	2.72	0.99	1.17
Seraikela Khar..	5.90	7.91	10.3	13.2	11.7	9.41	10.5	11.3	10.2	7.23	6.42	6.05
East Singhbhum	5.41	8.37	10.7	12.7	10.6	8.29	8.77	9.75	9.33	7.19	5.19	5.14
West Singhbhum	6.28	7.27	10.7	13.2	12.5	7.37	7.91	8.83	9.322	8.10	7.19	6.43



Graph 6 (a) Monthly v/s Yearly Average Wind Speed for five years.

7. CHALLENGING AND FUTURE PROSPECTUS

➢ **Pros**
You might save as much as one hundred per cent on your monthly power expenditures.
A single investment that provides unlimited electrical power for the rest of your existence.
Solar panel subsidies range from 30 percent to 90 percent.
A satisfactory return on your investment in as little as three to five years.
Method of generating electricity that is gentler on the environment.

Enhance not only the worth of the home but also your reputation in the community.
A way of producing power that is efficient from a financial standpoint.
Simple to set up and requires little maintenance afterward.
Off-the-grid and hybrid solar energy systems might benefit from an additional source of electricity.
There is additionally the possibility of benefiting from photovoltaic net billing.
➢ **Cons**
Demands a significant up-front financial expenditure.
Installation could only take place in areas that were completely free of shadows.
It is essential to do regularly scheduled upkeep in order to achieve continuous production.

FUTURE PROSPECTUS

Prospects for the Future It looks that solar power plants have a bright future ahead of them. Solar technologies are anticipated to become even more cost-effective and efficient as long as research and development efforts are maintained. The intermittent aspect of the production of solar power is being addressed by the development of energy storage systems such as batteries, which will ensure a consistent supply of electricity both during the day and at night. Solar power plants will play a crucial part in the energy landscape of the world as governments and companies increasingly prioritise the use of renewable energy sources.In the final analysis, sunlight-powered plants serve as a shining example of the production of electricity that is both sustainable and environmentally friendly. Plants have emerged as crucial participants in the fight against global warming as well as in the effort to satisfy the energy requirements of the globe as a result of their lengthy history, many technological alternatives, and ecological benefits. Solar power plants are well positioned to bring about a sea change in the manner in which societies generate and use power as technology continues to progress.

8. CONCLUSIONS

In this research finally we came to know that In Jharkhand there are total 24 districts in which if we talk about wind power plant only few districts can generate an electricity but is very less amout which is not benefits to setup the wind power plant which is shown in graph 7(a). But solar power plant is much benefaciery because if we generate 10kw of power its takes 750sqf only, each pannel 250 w. cost approx. 5-6 lakh but the main thing is if we generate 10kw its Total current production power is 5.85 KW, Total uini 13.70, Toatl current production power 123.30 INR, Total annual production is 401.50, Total production is 14.07, Total anticipated yield is 126.64 INR, Total planted tree is 766.65, cost save is 5.62 Ton and the last one its not polluted carbondioxide that is 8.17 Ton. There are total 13 districts till now in Jharkhand where aleardy solar power plant is setup These districts are KHUTI, SAHEBGANG, GHARWA, SIMDEGA, CHATRA, RAMGHAD, KODERMA, LATEHAR, JAMTARA,PAKUD, GODDA, SARAIKELA- KHARSAWA AND JAMTARA. There are some other districts where electricity can be made easily and there is no problem of sunlight like the rest of the 13 districts. that district is DEOGHAR, BOKARO, ASANSOAL AND GIRIDHI.

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