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Impact of Environmental Factor's on Solar Photovoltaic Module and Different Material Employed on it

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***Abstract*— Solar energy is the future of our planet, because of the decline of non-renewable field. solar energy source are the cause of 80% of the world electricity and we are now heavily rely on non-renewable energy resource, regardless of increased power requirement new research is taking place in green energy, Technologies which are resulted in solar cell reaching an output of 15 to 20% on a commercial basis and increase day by day many factors impact on solar cell capacity and its production while other factors increase solar cell quality and improve results, these factor together with several other factors involved solar panel temperatures, humidity and wind velocity, light intensity, altitude and wind speed these factors are reviewed in this paper along with their effect on the performance of the solar cell, this paper also reviewed the brief explanation on the materials of solar panel the its procedure and steps also to be followed during the manufacturing of Silicon Solar cell the material used in the manufacturing of solar cell and the classification of solar cell centered on material and production this also explain the analysis of materials of various styles used in PV system its cost, life span and efficiency is compared.**

Keywords—Solar Cell Efficiency, humitidy, temperature, dust depostion, Monocrystalline solar cell, Polycrystalline Solar cell .

1. INTRODUCTION

Renewable energy resources lead to a larger part of the world's energy consumed. Any work done has a secret consequence of itself. Changing climate is most demanding challenges facing the world today. The main cause of environmental pollution is the electric generation, which not only creates environmental threats but also affects the amount of small conventional energy sources such as coal, petrol, and diesel, etc. This has contributed to the quest for certain cleaner energy sources, e.g. wind and solar, named green energy sources.

Renewable resources are natural reserves that can be recharged over some time and are considered renewable energy (R.E). There are many various forms of RE including solar, wind, biofuel, geothermal, and ocean. Worldwide, RE serves 16 percent of the fuel generation. Of 16%, 10% use biomass, 3.4% use hydroelectric power and 3% use newer forms of RE including geothermal, solar, wind, biomass, and biodiesel. RE has many benefits; some of them are: (1) infinite, (2) safe, i.e., environmentally friendly, (3) dispatched mostly anywhere and without the costly power lines, (4) require fewer repairs than non-RE sources.

1.2 SOLAR ENERGY

PV cells use an energy transfer cycle to turn sunlight into electricity. For all of these PV cell situations, photons drop on the cells resulting in thrilling electrons in semiconductor substance atoms. Silicon is the main ingredient of PV system construction. The excited electrons result in an electrical current and voltage being produced. PV systems have gained tremendous interest today because their usage is safe and stable.

These systems provide homeowners the ability to produce energy in a secure, safe, and quiet manner that can minimize potential energy costs and reduce grid power dependencies. PV cell lifetime is very high. (The first PV device installed in the United States – in 1954 – is now in service today). PV device output voltage, current, and control differ as the solar irradiation works. Solar collectors and a collection of diffusion tubes connected to heat-water or structures use heat-absorbing devices. Active solar energy collectors capture solar energy for agricultural, commercial, or domestic usage to heat the ambient air and/or water. Typically, the solar focus devices utilize mirrors. We typically organized in a sequence of long and wide circular tiles, PT , or a circle filled with a "control tower"—to concentrate on a heat-collecting feature the mirrored sun rays. The intense sunlight produces heat or a heat storage solution such as molten salt used to produce energy, which is then traditionally used for generator spinning and electricity production.

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Passive solar architecture is the innovative usage of screens, skylights, and sunspaces, position, and orientation of the building and Thermal construction products for heating and lighting homes, or for boiling water, the normal route. In India and several others. In places around the world where the production of solar energy is tremendous, the photovoltaic device has grown as a big competitor to satisfy electricity demand. It also expands renewable energy (with no pollution) as a possible option Link, with very few operating expenses and repair costs.

1.2 ENVIRONMENTAL IMPACT ON THE PERFORMANCE OF THE PV SYSTEM

PV systems efficiency is highly affected by various factors such as design features, Cleanliness, age, heat, lighting, weather, water, noise. Climate change of some form This induces adjustments in solar radiation and atmospheric temperature, and thus adjustments in solar PV production Achievement. Several reports can clarify these impacts'

2. LITERATURE VIEW

2.1. Manas Ranjan Das:

This paper addresses the factors impacting the performance of the Solar Panel. Variables factors include solar array wind speed, temperature and humidity, light strength, altitude, and air density along with several other variables. Results say Temperature is inversely related to solar panel efficiency. The humidity affects the efficiency of the solar cell module in two different ways droplets that mirror the sun light from of the surface of the panel second to the rusting of the metal that decreases the existence of the device. The wind speed helps lower the temperature from the panels and increase the light intensity which directly impacts the power production.

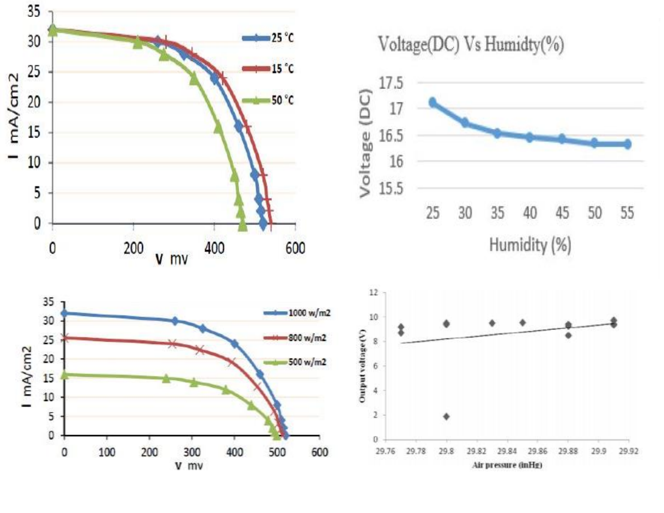

Fig 1: (a) Temperature Effect on I-V Characteristics of solar cell modules, (b) Humidity vs Voltage, (c) V-I Characteristics of solar ccell w.r.t light intensity, (d) Voltage vs Air Pressure[1]

2.2. H. Marroua,b, L. Guilioni c, L. Dufour a, C. Dupraz a, J. Wery d:

The goal of this research is to assess whether crop growth rate in the particular shade of PVPs is affected. Reduction of incident radiation can be accomplished by shifts in climate, soil and seed temperature, humidity, wind speed, and also reported in full sun treatment at hourly rates and in two agro -based-voltaic systems of separate PVP densities across three seasons (Spring, winter and summer). Results suggest that the mean average crop temperature did not increase significantly in shade and that the growth rate was only determined in lettuces and cucumbers during the juvenile period and may benefit from variations in soil temperature.[2]

2.3. Ina Neher1,2, Tina Buchmann3,4, Susanne Crewell 2, Bernhard Pospichal 2 and Stefanie Meilinger 1:

In order to measure the effect of aerosols on solar capacity, they use meteorological observations with temporal resolution and aerosol products from six sites, spread across various climate zones in West Africa. For solar energy forecasts and cloud-free situations simulation the combination of solar power and meteorological models is important. Two separate solar power systems, one photovoltaic (PV) and one power plant with a parabolic trough (PT) are known. A formula chain mixing radiative specifies the average loss of the solar power attributed to aerosols. Thanks to the production of aerosols, the local average decrease in PV and (PT) capacity is between 13% and 22% and between 22% and 37%. In March 2006 a major dust outbreak occurred investigate the impact of an aerosol on A regular reduction of up to 79% to 100% of PVAC to PTP happens with an annual reduction of 20 % to 40% for PVAC and 32% to 71%.

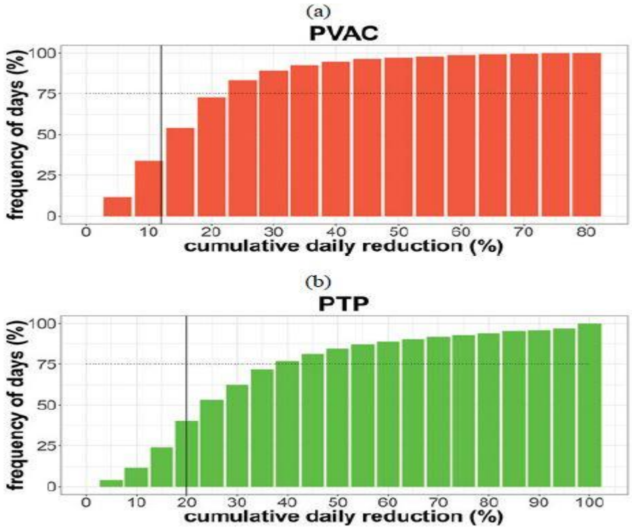

Fig 2: Cumulative daily reduction vs Frequency of days for (a) PVAC and (b) PTP.[3]

2.4. Andrew Blakers a , Ngwe Zin a , Keith R. McIntosh b , Kean Fong a.

This paper aims to review existing progress in the design and manufacturing of high-performance silicon solar cells, and address strategies for optimizing production. A major increase in the mass processing of high quality wafers is observed due to the capacity to manage thin wafers, the conservation of high minority charge life, the passivation of the sheet, the minimization of optical errors, and the characterization of the system. The upper limit of the performance of silicon solar cells is 29 per cent, which is better than the highest laboratory (25%).It is attributed to a

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mixture of a thin surface with a very high lifetime variance carrier, excellent surface passivation, tiny-area electrical contacts associated with low contact replication, free carrier absorption and touch tolerance, antireflective coatings and rear surface reflectors, wider cells and edge passivation; and ample metal thickness to reduce resistive losses. The key benefit of the configuration of the rear touch is decreased lack of resistance. The open circuit voltage over 720 mV (35 fA / cm2) is 26 per cent performance compliant.

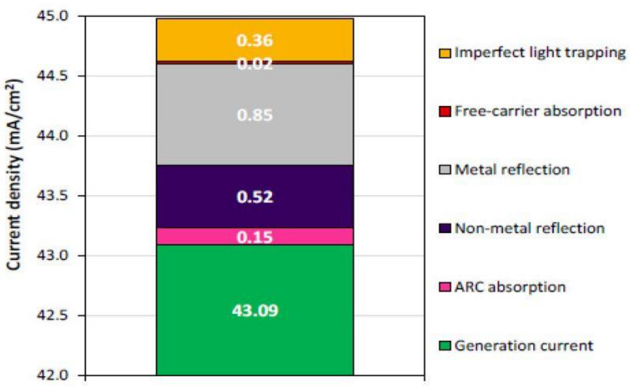

Fig 3: Optical losses in high performance PERL cell.[4]

2.5. J. B. Milstein, Y. S. Tsuo.

They will study the findings and understanding of silicon solar cells, explain how higher conversion efficiencies can be accomplished, strengthen our knowledge of the phenomena of complexation of electrically active hydrogen deficiencies, and examine the low-angle silicon surface. Whether we can learn to monitor these defects, this invention may prove extremely useful, both in enabling us to prepare cells of the highest standard understanding and in demonstrating high performance in silicon solar panel, and in the anticipation of more developments, demonstrable cells exhibiting above 17 percent output by the greatest amount of functional performance limits that we are.[5]

2.6. Guiming Peng1,2,3, Xueqing Xu 2, and Gang Xu2.

Throughout this study, the key accomplishments for PS solar cells classified from a system structure point of view are PSCs that first appeared throughout 2009 as a solvent electrolyte-depended solar cell with a PCE of just 3.8%. And liquid electrolyte considered brittle. In 2012, solid-state dye-sensitized solar panel with only a PCE of 10.2 percent was achieved through the usage of tin containing perovskite CsSnI3 whole Conductor N719 as sensitizer and CH3NH3PbI3 perovskite sensitized solar panel with 10.9 percent PCE on Al2O3 scaffold. In 2013, perovskite's PCE was raised to 15 per cent. Then an identified efficiency of 17.9 per cent jumped to 19.3 per cent in early 2014. By November 2014 KRICT reached a great record of 20.1 per cent certified non-stabilized efficiency. The most frequently practiced CH3NH3PbI3 is a direct bandgap semiconductor with band gap energy of 1.55 eV.[6]

2.7. Di Zhou, Tiantian Zhou, Yu Tian, Xiaolong Zhu, and Yafang Tu:

They present the production and function of PCS in this article. The perovskite solar cells' photoelectric power transmission performance has improved from 3.8 per cent in 2009 to 22.1 per cent in 2016 to replace conventional silicon solar cells in the future. It formed rapidly, but external environmental variables (such as humidity, temperature, and ultraviolet radiation) strongly impact the stability of the organic lead halide perovskite. Secondly, the hole which carries Spiro-omitted materials used in PS. Third, a wide amount of continuous perovskite film is challenging to deposit using the conventional process. Fourth, the Pb factor used in PCS is extremely toxic, which will obstruct the industrial production and promotion of PCS. Fifthly, there is a lack of deep knowledge of the PCS system for microscopic physics. When SiO2 nanoparticles were 50 nm in thickness, the PCE was 11.45 percent, which was significantly better than the PCE (10.29 percent) of TiO2 nanoparticles of the same scale.

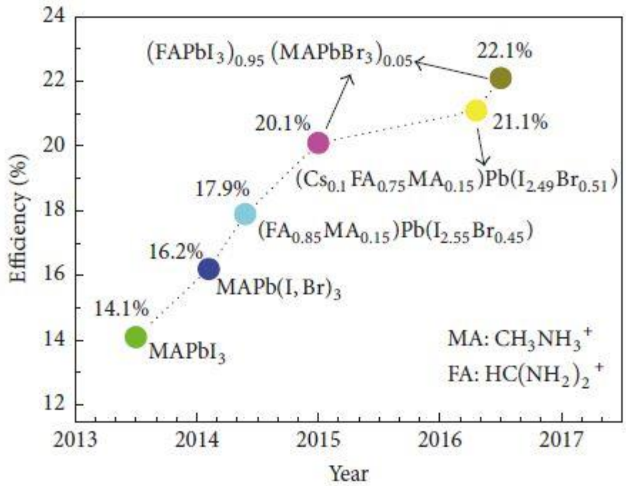

Fig 4: Efficiency vs Year.[7]

2.8. Rohan V Angadi, Revanasiddesh B, Vineeth Kumar P K:

This paper includes a brief understanding to the solar cell components, measures and technique taken during the manufacture of silicon solar cells. The operating mechanism of solar panel is focused on the three factors: (1) Light adsorption to produce employment in charging. (2) Separation of charge. (3) The set of charging jobs on the respective electrodes evaluating the potential difference around the p-n junction gap found at the p-n junction of the cell in reaction to visible radiation is used to do the work. Gallium arsenide solar cell has the maximum performance but life cycle is lower among such products. Throughout the long run, the Monocrystalline silicon solar panel are expensive with decent performance which has rendered them extremely marketable. Polycrystalline cell also shows performance similar to the Monocrystalline with the same lifetime and lower expense rendering it cost-effective in the long run.

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Cell materials	Theoretical efficiency (%)	Practical efficiency (%)	Cost/watt (INR)	Life Span in years
Monocrystalline silicon[10]	20-26	12-18	48	25
Copper Indium Gallium selenide	20	14	45	12
Gallium arsenide thin film	28.8	22	29	18
Amorphous silicon[10]	12-14	5-12	40	15
Cadmium telluride	15-16	5-10	39	20
Gallium arsenide[21]	26-32	18-25	18	20
Ribbon grown silicon	8-10	<10	25	14
Bifacial[21]	19.8-21.4	13	11	30
Perovskite[22]	23	20	10	20

Table 1: Efficiency of Different types of solar cells[8]

2.9. Grant Vonder Haar

This work is performed on solar cell designs and calculated the most effective commercial and residential configuration. Research into solar power over the last decade has facilitated the production of solar cells that can achieve an average energy conversion capacity of nearly 20 per cent. When utilizing conventional crystalline silicone solar cells in conjunction with gallium arsenide compounds, solar cells have the ability to obtain a conversion capacity of more than 50 percent. Cells with potential efficiencies of approximately 80 per cent are developed by using utilizing construction techniques. Crystalline silicon PV cells have laboratory power conversion efficiencies greater than 25 percent for single-crystal cells and more than 20 percent for multi-crystalline cells This analysis has allowed us to establish that gallium arsenide compounds together with crystalline silicon cells are the most efficient in absorbing and storing solar energy. I have identified that factors such as multifunction cells and light concentration improve the output of the cell[9]

2.10. Yasemin Uduma,b , Patrick Denk a, Getachew Adama, Dogukan H. Apaydin a, Andreas Nevosad c, Christian Teichert c, Matthew. S. White a, Niyazi. S. Sariciftci a, Markus C. Scharber a.

The traditional bulk-heterojunction system consists of a substratum coated with a conductive oxide. Using Kelvin probe force microscopy the work function of various bottom electrodes has been tested. You will consider the complete range of topologies and CPD scans. The findings indicate that the PEI- and cross-linked PEI-layers added the ITO work function by around 400–500 mV. The reliably strong VOC and FF in our solar cells demonstrate that this broad change is adequate to turn the ITO into a good-performance hole-blocking electrode most samples being studied are below the 0.05 V band. We find that specific cross-linkers can be applied to PEI which results in a very similar overall output of the system. This may be of great relevance for the production of innovative solar cells of next generation. Our findings indicate that PEI adheres to ITO very well and cannot be extracted with can organic solvents.[10]

2.11 S.Sakthivel 1, V.Baskaran 2 and S. Mahenthiran 3.

Throughout this paper dye sensitized solar cells is produced using normal beetroot-extracted dyes. The performance of ZnO Nano rod solar cells sensitized to beetroot extract is observed to be a value of 0.69 percent in ethanol then solvent at 500 C. Photovoltaic devices are about 20 per cent effective. TiO2 dye-sensitized solar cells centered on Nano particles offer efficiencies above 10 percent. The average efficiency of the cells is equal to the strength of the electron injection. Findings demonstrate that ZnO2 nanowires quickly replace porous as well as voids. Solar cells based on TiO2 nanoparticles are polycrystalline in nature, and the typical size is about 14-17 nm. The SEM picture reveals that it has spherical rod like structure and the arrangement is packed densely giving rise to slight porosity and voids. The output of the Beetroot extract sensitized solar cell demonstrates stronger performance than other natural dye sensitized solar panel, which can be improved by adjusting the solvent.

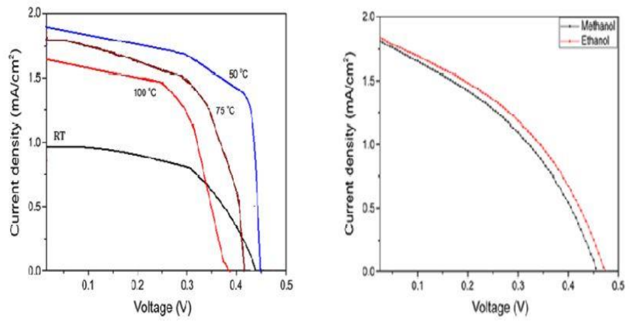

Fig 5: J-V Characteristic of natural dye extracted at different temperature & solvents.[11]

2.12 Md. Rajibul Hoque Rajib1, Sardar Masud Rana2, Md. Rakibul Hasan2, Rashed Al Amin 1, Md. Shahid Iqbal 1, Md. Ruhul Kabir Anik 1, Md. Nasrul Hoque Mia 2, Mahbubul Hoq 2, Mahmudul Hasan 2:

This paper addressed the findings of a comparative analysis developed by COMSO on mono layer silicon photovoltaic simulation. In this paper contrasts the simulation effect of J-V characteristics with the performance of the cell with the constructed output with the difference of the absorption light strength. In simulation we will get solar cell's output is 27 per cent-28 per cent and after the cell's produce the performance is 11 per cent-12 per cent using sun simulator. The transformation performance Hydrogenated amorphous silicon single-joint thin-film solar cells also slightly increased from 2.4% to 10.1%. Factors used to determine the power output, such as: semi-conductive material form, solar radiation incompatibility with cell absorption, photo-element spectrum sensitivity, and cell designing. Upon production, the performance of production of mono-layer silicon solar cell approaches 12 per cent, which in the present world is much stronger manufacturing.

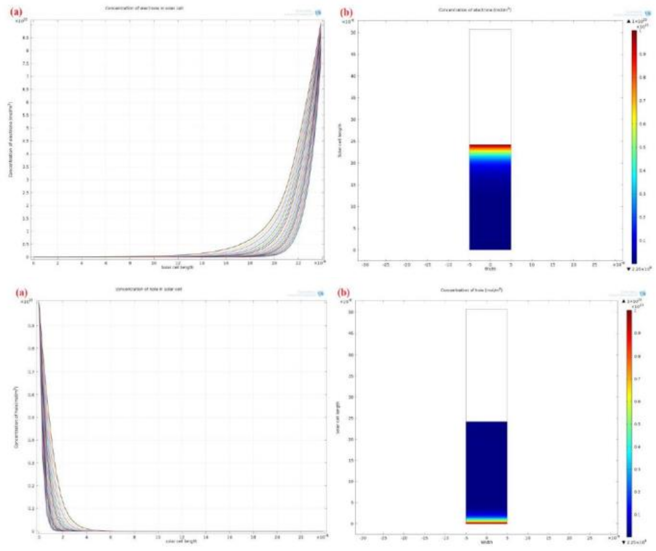

Fig 6: (a) Electron density and Electron density surface of the solar cell, (b) Hole density and Hole density surface of the solar cell.[12]

2.13 Reinhart Appels 1, Buvaneshwari Muthirayan 1, Alexander Beerten 1, Robin Paesen 1, Johan Driesen 1, and Jozef Poortmans 2.

In this article we calculated the impact of dust settling on the performance of solar panels. After 2 months of displaying thermal collectors with a tilt angle of 30 ° the result was clearly noticeable a decrease in output of 4.7 percent. If the volume of accumulated dust decreases with reduced angle of tilt. The influence of wind velocity has on dust particles observed. (Egypt) used 100 glass panels with various tilt angles, and weighed 15.84 g / m2 (0 °) and 4.48 g / m2 (90 °) deposition. Europe started exploiting the benefit of different glass forms, such as self-cleaning glass with an anti-reflective coating. The findings only take the consequences of the soil deposition into account. Photovoltaic systems are susceptible to other means of pollution, such as droppings of animals, dropped leaves, chemicals and moss production.[13]

2.14 A. Benatiallah, A. Mouly Ali, F. Abidi, D. Benatiallah, A. Harrouz and I. Mansouri

They have studies of multi crystal solar module actions according to the density of material, and the electrical function of the principal. Our tests indicate that dust induces a loss of around 69-97 percent of the module's electrical parameters. Variation of present by sand density from 72-93 percent. It helped to show that dust density is creating a reduction in solar module efficiency. The experimental such parameters are dust-sensitive. We note a decrease in the module's output that may reach 80%.Also in the absence of wind; the module's attribute is determined by the thin grain suspended on the floor, resulting in a 17.5 percent reduction in strength and a 1.5 percent reduction in output.

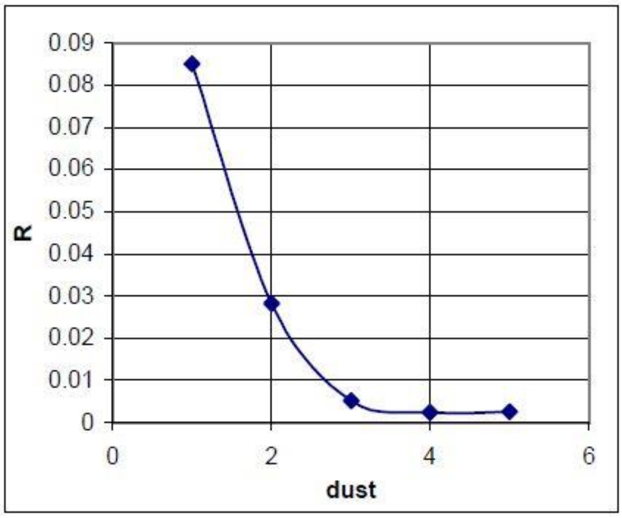

Fig 7: The Efficiency variation with dust[14]

2.15 C. Dupraz a , H. Marrou a , G. Talbot a , L. Dufour a , Nogier b , Y. Ferard b.

In this paper they challenge the best methods for turning solar radiation into energy and food. The photosynthetic process's inherent performance is very small (around 3 per cent). Though monocrystalline solar (PV) panels have a 15 per cent maximum yield. For this article, we propose a blend of solar panels and food crops on the same surface. We recommend that this be called an agrivoltaic scheme. Comparing traditional solutions and two agrivoltaic systems of specific PV panel densities, we utilized Land Equivalent Ratios. We are using crop model to estimate the productivity of the results of the partial shading crops signify that agrivoltaic systems are very effective. The two densities of Pv modules is expected to improve global soil productivity by 35e73 per cent. New solar plants can mix food and energy output. Backside mirror utilizations have a very positive impact on performance.[15]

2.16 Talia R. S. Martz-Oberlander

He is trying to identify viable PV modules to survive such extreme climatic conditions as high temperature, humidity, and low atmospheric pressure. Ultimate PV Modules performance depends on the intrinsic characteristics of the solar cells. Cadmium Telluride CdTe demonstrates 0 per cent decrease in the performance of energy transfer by rising temperatures. This research has been conducted in the Netherlands by installing six separate commercially accessible solar modules outdoors. The results indicate a cumulative performance improvement of up to 53.5 per cent. Solar energy interaction output losses from 20gm dirt density are estimated to be as large as 35 per cent. We consider that the specific forms of panels accumulate varying quantities of soil, depending even on their immediate context. The dirt shows a fairly flat spectral response, and as a result of the amount of dirt accumulation is the key determining factor for the depends on solar cell efficiency. [16]

2.17 Manoj Kumar Panjwani 1, Dr. Ghous Bukshsh Narejo:

They researched how humidity influences solar PV cells. Study reveals that average losses of resources are about 15-30%. From our experimental study, we find the humidity that decreases solar energy consumption to approximately 55-60%. U .S In 1972 the Department of Agriculture reported 30% of electricity shortages. The impact of moisture on the solar panels creating barriers to dramatic variability in the produced electricity. Cities like Karachi, Malaga, Mumbai and los angles where the degree of humidity is above the normal. Results Show limited water layer on the solar cell which decreases performance.

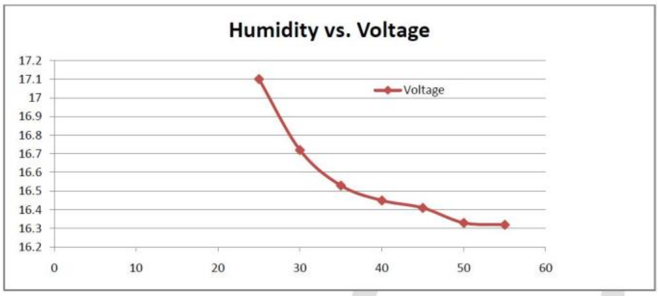

Fig 8: Graph b/w humidity and voltage. Humidity appears as X and Voltages appears at Y axis.[17]

2.18 Carlos Toledo 1, Ana Maria Gracia Amillo 2, Giorgio Bardizza 2, Jose Abad 3 and Antonio Urbina 1.

This research presents the comparison of two types of transposition used to achieve in-plane irradiance, utilizing diffuse irradiation and global on the horizontal plane as input results. The capacity of vertical façades utilizing experimental results from Burgos (Spain) and inferred that the energy obtained by the facing of four vertical façades is approximately double that extracted by the horizontal plane three times over the year as opposed to a horizontal winter sheet. Studies indicate the power losses incurred by deposition of dust at various angles of inclination. Statistics indicate the incidence of error in simple day's decreases. Good performance can be obtained by reducing the angles of the solar level to prevent shadowing. When the irradiation obtained can be gathered twice as often by the horizontal plane, the working conditions of all the facades at these positions are primarily low irradiance and medium temperature.

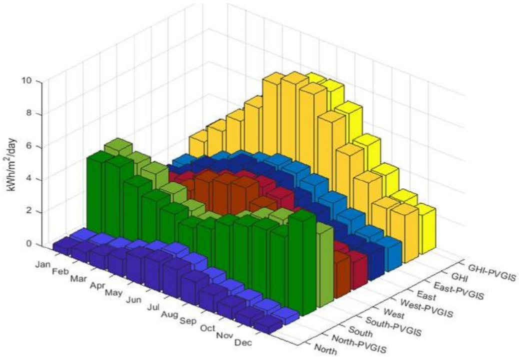

Fig 9: Monthly average of daily irradiation (kWh/m3/day). PVGID-SARAH database and measured.[18]

2.19 Melissa A. Yaklin1, Duane A. Schneider2, Kirsten Norman3, Jennifer E. Granata4 & Chad L. Staiger3.*

The effect of temperature and humidity on a transparent conductive oxide (TCO) dependent on zinc oxide has been tested under accelerated conditions of aging. Under regulated atmospheric conditions, an electro analytical system was used to test the electrical characteristics of zinc oxides. Studies indicate water absorption in thin-film PV module is especially troublesome. The original aging research sequence investigated the influence of oxidation on AZO's surface resistance at 79 C. Samples display a nonlinear rise in sensitivity with increasing sensitivity to moisture over time. The deterioration factor is the rise in resistances at 0.38 ohm / sq / h for an AZO film kept at 79 C at 24 h. throughout the initial application of AZO, which is triggering higher humidity and higher temperatures, a nonlinear rise in surface resistance was observed. Finalization of the test matrix will enable the thin film PV cell / module to establish Factors of acceleration and kinetic parameters of that key component.[19]

2.20 Athar Hussain1, Ankit Batra2 and Rupendra Pachauri3.

A thorough analysis of the impact of air dust particles on the efficiency of a model (PV) was carried out in this report. The study of SEM was perfumed, and the picture indicates the character and topography of the particles in the dust collection. Samples of dust of varying weights with power loss were collected in a PV module at 3 solar irradiation rates of 650, 750 and 850 W / m2. Throughout deposition of rice husk on the PV module Impact the minimum power value of 3.88 W was observed. The power production of solar PV module is obtained by measuring current and voltage calculations with seven separate dust samples of different weights. In the analysis an average of all three voltage and current values was recorded. In the case of Badarpur sand 1 of 50 gm weight sample, the maximum power losses of 59,31, 60,70 and 62,10 per cent were observed at radiation levels of 650, 750 and 850 W / m2.[20]

2.21 Farid Abdelkader Touati 1, Mohammed Abdulla Al-Hitmi 1, and Hamdi Jamel Bouchech 2

Specific solar photovoltaic technologies are prone to pollen, humidity, and Relative humidity of Doha 's climate is studied. Tests reveal that for amorphous specimens, monocrystalline (PVs) have efficiency improvements as large as 85 per cent relative to 70 per cent. The impact of amorphous and monocrystalline silicon PVs on temperature or relative humidity is even more seriously impaired by dust accumulation. It was calculated that 100 days of dust deposition over monocrystalline PV panels culminated in a decrease in output of about 10%. The analysis showed a decrease in panel output as the relative humidity and temperature of the PV panel rise from the reported minimum values of 22 percent and 40 PRIC. At the other side, amorphous PVs were more influenced by temperature and relative humidity changes above 40 level C and 22%. This suggested that monocrystalline PVs in the Doha setting could be preferable to amorphous PVs.

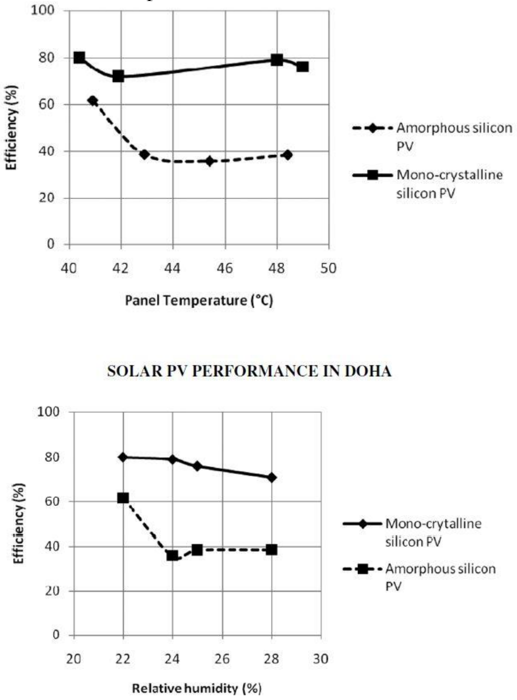

Fig 10: (a) Temperature effect on efficiency of monocrystalline and amorphous silicon PV panels and (b) Relative humidity effect on efficiency of monocrystalline and amorphous silicon PV panels.[21]

2.22 Sophia Akhtar 1, Ishaq Ahmed 1, Khurram Hashmi 2, Rizwan Raza 1.

This study describes Pakistan's electricity problem and its remedies by the application of solar radiation for energy purposes. By using more powerful reflectors we can produce the more electricity. They raise the energy production of solar panels as the entire solar spectrum So far no significant research has been done in Pakistan towards solar reflectors growth. When reflectors are used with the solar panels, their performance as well as the solar panel output can be maximized. CPEC will not be just a road in Pakistan, but it would be beneficial for both nations if the solar reflectors industry is developed by their partnership. We have large lands for solar harvesting and strong light irradiance position, but what we lack is 'industries.

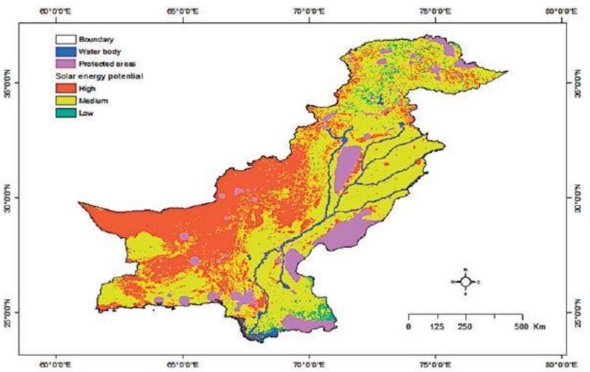

Fig 11: Pakistan's solar irradiation map.[22]

2.23 Swapnil Dubey , Jatin Narotam Sarvaiya , Bharath Seshadri

They investigate the impact of temperature on photovoltaic plant electrical efficiency. Literature reveals that efficiency declines with latitude due to temperature, high-altitude areas often have a strong output ratio due to low temperature, such as the southern Andes, the Himalayas and the Antarctic zone. For the high temperature areas, Pv systems with less temperature sensitivity are preferred and more temperature sensitive would be more efficient in the low temperature regions. Consideration is given to the geographic distribution of solar energy capacity provided the influence of irradiation and relative humidity on output of the PV device. Conclude that all The electric performance and power output of a PV module are linearly depending on the process Declining Temperature with Tc.[23]

2.24 Sanaa Abdulhadi 1 , Miqdam Tariq Chaichan 1 , Hussein A Kazem 2 , Roshen Tariq Ahmed Hamdi 1.

This study reviews the impact of relative humidity on the efficiency of the solar cell from earlier research with the remainder of environmental variables. Research also shown that cell function is causing a substantial decrease of cell performance of hot air temperatures and high humidity environments. Moisture within the photovoltaic cell allows the solar radiation to replicate. Solar cells operate under extreme environments such as high temperatures and low humidity, decreasing the performance of solar cells by more than 70 per cent. Under low relative humidity and cool cell conditions it can function more efficiently. Studies often indicate corrosion of metal owing to moisture. Both of these factors contribute to a substantial decrease in the efficiency of the solar cell throughout its working life.[24]

2.25 Zeki Ahmed a, Hussein A Kazem b and K. Sopian a:

This paper discusses the effectt of dust on PV efficiency work is focused on the influence of dust properties, PV device parameter impact and environmental parameter effects. Research conducted on the basis of the influence of dust on PV cell output, even the effect of humidity on PV cells. The first case is the influence of water vapor particles on the ultraviolet irradiance stage and the second case is the absorption of humidity to the solar panel enclosure. Such results deteriorate the degree of receipt of the direct solar radiation portion further research and suggestions are necessary to will the impact of dust.

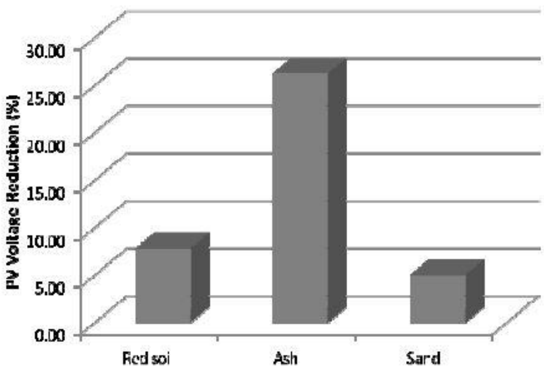

Fig 12: Reduction in PV voltage due to the three pollutants.[25]

2.26 S. Mekhilef a , R. Saidur b , M. Kamalisarvestani a.
This research explored a variety of parameters that are critical to solar cell activity. It should be noted that accumulation of dust and settling on the surfaces of PV cells should cause degradation in the performance of solar cells almost always due to humidity. More heat may be extracted from the PV cell surface by increasing wind velocity, higher air velocity reduces the relative humidity of the atmosphere, resulting in better performance. Wind raises dust and disperses it into the air resulting in shade and low PV cell efficiency. .The tests may be performed in future studies on the basis of simultaneous effects of experimental findings, associations and simulations based on mathematical models which involve various variables tend to be the potential outcomes of future investigations.[26]

3. CONCLUSION

In this paper several environmental factors influencing solar cell production are discussed, various material having specific levels of efficiency and deposition of dust. Studies show temperature decreases solar cell efficiency. Humidity can impact the solar cell's life and power output and is also responsible for corrosion on the solar cell panel. The wind has a beneficial impact on the solar panel module by reducing the surface temperature. The increment of light intensity would maximize efficiency. The highest effective substance in a solar cell Gallium arsenide, but less period of life. Monocrystalline silicon solar cells have good efficiency and are economical in the long period. Poly-crystalline cell also shows near-monocrystalline performance for the same life cycle but having a lower cost. Reduction in power by 69-97 percent in module due to dust deposition. Regular cleaning of panels is essential to tackle the issue.

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