

# REVIEW ON SOLARIZING A PUBLIC BUILDING – DESIGN AND ESTIMATION OF SOLAR PV SYSTEM

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## ABSTRACT:

Now-a-days non-conventional source of energy is becoming one of the important methods for generating electricity. With this source of non-conventional energy, Solar Photovoltaic energy is mostly used, as Sun radiation is available for lifetime to use. This paper highlights the study of estimating and designing an on-grid connected PV system for govt. School. The estimation and designing are done by keeping the factors like shadowing, dust, sun peak hours in mind. This installation will promote Solar PV energy in educational institutes which further helps to reduce their energy consumption bills.

**Keywords :** Non-conventional Source ; Solar photovoltaic energy ; On grid PV system ; Sun peak hours.

## INTRODUCTION:

In today's world, Renewable energy are considered to be the major source for generation of electricity. The trend of energy is changing day-by-day & non-conventional source are playing a vital role in it. As per latest report by Ministry of Power, India's per capita electricity consumption is 1811 KWh. As solar photovoltaic is considered to play a major part in generation of electricity. As Sun's radiation is the main key for generation which lasts forever. Thus,  $1.8 \times 10^{11}$  MW amount of energy is available per annum which is much larger for generating electricity.

In this paper, the design & estimation of a solar PV system is done for a govt.

school. It is basically done on the design of on-grid system. A on-grid is cheaper and less components are required which helps in costing. All components and their functions have been studied and used according to their use. Govt. are also creating awareness for installing solar photovoltaic system in their houses & agencies are also made like MNRE, SECI etc. All the factors are kept in mind like dust, dirt, shadowing, site assessment, etc. while designing a system.

Therefore, this work aims to promote and create awareness of installation of photovoltaic system as it is becoming a trend of the future for generation of electricity.

## LITERATURE REVIEW:

This review paper is highlighted on the study of "On grid Solar photovoltaic system". They showcase the components, design used in on-grid PV system. They also did a case study on 95 KWp on-grid system to have a strong look on its performance, efficiency & functioning (95KWp project in Karunya institute of Tech., Coimbatore). They also include the online monitored data as a result of power generation through an on-grid system in KWh/KWp. They explain the future trend of on-grid system rather than off-grid system due to advancement in PV Technology and power electronics. Designing and installation of on-grid system includes to follow the technical & non-technical considerations such as behavior/working of components; environmental factors; appropriate solar radiations. [1]



This paper highlights the importance of one of the renewable and sustainable energy i.e., Solar energy. This paper also review the photovoltaic conversion for electricity generation. The power of sun is much higher in compare to the rate of all energy consumption i.e.,  $1.8 \times 10^{11}$  MW. This paper also review the technologies, sizing, solar type cells etc. used in solar power generation. This also look up different solar project for the analysis of sizing ,grid connected capacity ,its potential in terms of economic and environment. They deal with the basic applications and environmental aspects of solar generation. The information will provide basic idea or build the basic concept for the manufacturers, researcher, academicians etc.for their further knowledge on solar pv technologies & its related terms.[2]

This paper provides the basic information about the photovoltaic system. They focused on the advancement to improve its design, operation & its maintenance. They also showcased the different critical components of photovoltaics system and their improvements required in the terms of efficiency. They also reviewed the risks which are held in the operation and

maintenance of photovoltaics system. They also keep an eye on the environment problems which affects the efficiency and power generating potential by dust,dirt, shadowing etc. It has been also detected a few basic items to take a constant look in order to minimize its consequences in upcoming time. This article thus tried to present the improvements required in performance & to decrease its costing of its operation and maintenance. [3]

This paper highlighted the feasibility of the Grid - connected solar photovoltaic system. They have used the PVSYS software to analyze the performance of the system. They reviewed the conversion of efficiency of photovoltaics system i.e., one of the important factors needed to be determined in power generation technologies. They simulated the photovoltaic system on the basic terms like losses,energy production, shadow analysis etc.They also focused on different installed projects to design a basic grid connected system for Surat,( Guj.) according to its climatic conditions. They simulated & founded the basic components required for the specific place. From their requirement they concluded having 170.23 MWh ;163.11 MWh;155.20 MWh electricity generation in a year & its availability to the grid.[4]

This paper presents a correlation between the energy sufficiency of India and role of renewable resources to fulfill it. As Indian energy scenario is suffering much from challenges of energy deficit, energy security etc. This paper also reviews the future scenario of energy in India in field of renewable & non- conventional resources like solar, wind, water etc. Though for non-conventional use, the National Solar Mission (NSM) & National Action Policy on Climate Change (NAPCC) are taking initiative to create awareness. This paper also identifies the estimated potential of every renewable resource in Indian context and provides different scenarios for every resources. By 2013, per capita consumption of electricity is 765 KWh/year of India. So, efforts are made to take per capita consumption upto 3000 KWh/year i.e., lose to current world consumption. Different scenarios are combined to get demanded renewable generation scenarios i.e., Optimistic Demand (OD), Expected Demand (ED) and Pessimistic Demand (PD). This demand has been simulated by product of population & per capita electricity consumption. This analysis shows through the current renewable resources can provide a need of the future

electricity demand in India.[5]

This paper presents the size optimization techniques of photovoltaic system. Despite from being clean,eco-friendly, it has major drawback of high capital cost. This paper has focused on the optimization in terms of no. of PV modules, capacity of storage battery, generator size etc. In this paper, the optimization has been reviewed by taking combined system of hybrid PV/diesel, hybrid PV/wind, standalone system and grid connected system. Optimization of inverter

size in photovoltaic system is also reviewed.Simulation based method (numerical method) i.e.,long series of weather data, are used majorly for optimization. AI techniques such as ANN & Genetic Algorithm played important role in improving the photovoltaic system size optimization techniques. The result of this paper shows that the optimization strongly dependent on meteorological variable like solar energy, wind speed & ambient temperature. [6]

**Validation Table:**

| S.no | Review Paper   | Author  | Problem  | Solution   |
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| 1    | A review of PV System:Design,operation & maintenance. (2019)                     | Luis-H-Vallejo; Sara Gallardo Saavedra; Victor A Gomez  | <ul style="list-style-type: none"> <li>•intendstoimprovedesignofPV system as well as optimal operation &amp; its maintenance.</li> <li>•The critical components of system and its design are also reviewed.</li> <li>•Regrading operation, efficiency, power quality etc. are reviewed and their performance and risk of failure models are alsoreviewed.</li> </ul> | <ul style="list-style-type: none"> <li>•Regradingdesign, criticalcomponents&amp; design of PV system is analyzed.</li> <li>•Newmodelofinvertersare needed which does not have transformer associatedwithItandmore efficient, reliable are desiredspecifications.</li> <li>•Batteries are replaced by accumulation system for short lifetime and effective methodofenergygenerationcontinuously.</li> </ul> |
| 2    | On-grid Solar PV System: Design Considerations, components and case Study.(2018) | Nallapaneni Manoj Kumar; M.S.P Subathra; J.Edwin Moses. | <ul style="list-style-type: none"> <li>•Studyonvariouson-gridssystem,their operation along with design.</li> <li>•case study of KITS in Coimbatore is done by online monitoring data analysis.</li> </ul>  | <ul style="list-style-type: none"> <li>•All the details on grid components &amp; design are clearly explained</li> <li>•Asperformancewasillustratedwith verification study of expended results using PVGIS &amp;PV watttools.</li> <li>•Thus, software result are almostsync with practical data.</li> </ul>   |

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| 3 | Design of Solar PV System (2018)   | Arpit Garg<br>Ankita Ghatia<br>Md Asif Iqbal<br>Dr. Deepika Chauhan | <ul style="list-style-type: none"> <li>Reviewed to evaluate the feasibility of grid connected rooftop solar PV System.</li> <li>Main aim is at simulation &amp; development of grid connected pv system on basis of module, losses, size &amp; shadow analysis.</li> </ul> | <ul style="list-style-type: none"> <li>The system losses, configuration &amp; output electricity are analyzed by the help of PVSYST software.</li> <li>Simulation is done basically for designing a solar pv system for Surat city. Thus, for that, a free mounted air circulation with air duct behind should be applied for continuous generation of electricity.</li> </ul>  |
| 4 | Energy sufficiency aspirations of India and role of renewable resources: Scenarios for future (2017) | Rhythm Singh  | <ul style="list-style-type: none"> <li>This highlights the promises offered by renewable energy technology.</li> <li>This analysis the current percentage share &amp; future share for desired demand of energy required in India as future scenario.</li> </ul>           | <ul style="list-style-type: none"> <li>A simple logistic model has been used for forecasting the penetration of the different renewable technologies in all scenarios. The results from the model show that solar power will probably reach its saturation level by 2034—2036.</li> <li>Out of these six scenarios, the OD-TMRE scenario would be the most desirable—as it represents at least as much energy sufficiency.</li> </ul> |
| 5 | A review of PV System Size optimization techniques (2013)  | Tamer Khatib<br>Azah Mohamed<br>K sopian                            | <ul style="list-style-type: none"> <li>The current status of PV System size optimization is reviewed.</li> <li>In addition they also show cases of the size optimization techniques for inverters in PV System.</li> </ul>   | <ul style="list-style-type: none"> <li>As a result, optimization of pv system strongly depends on meteorological variables like solar energy, ambient temperature.</li> <li>The mostly used optimization method is simulation based method (numerical method) which uses long time series of weather data.</li> <li>AI techniques like ANN play important role in improving the quality.</li> </ul>                                   |

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| 6 | A review of solarpv technologies(201L ) | Bhubaneswari Parida S.iniyank Ranko Goic | <ul style="list-style-type: none"> <li>•About pv technology, its power generating potential, Light absorbing material used is highlighted.</li> <li>•Environmentaspectcouple dwithits applications forimprovement.</li> </ul> | <ul style="list-style-type: none"> <li>• In order to maintain the growthrate ,the design, consumption &amp; production technologies need new development to improve and increase the overall efficiency.</li> <li>•Solar hydrogen batedenergy has capabilities of providing the requirement of energy.</li> </ul> |
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**Conclusion:**

Now a days generating electricity has become a major challenge of the world as fuels are vanishing day-by-day. Solar photovoltaic energy is the probable solution for generating electricity due to its renewable resources factor. Thus, the designing and estimation of solar photovoltaic system are done for public building (govt. school). All components are picked and used according to on-grid system installation. Thus, the result is to promote the installation of solar photovoltaic system to every residence and consumes more per capita energy.

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