



**MGM's COLLEGE OF ENGINEERING & TECHNOLOGY
KAMOTHE, NAVI MUMBAI**

DEPARTMENT OF Electrical Engineering

Two Days workshop

On

INSTALLATION OF ROOF TOP SPLAR PANELS

21st & 22nd April 2018

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OBJECTIVE

A Powerful Opportunity

- The two-day, eight-hour workshop includes design considerations for PV, how to speak about the technology's advantages, and where to find information on installation of rooftop Solar Panel.
- Program proponents believe the areas of ready to embrace solar with the future saying "Let's start this green power revolution now,"
- The solar industry is about to boom in the region because of a trainable workforce, and people are interested in becoming installers and suppliers for the technology."
- Building owners unsure about solar should be of aware of available financial incentives as well. A solar power purchase agreement, or PPA, allows a host customer to pay for generated electricity at a fixed rate typically lower than the local utility's retail rate.
- Green Power Providers program are paid a retail rate for every kWh generated by solar, wind, biomass or hydropower systems

On the Ground Floor

- Arming design professionals with fundamental knowledge about solar makes it easier to introduce the concept at a project's rooftop, as it's less expensive to incorporate PV on already existing building.
- More people are saying they want to work in a clean structure built without toxins
- With solar and other measures, building owners will take additional steps to make their project energy efficient. "We can't teach (my students) in two days all they need to know, but they'll take away a basic understanding of solar, how to install it, and how it impacts the operation of a building .

Our students can have their own start up and differentiating themselves in the marketplace is the benefit we're trying to convey. "Don't just go find a solar installer, have it thoughtfully installed into the project you're working on."

ACKNOWLEDGEMENT

We are gladly thankful to our Chairman Honourable Shri Kamal Kishor Kadam for his encouragement and providing opportunities in the field of Technical education. We are also thankful to our Director General Dr. K G Narayankhedker and our Principal Dr S K Narayankhedker for their continuousf inspiration and motivation for learning new and latest technical knowledge. We are also thankful to our faculty who gave us a great guidance regarding conduction of workshop and worked relentlessly for making this workshop successful. So we decided to organize the two days workshop on “INSTALLATION OF ROOFTOP SOLAR PANEL ” at MGM’College of Engineering and Technology, Kamothe, Navi Mumbai.



General

Date of Birth : 13th June, 1964

Designation : Professor (**Institute chair professor**),

Address: Department of Electrical Engineering, Indian Institute of Technology - Bombay, Powai, Mumbai - 400 076, India,

Phone: (91)-(22)-2576-7422

email: agarwal@ee.iitb.ac.in

Academic Qualifications

Ph.D. (Electrical Engg.) 1990 - 1994: University of Victoria, British Columbia, Canada.

Specialization : Power Electronics

M.E. (Electrical. Engg.) 1986 - 1990: Indian Institute of Science, Bangalore, India,

B.Sc. Physics (Hons.) 1982 - 1985: St. Stephen's college, Delhi University, New Delhi, India

Field of Interest

1. **Power conversion:** New converter topologies, High frequency link power conversion, ZCS-ZVS configurations, Switched Capacitor DC-DC converters
2. **Power quality issues:** Power factor correction techniques, Static VAR compensation, Active filters
3. **Non-conventional energy (solar PV, Wind, Fuel cell) :** Power conditioning, maximum power point tracking, stand-alone and grid connected systems, Microgrid
4. **Intelligent control of power electronic systems (including electric drives):** Advanced control schemes, DSP and FPGA based control

**Glimpses
of
Narayan R. Khushalani**

Mr.Narayan R.Khushalani is an Electrical Engineering Graduate of 1972 from Mumbai University.

He has served the Electrical Industry mainly in Marketing.

He had his own Electrical Trade business from 1980 to 2007.

He is presently working for M/s Polycab Wires Pvt.Ltd. as Vice President-Marketing - Business Development in the Solar Division

During the initial days of setting up National wide network of Distributors/Dealers for Polycab he has travelled extensively all over India covering almost all major cities and towns of each state. He has literally brainwashed people to switch-over to Polycab brand overnight after delivering the Technical Seminars on Polycab products to various segments of users of Electrical Industry.

Customer Complaint Cell was also headed by him in Polycab. Lot of improvements were done to effectively bring minimize the customer complaints.

He is also a certified Six Sigma Green Belt.

He has been instrumental in signing Rate Contracts with most of the OEMs like L&T, Siemens, ABB, Schneider Electric, GE and Alstom, etc.

He has been instrumental in getting the Switchgear Division revived and getting the products reach launching stage.

Presently he is now heading the Marketing of Solar DC Cables and Solar Inverters for the company. With the encouragement given by Government to Solar Industry this division will definitely be a rising star in the coming years.

On a Spiritual platform he is a Grand Master in Reiki, first degree Pranic Healer, Psychic Healer and practices the miraculous Bio-Etheric Healing. He has resolved to spread the awareness to public at large through gatherings about how we can learn from the laws of nature and tune ourselves to keep healthy and happy.

Aged 68 years, Mr.Narayan R.Khushalani is a family man blessed with a loving wife, one son, two daughters and grand children.

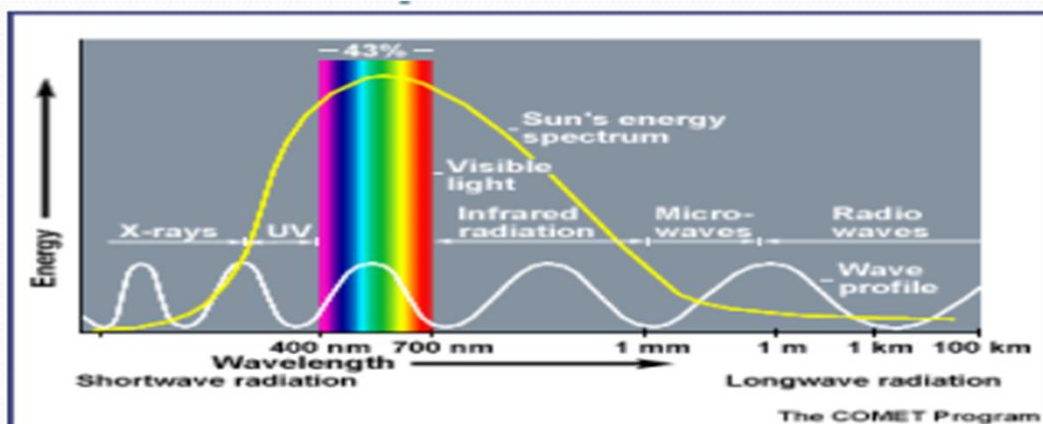
He firmly believes in enjoying life and being at peace within amidst the chaos surrounding our environment.



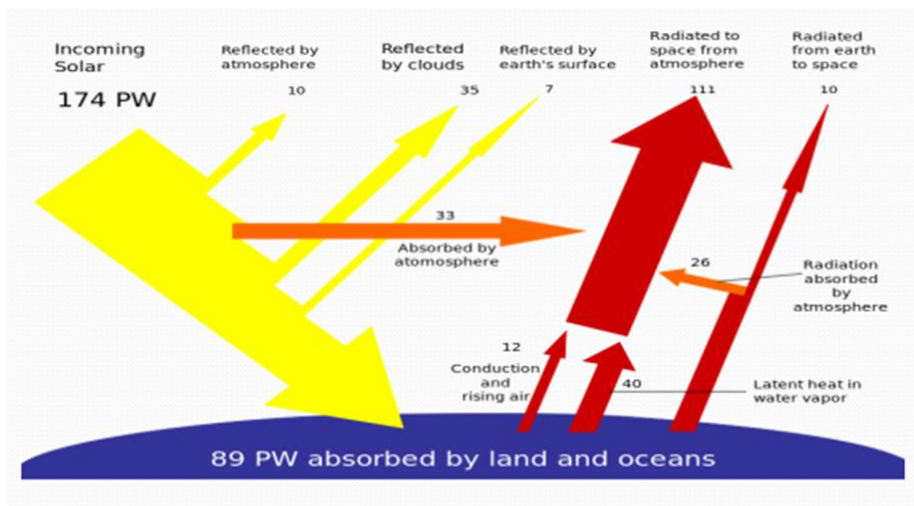


What is Solar Energy?

Solar Energy originates with the thermonuclear fusion reactions occurring in the sun. The spectrum of solar light at the Earth's surface is mostly spread across the visible and near infrared ranges with a small part in the ultraviolet region.



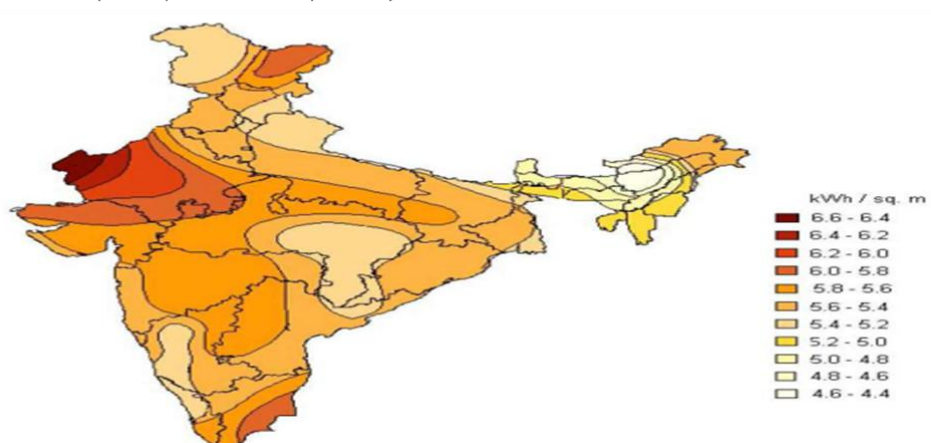
How much solar energy reaches to earth?



About half the incoming solar energy reaches the Earth's surface

Solar Map of India

About 5,000 trillion kWh per year energy is incident over India's land area with most parts receiving 4-7 kWh per square meter per day



Steps to size Roof-top plant

1. Scoping of the project
2. Calculating the amount of solar energy available
3. Surveying the site
4. Calculating the amount of energy needed
5. Sizing the solar system

A) Scoping of Project

Clearly laying out what you wish to achieve with your rooftop solar PV installation is critical to designing a plant that fits your needs. Examples of different kinds of needs we encounter in our work include

- › Completely supports your daytime electrical needs
- › Supports lighting loads
- › Supports critical loads during power cuts
- › Abates diesel consumption
- › Provides power for night-time use

B) Calculating Energy Power

The amount of solar energy available to you is limited by the amount of sunlight that falls on a solar panel per day. This is expressed in kWh/m²/day. We expect about 4-7 kWh/m²/day of solar insolation in India.

At crystalline panel efficiencies (which are the kind used in rooftop systems due to their higher efficiency), we can generate 4 kWh of power per day from a 1 kWp panel. This is an average measure that can vary across different regions in India. You can find more details on output in different Indian states [here](#).

The approximate solar insolation at your location can be determined from the [NASA website](#). To be absolutely certain of solar insolation at a particular site we would have to place sensors on-site that measure the actual insolation received over a period of time. This is both an expensive and time consuming process.

c) Survey of Site

The site survey establishes the suitability of the roof for installing solar. Things to watch out for include

- › Space available – 1 kW of panels would require 100-130 SF (about 12m²) of shade-free roof area
- › Orientation – A south-facing roof is ideal for those in the northern hemisphere

C) Calculating the amount of energy needed

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Executive Summary

The two days workshop “Installation of on Rooftop solar panel” was organised at MGM College of Engineering and Technology, Kamothe, Navi Mumbai. The purpose of conducting this workshop to put together basics and research which are going on in a way and can be explained by academicians and industrialists interested in the field of Solar energy. The workshop provided a quick learning from experts, researchers as well as novices in the field of Rooftop solar panel Installation. Theory and applications have been discussed as well, with a view of giving an in depth knowledge to the learners.

The workshop was scheduled for two days .

Day 1, Date 21 April, 2018

There were three speakers on 21 April

1. Shri N R Khushlani, Vice President, Polycab wires Pvt Ltd, Mumbai explain the basics of solar power generation and its process from solar energy to electricity.

There are three basic types of solar power system designs that can be used in homes and businesses:

Passive solar energy, active solar energy and solar thermal energy.

Passive solar energy involves orienting a building to optimize sun exposure. Then, passive solar power systems are built right into walls, windows and skylights to take advantage of the sun's heat. They do not use outside materials to capture and disperse light within the structure. Passive solar energy requires designing buildings from the blueprint phase (or at least by developing detailed plans for any major overhauls) that maximize energy use without external mechanisms. Installation of glazed windows and building overhangs are some common examples of passive solar design.

Active solar power is much more common. An active solar energy system uses a mechanism, such as solar panels on a roof, to capture sunlight and generate power. These systems involve installing panels, wiring and other materials to harness the sun's energy to power electric systems.

Solar thermal energy involves using the sun's radiation to heat water and is a great way to reduce your water-heating bills and keep your pool heated

He emphasized that as per Solar Map of India ,about 5,000 trillion kWh per year energy is incident over India's land area with most parts receiving 4-7 kWh per square meter per day.

Solar panel manufacturing techniques were explained as **Mono-Si**: Crystal Lattice of entire Sample is continuous and **Poly-Si**: Composed of many crystallites of varying size and orientation Solar Panels Manufacturing Technique DC Distribution Box and A C distribution box function was well explained. Solar Inverters – Grid-tie System and Net metering were also explained.

The electrical grid is divided into three main components:

1. GENERATION - There are two types of generation - centralized and decentralized.

Centralized generation includes coal, nuclear, natural gas, hydro, wind farms and large solar arrays.

Decentralized generation occurs close to consumption, for example rooftop solar.

2. TRANSMISSION and DISTRIBUTION - Transmission include transformers, substations and power lines that transport electricity from where it is generated to points of consumption.

CONCLUSION

The purpose of this workshop is to learn about components of solar power installation unit and its maintenance. One of the very basic necessity in rooftop Solar power is calculation of requirement of capacity of Solar plant. This work shop was effective for the knowledge of technical and practical purpose. Effective calculation and installation are essential for the best output of any strategies. The Two-Day session envisaged and facilitated the participants to analyse the importance of Solar power, P V technology ,Installation procedure, comparison of rooftop and ground panels. Such workshops will enhance the technical and professional knowledge to develop their own start up because of its connectivity to the industry and educational vivacity.