

Report on Industrial Visit
to
Vikram Solar Power Plant, Kosuvaripalle, Andhra Pradesh
Organized by
Department of Electrical & Electronics Engineering
in Association with IIC and ISTE Chapter, MITS
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Participants: B. Tech-II Yr / I Sem-EEE & Mechanical Students

Total No of participants: 39

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Introduction:

The Vikram Solar Power Plant at Kosuvaripalle, located in the Annamayya District of Andhra Pradesh, is a utility-scale solar power generation facility developed exclusively for Tirumala Tirupati Devasthanams (TTD). The plant was commissioned on 01 April 2017 following an accelerated construction schedule. Spread across approximately 67 acres, the plant has an installed capacity of 10 MWp and was established under a Build, Operate, and Transfer (BOOT) model, providing a structured framework for ownership and operational transition. The project represents TTD's commitment to renewable energy adoption, sustainable power generation, and modernization of its energy infrastructure.

Objectives of the Visit:

The industrial visit was organized with the following objectives:

- To understand the design, operation, and control mechanisms of a utility-scale solar power plant.
- To gain practical exposure to solar PV modules, inverter systems, substations, and grid-integration processes.
- To understand real-time monitoring and performance assessment through SCADA systems.
- To familiarize students with renewable energy technologies and their contribution to sustainability and carbon-emission reduction.

- To bridge the gap between theoretical knowledge and practical applications in solar power generation.

Overview of the Solar Power Plant:

The Kosuvaripalle solar power plant was established at a location with favorable solar irradiance conditions, supporting efficient solar energy generation. The plant operates as a grid-connected solar power system, with generated electricity being evacuated to the regional distribution network. The power generated also supports the nearby Mudivedu substation, contributing to improved power-system stability and reduced transmission losses.

The plant is equipped with high-efficiency polycrystalline photovoltaic modules, with individual module ratings ranging from 310 Wp to 315 Wp, selected to suit the prevailing environmental and thermal conditions of the region.

The generated power is evacuated at 33 kV and synchronized with the grid through string inverter systems. A centralized SCADA-based monitoring system facilitates real-time monitoring of plant performance, identification of faults, and preventive maintenance activities. The plant generates more than 1.55 crore units of electricity annually, meeting approximately 38.5% of Tirumala's energy demand and providing significant economic and environmental benefits.

Activities Carried out during the Visit:

During the industrial visit, students were taken through various sections of the solar power plant and were provided practical exposure to the following systems:

- Solar PV module arrays and string configurations.
- Grid-connected inverter sections and power-conversion units.
- 33 kV substation and power-evacuation systems.
- Centralized control room and SCADA monitoring facilities.
- Solar power generation, conversion, protection, control, and grid-integration processes.

The technical staff explained the complete process of solar power generation, from the conversion of solar energy into electrical energy through PV modules to its conversion, monitoring, control, and evacuation to the grid. The interactive sessions enabled students to relate their classroom learning to the practical operation of a large-scale renewable energy facility.

The visit also provided an understanding of the environmental and economic benefits of solar power generation. The plant contributes to an estimated annual reduction of approximately 15,143 metric tonnes of CO₂ emissions and provides estimated cost savings of approximately ₹4.5 crore to TTD.

Sustainable Development Goal (SDG):

SDG	SDG Title	Relevance to the Industrial Visit
SDG 7	Affordable and Clean Energy	Exposure to utility-scale solar power generation and clean energy adoption.
SDG 9	Industry, Innovation and Infrastructure	Understanding modern renewable energy infrastructure and grid integration.
SDG 11	Sustainable Cities and Communities	Contribution of solar energy to sustainable urban and institutional power systems.
SDG 12	Responsible Consumption and Production	Efficient utilization of renewable resources and reduced dependence on fossil fuels.
SDG 13	Climate Action	Awareness of carbon emission reduction and climate change mitigation through solar energy.

PO Mapping for Industrial Visit – Vikram Solar Power Plant (New NBA):

Sl. No.	Program Outcome (PO)	Justification / Relevance to Visit
1	PO1 – Engineering Knowledge	Understanding of solar PV systems, inverters, substations, and grid-connected operation.
2	PO2 – Problem Analysis	Analysis of practical operational challenges in solar power generation and evacuation.
3	PO5 – Modern Tool Usage	Exposure to SCADA-based monitoring, protection systems, and control room operations.
4	PO7 – Environment and Sustainability	Awareness of renewable energy benefits and carbon emission reduction.
5	PO9 – Individual and Team Work	Group-wise learning and coordinated activities during the industrial visit.
6	PO10 – Communication	Technical interaction with plant engineers and reporting of observations.

Photographs:



Conclusion:

The Vikram Solar Power Plant at Kosuvaripalle stands as a significant example of successful utility-scale solar energy implementation. With an installed capacity of 10 MWp, the plant demonstrates reliable grid-connected operation and effective integration of renewable energy into the power system. The deployment of advanced photovoltaic (PV) modules, inverter systems, and SCADA-based monitoring facilitates efficient plant performance, real-time monitoring, and operational reliability. The industrial visit provided students with valuable practical exposure to the design, operation, monitoring, and grid integration of a solar power plant, thereby strengthening their understanding of large-scale renewable energy systems and their practical applications.

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We also express our heartfelt gratitude to the management and technical staff of the Vikram Solar Power Plant for their warm hospitality, cooperation, and valuable technical guidance. Their support and interaction with the students made the industrial visit highly informative, enriching, and successful.



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