JEF

Since 1994

SUCCESS STORY

First-Of-Its-Kind Grounding System for NTPC's Largest Floating Solar Plant

Client: NTPC Limited

Sector: Electricity

Region: Kerala, India

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Client Overview

National Thermal Power Corporation Ltd. (NTPC) is India's largest energy producer in the public sector, generating and distributing electricity to all the State Electricity Boards. Founded in 1975, the company has established its presence in the entire power generation chain, harnessing electricity from fossil fuels, hydro, nuclear, and renewable energy sources.

Ranked as No. 2 Independent Power Producer (IPP) in Platts Top 250 Global Energy Company rankings and a Maharatna company in 2010, NTPC Limited operates in 70 locations across the country through 55 power stations with an installed capacity of 69,134.20 Megawatts (MW).

NTPC Limited is a prominent energy player constituting 20.96% of the power generation in the country.

Project Synopsis

NTPC Limited had appointed Tata Power Solar Systems for setting up a 70 MWp floating solar photovoltaic project in the backwaters of Kayamkulam, Kerala. This project was a part of NTPC Limited's 92 MW floating solar project spread across 350 acres of backwaters. The prestigious project required an efficient grounding system to ensure the safety of the equipment and human life.

Considering the expertise required to design a unique protection system, Tata Power Solar tied up with JEF Techno, the most trusted name in risk management and reliability.

The project involved developing the lightning protection and earthing system for the floating solar project starting from the pre-engineering stage of preliminary estimation and planning to the detailed engineering stage of design and development.

The Challenge

Unlike building a grounding system on land, building a system with water as the medium had its unique challenges. These included:

- Building a grounding system that doesn't affect the flora and fauna of the region.
- Ensuring that the fault current does not pass through the water (as salt water is a good conductor of electricity).
- Movement of man and material in a water body that is not easy to navigate.
- Managing budgets and timelines despite challenges of the pandemic.

Other challenges included

- Manufacturing the designed components during the COVID phase 1.
- High sea tides and changing water depths.
- Identification of coordinates without visual cues on the water body.
- Highly corrosive nature of salt water.

The Solution

To overcome the execution challenges, the JEF team had to go to the drawing board right from design, to execution. The project called for out-of-the-box thinking and problem-solving at every step.

Designing a system that is unique:
Lightning Protection and Earthing cannot work without one crucial component - Earth. There was plenty of it available, but under several meters of salt water. Simply using the existing soil and dissipating the current was not an option.

After several iterations within the team, solutions were found to best access and dissipate the fault current.

- Specially designed earthing blocks were developed keeping in mind all the challenges at sea.
- A customized Lightning Protection Floater System was designed.
- To ensure protection and long-life given the natural elements, products with the highest level of quality were used.

As the margin for error was low, there was intense testing and scrutiny on the CDEGS HighFreq software module, before installation.

Implementing in a unique environment:
Anyone who has been at sea will vouch that navigation is not easy, as there are no visual cues. The material that needed to be installed was heavy and sensitive. To add to all of this, the pandemic was on.

The JEF team, was however up for all of these challenges. From commissioning a GeoSurvey, to designing a special anchoring system, all problems were tackled head-on.

To ensure the transportation of heavy earthing components, the company designed a special barge, assuring timely delivery despite lockdown issues. All safety protocols such as vaccination of employees, PPE kits for workers, and others were duly followed.

JEF handled the site activities to perfection even during the heavy downpour. The team braved two intense rainy seasons and even sailed in dinghy boats to ensure total efficiency in meeting the project timelines.

The Outcome

The earthing design proposed was approved and acknowledged by NTPC Limited as the most logical and functional solution considering the high and low tide variations in the backwater floating platform.

Lightning Protection Systems are extremely crucial for projects such as these, because, in an environment where one is at the mercy of nature, it is best to be prepared. Despite the hurdles, JEF managed to deliver the first-of-its-kind, highly efficient, and cost-effective solution within the stipulated time.

JEF's grounding system for floating solar projects is a pioneer not only in India but across the world and can be adapted in various projects facing similar challenges. Thus, the grounding system can be used by different industries on a global scale.

The solar power plant in Kerala is a huge step toward the green energy initiative of NTPC Limited. JEF is proud to be a part of India's transition to renewable power generation.

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Highlights and Innovations

- Customised Earthing and Lightning protection system.
- Custom-made barge for operation. Including special engine and cargo load capability.
- Cost-effective and timely execution.
- Highly efficient and economical grounding design for floating solar plants.
- Specially designed and formulated earthing block.

A Plethora of Benefits Along with Cost-Efficiency

- **Building with innovation:**
  JEF's grounding design for NTPC Limited had to overcome the unique challenge of contact in the sea bed without passing the electricity in the water. The team was able to provide a pioneering solution to this challenge within the given time, despite the hurdles due to weather and the pandemic.

- **One-of-its-kind project in the country:**
  This is the first of its kind project spread over a single location of 350-acre backwaters in Kerela, making it India's largest solar project on a water body.

- **Special barge design:**
  One of the key areas of the project was the preparation of the special barges that were custom-made as per the site requirement.

A Case for Greater Vision

Unlike burying the grounding system in the ground and establishing contact with the equipment, this system directly connects to the seabed without passing the electricity through the seawater.

Prashanth BG, Managing Director & CEO of JEF Group of Companies, said, "A floating solar plant of this scale has been a remarkable feat, not just for those involved in the project but also for the State of Kerala and the country. It is an innovative leap toward the sustainable production of green energy".

Tata Power Solar Systems commissioned a 70MW solar floating project for NTPC. JEF envisioned an innovative grounding solution that can be adapted to various projects with similar challenges. The solution opens doors to its utilization in floating projects in different industries, both national and global.

NTPC Limited is consciously contributing to the green energy space through multiple renewable energy sources. The solar power plant in Kerala acts as a huge step in this direction as it aids India's transition to renewable power generation.

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About JEF Techno

Founded in 1994, JEF Techno Solutions Pvt. Ltd. is a distinguished technology firm based in India. With national and international industry-leading clientele, JEF provides innovative technological solutions in Grounding, Power Quality, Electromagnetic Interference, Lightning Protection, Earthing Design & Health Assessment, and HV & EHV Design services.

The company provides specialized services for comprehensive Earthing system health assessment and design. JEF Techno uses the world-renowned CDEGS software for carrying out the simulations and is Level-2 certified in CDEGS software proficiency.

Providing breakthrough solutions for various sectors such as Transmission & Distribution Utilities, Oil & Gas, Infrastructure, and others, JEF Techno is a trusted partner in risk management and reliability.

Our Solutions:

1. Earthing Health Assessment Studies
2. Lightning Protection Adequacy Studies
3. Electrical & Fire Safety Solutions
4. Cable Health Assessment & Residual Life Analysis
5. Power Quality Studies and Solutions
6. Earthing, Lightning, and Surge Protection Systems
7. Electromagnetic interference studies and solutions
8. Design Services