

## **120kW Solar Rooftop Installation at IIM** **- Raipur, Chhattisgarh**



**Project Integrator & Developer –**

**Sunkranti Energy Private Limited.**

### **1. Introduction:**

Indian Institute of Management (IIM) has been set up by the government of India, Ministry of Human Resource Development (now known as Ministry of Education) in 2010 at Raipur, the capital of Chhattisgarh. The Government of Chhattisgarh has allotted over 200 acres of land for the IIM Raipur campus in Atal Nagar. 120 KW rooftop solar installation at the IIM, Raipur aligns with institution's sustainability initiatives and efforts to reduce its carbon footprints. This project reflects a broader trend of incorporating renewable energy into institutional infrastructure, particularly within educational campuses aiming to set an example for green practices. Raipur, as a location, offers significant solar potential due to its favourable climatic conditions with high solar insolation. The solar installation aims to reduce dependency on conventional power sources, thereby lowering electricity bills and contributing to energy efficiency. As part of their commitment to environmental sustainability, such initiatives help to reduce greenhouse gas emission, which is crucial in the global context of combating climate change. Educational Institute like IIM Raipur often serve as leaders in adopting innovative technologies. This project is intended to inspire students, faculty and the wider community about renewable energy's feasibility and benefits. For IIM Raipur, this initiative complements its other sustainability- focused projects and enhances the green credentials of its campus, making it a model for other institutions to follow.

## 2. Problem Statement:

The IIM, Raipur faced several challenges:

- **Voltage Fluctuations:** Mostly in the summer days and customer get affected
- **High Energy Costs:** Energy bills accounted for a significant portion of operational costs.
- **Sustainability Goals:** Sunkranti Energy is aiming to reduce its environmental impact and meet corporate sustainability targets.

## 3. Project Objectives:

- **To avoid Fluctuations:** In summer days, solar is the best options for energy generation
- **Reduce Electricity Costs:** Lower operational expenses by offsetting a significant portion of electricity consumption.
- **Increase Energy Independence:** Minimize reliance on external energy sources and mitigate risks from power outages or price fluctuations.
- **Enhance Sustainability:** Achieve a reduction in greenhouse gas emissions and contribute to the institute's green image.

## 4. Solution Overview:

Sunkranti Energy & IIM, Raipur decided to install a **120-kW solar photovoltaic (PV) system** on the parking roof of institute. The system was designed to meet **80% of the institute's total energy consumption**. Key features of the solution include:



- **System Size:** 120 kW (enough to generate approximately 197100 kWh annually).
- **Solar Panels:** High-efficiency Bi-facial glass to glass panels with a 30-year warranty.
- **Inverters:** Commercial-grade string inverters to optimize energy conversion with a 10-year warranty.
- **MMS** – Module mounting structure with 180-micron HDG that will sustain of 120km/hr wind speed.
- **Roof Utilization:** The system used the parking roof of the institute.
- **Energy Net Metering:** Net metering mechanism that allows institute to export excess solar energy generated at their parking rooftop solar plant to the grid of DISCOM, which is then adjusted against institute energy bill.

## 5. Financial Breakdown:

- **Installation Costs:** The total upfront cost of the installation, including solar panels, inverters, batteries, and labour, was **75 lakh INR**
- **Incentives and Tax Credits:** The project qualified for federal and state incentives, including the **30% Investment Tax Credit** and a local utility rebate, which reduced the upfront investment.
- **Annual Energy Savings:** The solar system is expected to generate 1576800 Rs. INR in annual savings from reduced electricity costs.
- **Return on Investment (ROI):** The expected payback period is **5 years**. After that, the system will continue to provide energy savings with minimal maintenance costs.
- **Net Savings:** After accounting for incentives, annual savings, and system costs, IIM Raipur anticipates a **39,420,000 INR** net savings over the next 25 years.

## 6. Environmental Impact:

- **CO2 Emissions Reduction:** The solar system will offset approximately **168 tons of CO2** annually, equivalent to removing **36 cars from the road**.
- **Sustainability Achievements:** The system aligns with institute's commitment to reducing its carbon footprint and contributes to meet environmental

compliance standards.



## 7. Installation Timeline:

- **Site Assessment & Design:** 1 month. Detailed analysis of energy consumption patterns, design 3D roof structure, shadow analysis and sunlight exposure.
- **Permitting & Approvals:** 2 months. Securing necessary local permits and coordinating with the utility for grid connection and net metering approval.
- **Installation:** 3 months. Full installation of solar panels, inverters, and permissions.
- **Commissioning:** 1 month. Final testing, system calibration, and handover to operations.

## 8. Challenges and Solutions:

- **Roof Reinforcement:** The roof required some reinforcement to support the solar panels. A structural engineer assessed and made recommendations for minor modifications, which were incorporated into the design.
- **DG Set Integration:** Integrating DG Set with the existing electrical infrastructure required careful planning to avoid downtime and ensure seamless operation. This was achieved by working with specialized energy management systems to optimize energy use.

- **Operational Disruption:** Installation took place during off-peak production hours to minimize disruption to daily operations.
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## 9. Monitoring and Maintenance:

- **Real-Time Monitoring:** A cloud-based monitoring platform was installed, providing the operations team with real-time data on energy generation, storage, and consumption.
  - **Maintenance Plan:** The solar panels come with a 30-year warranty, but regular maintenance (cleaning and inspections) is planned annually to ensure optimal performance.
  - **Performance Guarantee:** The system provider offers a performance guarantee for the first 5 years, ensuring that the system meets minimum energy production thresholds.
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## 10. Lessons Learned:

- **Thorough Pre-Installation Assessment:** A detailed roof inspection and energy audit helped to avoid surprises during the installation process.
  - **Integration Challenges:** Integrating the system with the institute's existing electrical infrastructure required close collaboration with the utility provider and careful planning.
  - **Financial Planning:** While the initial investment was substantial, the long-term savings and incentives made the solar rooftop installation a financially viable option.
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## 11. Conclusion:

The solar rooftop installation at IIM Raipur was a success, meeting the institute's objectives of reducing fluctuations, energy costs, increasing sustainability, and enhancing energy independence. The system's performance exceeded expectations, providing substantial energy savings and helping the institute to achieve its green goals. The project also positioned Sunkranti Energy as a leader in sustainability within the solar integration and developer sector.

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## Key Takeaways:

- Solar energy can be a powerful tool for businesses looking to reduce costs and improve sustainability.
  - Government incentives and rebates can significantly lower the financial barriers to solar adoption.
  - The long-term benefits of solar energy, both financial and environmental, far outweigh the initial investment.
  - Planning and collaboration with energy experts and utility providers are critical for successful installation and integration
  - Storages of energy could be useful for the peak hour's tariff.
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