

Solar Project Site Operations and Work Execution Monitoring

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ABSTRACT

Solar photovoltaic (PV) project execution requires accurate coordination of technical activities, field operations, and monitoring systems to ensure reliable energy generation. This research paper evaluates the operational practices and work execution methodologies followed at a utility-scale solar project site. The study focuses on core engineering activities such as Module Mounting Structure (MMS) installation, solar module placement, DC string formation, SMU monitoring, AC–DC cable management, and SCADA-based performance assessment.

A descriptive and observation-based methodology was adopted to analyze real-time work processes, identify operational challenges, and derive performance insights. The findings highlight that structured site operations, daily planning, preventive maintenance, and proper resource allocation significantly improve project execution efficiency. The study concludes that productivity and reliability of solar plants can be enhanced through improved execution monitoring, optimized cable routing, periodic string testing, structured preventive maintenance, and better safety compliance.

Keywords: Solar PV System, Work Execution Monitoring, DC String Formation, SCADA Analysis, Solar Operations

1. INTRODUCTION

Solar photovoltaic power plants require systematic execution of field operations to ensure efficient energy generation. Site-level activities such as MMS installation, module mounting, cabling, string formation, and inverter synchronization must follow precise engineering and safety standards. Effective monitoring mechanisms and continuous performance assessment are essential to maintain operational stability and minimize system losses.

1.1 Site Execution Overview

Solar project execution includes MMS erection, module installation, DC wiring, SMU integration, AC cabling, and commissioning activities. Each stage requires technical discipline and quality checks.

1.2 Monitoring Importance

Monitoring helps identify electrical faults, low-performing strings, module mismatch, inverter alarms, and environmental impacts.

2. STUDY ANALYSIS

This section presents technical and operational analysis of solar project site activities with emphasis on DC/AC systems, safety compliance, and performance monitoring.

2.1 DC Side Operational Analysis

DC operations include module installation, string formation, polarity checks, and voltage verification.

2.2 Operational Practices

Observed practices include vegetation control, cable dressing, module cleaning, and preventive maintenance.

3. RESULTS & PERFORMANCE OBSERVATIONS

Performance monitoring revealed that execution quality strongly influences energy generation trends.

4. CONCLUSIONS

Efficient site operations and systematic monitoring are crucial for ensuring high performance in solar PV projects. Operational efficiency improves through preventive maintenance, task allocation, documentation, and safety compliance.

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6. REFERENCES

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