"Environmental Impact Assessment (EIA) for 100 MW Solar Photovoltaic (PV) Farm Project."

Client: ABC Energy Pvt. Ltd.

Project Location: Rajasthan, India (Semi-arid region)

Lead Consultant: Mr. XYZ

Date of Submission: [xx/xx/xxxx]

Background: The company plans to set up a 100 MW solar photovoltaic farm in Rajasthan, spanning 500 acres of semi-arid land. EIA is conducted to ensure the project meets environmental regulations, identify sensitive ecological zones, and prepare a plan for habitat restoration or compensation.

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1.0 Executive Summary

1.1 Project Synopsis

ABC Energy Pvt. Ltd. proposes to establish a 100 MW solar photovoltaic (PV) farm over 500 acres in a semi-arid region of Rajasthan, India. The project aims to contribute to India's renewable energy targets under the National Solar Mission (MNRE, 2020). The PV farm will utilize polycrystalline silicon modules mounted on single-axis trackers, optimizing energy yield while minimizing land disturbance. The internal site layout includes inverter stations, a central control room, internal access roads, and a transmission corridor connecting the site to the nearest 220 kV substation.

The project is expected to generate approximately 180–200 GWh/year, offsetting nearly 160,000 tons of CO_2 annually (IEA, 2021). The project life cycle is projected for 25 years, with periodic maintenance and panel replacement as required.

1.2 Key Environmental Sensitivities

Table 1.1: Key Environmental Sensitivities

Environmental Component	Sensitivity/Concern	Notes
Land Use	Conversion of semi-arid grazing/waste land to industrial use	Potential loss of livestock grazing and minor habitat clearance (Sharma et al., 2019)
Water Resources	Scarce groundwater extraction for PV module cleaning	Local aquifers recharge slowly; excessive use could impact nearby villages (Rajasthan State Water Board, 2022)
Avifauna	Risk to birds, including Great Indian Bustard and raptors	Panels can create "lake effect"; transmission lines pose collision/electrocution risk (BirdLife International, 2020)
Microclimate	Photovoltaic Heat Island (PVHI) effect	Increase in ground-level temperature due to large panel coverage (Hassan et al., 2018)
Visual & Glare	Impact on nearby settlements and aviation	Tilt angles and reflective surfaces could cause glare (Kalogirou, 2014)

1.3 Mitigation Highlights

1. Water Use: Adoption of dry robotic cleaning technologies to eliminate groundwater consumption. Rainwater harvesting will be installed at the control room (ABC Energy, 2025).

2. Avian Safety:
    - Bird diverters on transmission lines
    - Insulated poles and anti-perch devices
    - Avoidance of Important Bird Areas (IBA) during site selection (BirdLife International, 2020)
3. Microclimate & Soil: Maintaining native vegetation beneath PV panels to reduce heat island effect and soil erosion.
4. Visual & Glare Control: Anti-reflective coating on panels and optimized tilt angles.
5. Social Mitigation: Small-scale grazing allowance under panels, creation of local employment (installation, security, and maintenance).

1.4 Final Verdict

The net environmental impact of the project is considered positive, primarily due to:

- Significant reduction of greenhouse gas emissions compared to fossil-based power.
- Minimal permanent disturbance to the native habitat due to careful site planning.
- Implementation of advanced mitigation strategies for water conservation and wildlife protection.

If mitigation measures are strictly implemented, the project aligns with environmental regulations and sustainability goals. Approval under the Consent to Establish (CTE) and eventual Consent to Operate (CTO) is recommended with conditional requirements for monitoring (MNRE, 2020; MoEFCC, 2022).

Figure 1.1: Conceptual layout of 100 MW Solar PV Farm in Rajasthan

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2.0 Introduction

2.1 Project Rationale