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📘 FINAL SOLAR PV PROJECT WORK REPORT

📄Project Title:

Design, Simulation & Analysis of 4 kW Grid-Tied Solar Power Plant

📊Submitted By:

Haris Sheikh

💼Internship Organization:

Solar Complete Firm

🗓️Duration:

1-Month Internship

📍 Location:

Krishna Nagar, Kanpur, Uttar Pradesh, India

> *This project report has been completed as part of the technical internship training in grid-tied solar photovoltaic design and system simulation.*

FINAL SOLAR PV PROJECT WORK REPORT
(As per Internship Project Guidelines)

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📄PROJECT TITLE:

4 kW Grid-Tied Solar Power Plant Design & Reporting

📋CUSTOMER TYPE:

Residential

📌LOCATION:

Krishna Nagar, Kanpur, U.P., India

📊PLANT CAPACITY:

4 kW Grid-Tied Solar Power Plant

📦COMPONENT SPECIFICATIONS:

Sr. No.	Item	Details
1	Solar Panel	Bifacial 450 Wp, Mono PERC, 144 half-cut cells
2	Panel Brand	LONGi Solar
3	Number of Panels	8
4	Inverter	5.5 kVA, 1Ø, Grid-Tied, Model: EHC-S55MP3B-PNJ
5	Solar Panel Tilt Angle	15°
6	Solar Panel Azimuth Angle	0°

📜**Note:** The version of PVsyst software provided did not include a 540 Wp bifacial solar panel. Hence, a 450 Wp bifacial panel (LONGi Solar LR4-72 HBD 450 M G2) was used. All simulation results are based on this specification. Refer to the annexed PVsyst PDF report for validation.

🔗TASK 1: PV SYST GENERATION REPORT

Objective:
Generate an energy output simulation using PVsyst software.

Input Parameters:
- System Capacity: **3.6 kW** (8 × 450 Wp modules)
- Location: **Krishna Nagar, Kanpur**
- Tilt Angle: **15°**
- Azimuth Angle: **0°** (South-facing)
- Inverter: **5.5 kVA**, Single Phase (EHC-S55MP3B-PNJ)

Simulation Results (As per PVsyst PDF): - **Annual Energy Production:** 5.31 MWh/year
- **Specific Yield:** 1633 kWh/kWp/year
- **Performance Ratio (PR):** 75.57%
- **Soiling Loss:** 2.00%
- **Collection Losses:** 0.98 kWh/kWp/day
- **System Losses:** 0.47 kWh/kWp/day
- **Final Output to Grid:** 5.31 MWh/year

📂*See attached PVsyst report for full graphs and monthly data.*

🔗TASK 2: CABLE SIZING CALCULATION

Objective:
Calculate appropriate cable sizes manually for both DC and AC sides.

🔌DC Side Calculation:

- Voltage: 299 V
- Current: 11 A
- Cable Length: 20 m
- Voltage Drop Limit: 1% (2.99 V)

Formula Used: A = (I × L × 2) / (56 × Vd)
Result: A = (11 × 20 × 2) / (56 × 2.99) = **2.63 mm²**
🕰️Use **4 mm² copper cable** (rounded up per IS 732)

🔌AC Side Calculation:

- Voltage: 230 V
- Current: 15.65 A
- Cable Length: 15 m
- Voltage Drop Limit: 1% (2.3 V)

Formula: A = (I × L × 2) / (56 × Vd)
Result: A = (15.65 × 15 × 2) / (56 × 2.3) = **3.63 mm²**
🕰️Use **6 mm² copper cable**

Optimizer Compatibility: 🕰️Verified compatible with 450 Wp bifacial modules.

🔗TASK 3: TECHNICAL SPECIFICATIONS STUDY

Objective:
Review solar components as per MNRE & CEA specifications.

Summary: - **Panels:** LONGi Solar 450 Wp, bifacial, mono PERC, 21.3% efficiency, 25-year warranty - **Inverter:** 5.5 kVA, MPPT-based, anti-islanding, 5-year warranty - **Cables:** UV-resistant, Copper; DC: 4 mm^2, AC: 6 mm^2 - **Earthing:** 3 Nos Pipe Earthings + 1 Lightning Arrester (IS 3043 compliant) - **Structure:** Galvanized MS, fixed tilt (15°)

🕰️Technical compliance verified via MNRE guidelines & manufacturer datasheets.

🔗TASK 4: NET METERING REPORT

Objective:
Outline net metering rules, billing process, and user benefits.

Departments Involved: - UPPCL / KESA (Kanpur Electricity Supply Authority) - UPNEDA (State nodal agency for solar)

Net Metering Rules (Residential): - Capacity up to 10 kW for LT connections allowed - Bi-directional net meter required

Billing Example: - Generation: 500 kWh, Consumption: 400 kWh
- Net Export: 100 kWh @ ₹3/unit = ₹300 credited

Customer Benefits: - Monthly bill savings - Export surplus units to DISCOM - Central/state subsidies (if applicable)

KESA Calculation Method: - Monthly import/export readings - Energy balance billed or credited per UPPCL policy

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🔗TASK 5: DOCUMENT LIST (By Installer)

Sr. No.	Document Name
1	PVsyst Generation Report (PDF)
2	Cable Sizing Sheet
3	Technical Datasheets (Panel/Inverter)
4	Net Metering Application Copy
5	Installation & Commissioning Certificate
6	Warranty Cards & Purchase Invoices
7	Final Inspection Approval Report
8	Project SLD (Single Line Diagram)
