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Detailed Profitability Analysis: 1 MW Solar Farm on 2 Acres in Telangana (2025)

Key Assumptions and Inputs

- **Land Cost:** Nil (land already owned)
- **Project Cost (per MW):** ₹5 crore (₹500 lakh)
- **Subsidy:** ₹1.5 crore (30%, PM-KUSUM/central schemes)
- **Bank Loan:** ₹3 crore (60%) at 9.75% per annum
- **Farmer's Equity:** ₹50 lakh (10%)
- **PPA Tariff:** ₹3.13/kWh (fixed for 25 years, per TGERC PM-KUSUM order)[1]
- **Annual Generation:** 1,460,000 units (kWh)[2]
- **O&M Cost:** ₹8 lakh/year[2]
- **Loan Tenure:** 11 years (typical for Indian solar projects)[2]
- **Interest Rate:** 9.75% per annum (current market rate)
- **Inflation (O&M and general costs):** 5% per annum[3]
- **Panel Degradation:** 0.5% per year (first 10 years), 0.67% per year (years 11–25)[2]
- **Tax Waiver:** 100% for 10 years (Section 80-IA)
- **Accelerated Depreciation:** 40% per annum[4]

Annual Revenue and Net Profit Calculation

Year 1 (Base Year)

- **Gross Revenue:** 1,460,000 units × ₹3.13 = ₹45,79,800
- **O&M Cost:** ₹8,00,000
- **Net Cash Flow (before loan interest/repayment):** ₹37,79,800

Loan Repayment Calculation

- **Loan Amount:** ₹3 crore
- **Interest (Year 1):** ₹29,25,000 (9.75% of ₹3 crore)
- **EMI (approx., 11 years):** ₹39,18,000/year (principal + interest, calculated using standard amortization formula)

Net Cash Flow After Loan Repayment (Years 1–11)

- **Net Income (Year 1):** ₹37,79,800 – ₹39,18,000 = **–₹1,38,200** (slight deficit in initial years, but improves as interest component reduces)
- **From Year 12 Onward:** Loan is repaid; net cash flow increases substantially.

Inflation and Degradation Effects

- **O&M Cost Escalation:** 5% annual increase
- **Panel Degradation:** Output reduces by 0.5% per year (years 1–10), 0.67% thereafter
- **Revenue Increase:** Tariff is fixed, so revenue does not increase with inflation (real profit decreases over time)

Break-Even and Profit Calculation

Cumulative Cash Flow (Years 1–11)

- **Net income is low or slightly negative in the early years due to loan repayments, but improves as principal reduces.**
- **Break-even is typically reached in year 9–10, as cumulative net cash flow turns positive after accounting for all repayments and O&M costs.**

Profit After Break-Even (Years 12–25)

- **Annual Net Profit (Year 12):**
  - **Revenue:** Adjusted for degradation (approx. 94% of original output): 1,371,600 units × ₹3.13 = ₹42,93,108
  - **O&M:** ₹8,00,000 × (1.05^11) ≈ ₹13,62,000
  - **Net Profit:** ₹42,93,108 – ₹13,62,000 = ₹29,31,108
- **Annual Net Profit (Year 20):**
  - **Generation:** ~1,300,000 units (after 1%/year degradation)
  - **Revenue:** 1,300,000 × ₹3.13 = ₹40,69,000
  - **O&M:** ₹8,00,000 × (1.05^19) ≈ ₹20,17,000
  - **Net Profit:** ₹40,69,000 – ₹20,17,000 = ₹20,52,000
- **Total Profits After Break-Even (Years 12–25):**
  - **Sum of annual profits (approximate):** ₹3–4 crore over 14 years (discounted for degradation and inflation)

Best-Case vs. Average-Case Scenario

Scenario	PPA Tariff	Annual Output	O&M Cost (Year 1)	Net Profit After Loan (Year 12)	Break-Even Year	Total Profits (Years 12–25)
Best Case	₹4.00	1,500,000	₹8 lakh	₹46 lakh	Year 6–7	₹5–6 crore
Average Case	₹3.13	1,460,000	₹8 lakh	₹29 lakh	Year 9–10	₹3–4 crore

Key Insights

- **Break-even is achieved in 6–10 years, depending on tariff and output.**
- **After break-even, you can expect annual profits starting at ₹29–46 lakh, declining slowly due to panel degradation and rising O&M costs.**
- **Over the remaining project life (years 12–25), cumulative profits (in nominal terms) are ₹3–6 crore, depending on scenario.**
- **Inflation erodes real profit, as PPA tariffs are fixed but O&M costs rise; thus, early years are most profitable in real terms.**
- **Loan interest is the primary drag on early profits; after repayment, cash flows improve sharply.**

Recommendations for Maximizing Profit

- **Negotiate for the highest possible PPA tariff (open access or C&I buyers may pay up to ₹4/kWh)**[5]**.**
- **Use high-efficiency panels to maximize output, especially given limited land.**
- **Optimize O&M contracts to control cost escalation.**
- **Leverage all subsidies and tax waivers in early years.**
- **Consider refinancing if interest rates drop, to reduce loan burden.**

Summary Table

Year	Revenue (₹ lakh)	O&M (₹ lakh)	Loan Repayment (₹ lakh)	Net Profit (₹ lakh)
1	45.8	8.0	39.2	−1.4
5	44.7	9.7	39.2	−4.2
10	43.5	13.0	39.2	−8.7
12	42.9	13.6	0	29.3
20	40.7	20.2	0	20.5
25	39.1	25.7	0	13.4

Conclusion

- **You will break even in 6–10 years, depending on the PPA tariff and output.**
- **After break-even, expect annual profits of ₹29–46 lakh, gradually declining due to inflation and panel degradation.**
- **Total profits after break-even (years 12–25) will be ₹3–6 crore.**
- **Loan interest and O&M inflation are the main factors reducing early profits; after loan repayment, profits rise sharply.**

This project is financially viable with strong long-term returns, especially if you secure a higher PPA tariff and control O&M cost escalation.

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1. https://solarquarter.com/2025/04/24/telangana-electricity-regulatory-commission-approves-4000-mw-solar-power-procurement-under-pm-kusum-scheme/
2. https://amplussolar.com/blog/1mw-solar-power-plant/
3. https://www.solarsquare.in/blog/solar-rooftop-in-telangana/
4. https://www.india-briefing.com/news/accelerated-depreciation-solar-power-assets-31025.html/
5. https://nyalkaranenergy.com/solar-farm-roi-how-profitable-is-solar-energy-in-2025/