Comprehensive Financial Analysis Report: A 10 KLPD 2G Ethanol Plant in Ballari, Karnataka

1.0 Executive Summary

This report provides a comprehensive financial breakdown and feasibility assessment for the proposed 10 KLPD (kilo liters per day) second-generation (2G) ethanol production facility by Ark Bio Energies Pvt. Ltd. The project, located in Ballari, Karnataka, is designed to be financially viable and resilient, supported by a favorable policy environment and a proven, commercial-scale technology stack. The financial analysis, based on a 10-year projection, confirms the project's strong potential for capital appreciation and sustainable returns.[1]

Key Financial Highlights

- **Total Initial Outlay:** ₹55 Crore (₹50 Cr CAPEX + ₹5 Cr working capital).[1]
- **Effective CAPEX:** ₹40 Crore, after accounting for ₹10 Crore in government grants and subsidies, reducing the effective CAPEX by 20%.[1]
- **Funding Structure:** A 30:70 equity-to-debt ratio, in line with IREDA norms for green projects.[1]
- **Projected Returns:** A base case Internal Rate of Return (IRR) of 23-25% and a short payback period of 3.5 years, post-subsidies.[1]
- **Key Financial Metrics:** A positive Net Present Value (NPV) of ₹45 Crore (at a 12% discount rate) and a Debt Service Coverage Ratio (DSCR) of 1.8x on average, indicating a low-risk debt profile.[1]
- **Break-Even Point:** The project is projected to reach its break-even point at 4.5 KLPD, which is 60% of the plant's capacity.[1]
- **Investment Ask:** ₹20 Crore in equity for a 40% stake, based on a ₹100 Crore pre-money valuation.[1]

2.0 Financial Analysis and Projections (as of September 18, 2025)

The financial model for Ark Bio Energies is built on realistic projections that account for the specific dynamics of the 2G ethanol market. All figures are in Indian Rupees (INR) Crores,

based on 2025 estimates with a 5% annual inflation assumption.[1]

2.1 Initial Investment Phase (Pre-Operational: Q4 2025 - Q1 2027)

This phase covers planning, approvals, land acquisition, and construction. The total initial outlay is projected to be ₹55 Crore, which includes ₹50 Crore in capital expenditure (CAPEX) and ₹5 Crore for working capital.[1]

CAPEX Breakdown
The CAPEX is front-loaded, with the majority of costs incurred in Year 0 (2026 construction). The project's 2G technology costs approximately 3.5 times more than a 1G plant due to the enzymatic pre-treatment requirements.1

Component	Detailed Breakdown	Cost (₹ Cr)	% of Total
Land & Site Prep	5 acres SEZ lease (₹5 Cr) + civil works (₹2 Cr)	10 [1]	20% [1]
Plant & Machinery	Pre-treatment (₹8 Cr), hydrolysis reactors (₹10 Cr), fermentation tanks (₹5 Cr), distillation columns (₹7 Cr)	30 [1]	60% [1]
Utilities	Power substation (₹3 Cr), water treatment/ZLD (₹1 Cr), effluent system (₹1 Cr)	5 [1]	10% [1]
Engineering & Contingencies	DPR/EPC fees (₹2 Cr), training (₹1 Cr), insurance (₹1 Cr), 10% contingency	5 [1]	10% [1]

	(₹1 Cr)		
Total CAPEX		**50** [1]	**100%** [1]

Funding Structure
The project will be financed with a 30:70 equity-to-debt ratio, consistent with IREDA norms for green projects.1

Source	Amount (₹ Cr)	Terms	Timeline
Equity	15 [1]	Solo founder (₹10 Cr) + VCs/angels (₹5 Cr at ₹100 Cr valuation, 15% dilution)	Q4 2025 [1]
Debt	35 [1]	IREDA term loan (10-year, 4% interest post-subsidy; 1-year moratorium)	Q1 2026 [1]
Grants/Subsidies	10 [1]	JI-VAN (₹5 Cr VGF); Karnataka green subsidy (₹5 Cr)	Q2 2026 [1]
Total Funding	**60** [1]		

The total initial outflow is ₹55 Cr, net of the ₹10 Cr in grants, and includes ₹1.5 Cr in interest during construction.[1]

2.2 Operational Phase: Revenue, OPEX, and P&L (Years 1-10: 2027-2036)

Assumptions include 330 operational days per year, a 90% utilization ramp-up by Year 2, a 5% annual inflation on costs and prices, and a 25% tax rate post-depreciation.[1]

Revenue Streams Breakdown
Ethanol sales to OMCs represent the primary revenue stream with a fixed price of ₹65/L under a Long-Term Off-take Agreement (LTOA).1 By-products and carbon credits provide significant additional revenue, contributing up to 30% of the total.1

Stream	Year 1 (₹ Cr)	Year 5 (₹ Cr)	Year 10 (₹ Cr)	Assumptions
Ethanol (3 Mn L @ ₹65/L ramping to ₹85/L)	19.5 [1]	25.5 [1]	34 [1]	99.9% purity; OMC LOA (BPCL/HPCL).
CO2 (beverage grade, 1,000 tons @ ₹20,000/ton)	2 [1]	2.5 [1]	3.5 [1]	Carbon credits (₹1 Cr extra via CDM).
DDGS/Lignin (animal feed/biochar, 10K tons @ ₹15,000/ton)	5.65 [1]	7 [1]	9 [1]	20% yield from process.
Total Revenue	**27.15** [1]	**35** [1]	**46.5** [1]	CAGR 5.5%; 10% from exports/SDGs.

Operational Expenditure (OPEX) Breakdown
OPEX is projected to rise with inflation, with feedstock accounting for 25-30% of the total costs.1

Item	Year 1 (₹ Cr)	Year 5 (₹ Cr)	Year 10 (₹ Cr)	% of Total OPEX
Feedstock	4 [1]	5.5 [1]	7.5 [1]	27% [1]
Enzymes/Chemicals	3 [1]	3.8 [1]	5 [1]	25% [1]

Utilities/Labor	5 [1]	6.3 [1]	8.5 [1]	33% [1]
Maintenance/ Overheads	3 [1]	3.8 [1]	5 [1]	20% [1]
Total OPEX	**15** [1]	**19** [1]	**26** [1]	**100%** [1]

Profit & Loss Statement (P&L)

The project's P&L statement shows robust profitability over the 10-year period, with the EBITDA margin stabilizing at 40-44%.1 The cumulative PAT over 10 years is projected to be ₹83 Crore.1

Year	Revenue (₹ Cr)	OPEX (₹ Cr)	EBITDA (₹ Cr)	Depreciation (₹ Cr)	EBIT (₹ Cr)	Tax (₹ Cr)	PAT (₹ Cr)
1 (2027)	20 [1]	12 [1]	8 [1]	3 [1]	5 [1]	0.75 [1]	2.25 [1]
3	27 [1]	15 [1]	12 [1]	5 [1]	7 [1]	1.75 [1]	5.25 [1]
5	35 [1]	19 [1]	16 [1]	5 [1]	11 [1]	2.75 [1]	8.25 [1]
10	50 [1]	26.5 [1]	23.5 [1]	5 [1]	18.5 [1]	4.625 [1]	13.875 [1]

Cash Flow Analysis

The cash flow projections indicate a rapid path to positive free cash flow, with the cumulative FCF becoming positive by Year 7.1

Year	Operating CF (EBITDA - Tax)	Investing CF (Capex)	Financing CF (Debt/Equity)	Net CF	Cumulative CF
0 (2026)	0 [1]	-50 [1]	+50 [1]	0 [1]	-50 [1]
1	6 [1]	0 [1]	-3 [1]	3 [1]	-47 [1]
2	7.125 [1]	0 [1]	-3 [1]	4.125 [1]	-42.875 [1]

3	9.375 [1]	0 [1]	-3 [1]	6.375 [1]	-36.5 [1]
4	11.0625 [1]	0 [1]	-3 [1]	8.0625 [1]	-28.4375 [1]
5	13.5 [1]	-2 (upgrade) [1]	-3 [1]	8.5 [1]	-19.9375 [1]
6	14.8125 [1]	0 [1]	-3 [1]	11.8125 [1]	-8.125 [1]
7	16.375 [1]	0 [1]	-3 [1]	13.375 [1]	5.25 [1]
8	17.9375 [1]	0 [1]	-3 [1]	14.9375 [1]	20.1875 [1]
9	19.5 [1]	0 [1]	-3 [1]	16.5 [1]	36.6875 [1]
10	21.0625 [1]	-5 (expansion) [1]	-3 [1]	13.0625 [1]	49.75 [1]

2.3 Returns and Sensitivity Analysis

The project's financial returns are attractive, with a base case IRR of 23% and a rapid payback period of 3.5 years.[1] The financial model's resilience has been tested through a comprehensive sensitivity analysis, which shows its ability to withstand market fluctuations.[1] The project's break-even point is at 4.5 KLPD, or 60% of capacity, with a DSCR of 1.8x on average.[1]

Case	Ethanol Price	Feedstock Cost	IRR	Payback
Base	₹65/L	₹8/kg	23% [1]	3.5 years [1]
Conservative	₹55/L	₹12/kg	15% [1]	4.5 years [1]
Aggressive	₹75/L	₹6/kg	28% [1]	2.5 years [1]

3.0 Conclusion and Investment Opportunity

Based on the detailed financial analysis, the Ark Bio Energies project is financially robust and well-positioned for sustainable and profitable growth.[1] The project's ability to generate strong returns, its low-risk debt profile, and its rapid path to positive cash flow make it a compelling investment opportunity. The investment ask of ₹20 Crore in equity is positioned to provide investors with a clear and attractive path to liquidity, with potential exit options including a strategic sale to an OMC or an Initial Public Offering (IPO).[1]

I have rewritten the report to focus exclusively on the financial aspects, providing a detailed breakdown of the project's costs, revenue, and projections. I have removed all other non-financial content as requested.

Works cited

1. Financial report Arkbioenergies.pdf