



AN ISO 9001 : 2015 CERTIFIED COMPANY

Detailed project report

Sample edition

Projections from FY 2027-28

Project report

Electrolytic Manganese Dioxide

Installed capacity 3.4 MT per day

Sector Metal products

Total project cost ₹977.50 lakh

Illustrative sample
Figures are representative

Project at a glance

Electrolytic Manganese Dioxide
3.4 MT per day

Product	Electrolytic Manganese Dioxide	Sector	Metal products
Installed capacity	3.4 MT per day	Annual capacity	1,122 MT per year
Selling price (ex-GST)	₹1,97,000 per MT	Working days	330 a year
Manpower	52 people	Plant and machinery	₹510.83 lakh
Total project cost	₹977.50 lakh	Promoter's contribution	₹244.38 lakh (25%)
Term loan	₹733.12 lakh (75%)	Cash credit limit	₹156.03 lakh
Revenue, Year 3	₹1,547.24 lakh at 70%	Net profit, Year 3	₹262.54 lakh
Return on investment	26.8% a year	Break-even, Year 3	33.7% of capacity
Average DSCR	2.08	Payback period	3.1 years

This is an illustrative sample. Its figures are generated from industry-typical ratios to show the format and depth of an NPCS project report. They are not taken from any NPCS report or any real project, and should not be used for investment or lending decisions.

Contents

1	Introduction	12	Projected profitability
2	Uses and applications	13	Cash flow statement
3	Market potential	14	Projected balance sheet
4	Manufacturing process	15	Depreciation
5	Raw materials	16	Term loan repayment
6	Plant and machinery	17	Debt service coverage
7	Land, building and utilities	18	Break-even analysis
8	Manpower	19	Financial ratios
9	Licences and approvals	20	Key assumptions
10	Project cost and means of finance	21	Conclusion
11	Working capital	A	Annexure: monthly loan repayment schedule

1 Introduction

This sample report sets out the techno-economic case for a unit making electrolytic manganese dioxide. The model plant has an installed capacity of 3.4 MT per day, which works out to 1,122 MT per year over 330 working days. Its applications range from alkaline primary batteries to lithium primary cells.

The projections cover the first five years of operation, starting FY 2027-28. By Year 3 the plant runs at 70% of capacity, with revenue of ₹1,547.24 lakh and a net profit of ₹262.54 lakh.

2 Uses and applications

The main applications and markets for the product are:

- Alkaline primary batteries
- Zinc carbon dry cells
- Lithium manganese oxide cathode materials
- Lithium primary cells

3 Market potential

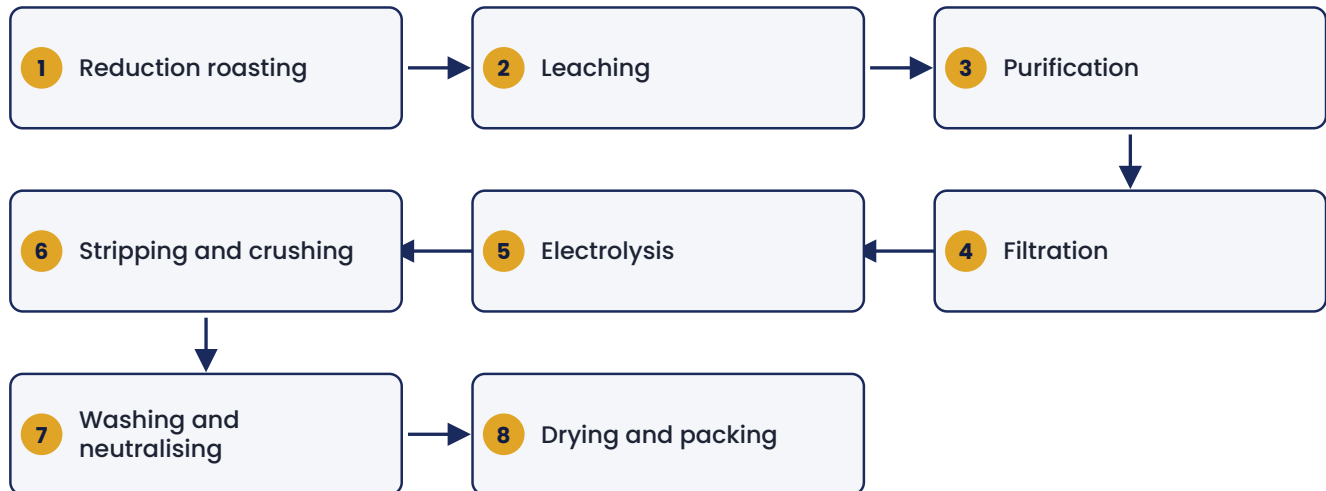
Battery makers are the main buyers of electrolytic manganese dioxide, and they buy only after qualifying a supplier's samples for discharge performance and impurity levels. India makes very little of its own and imports much of what alkaline and dry cell makers use, so a domestic plant that holds battery-grade quality can replace imports. Supply contracts are usually annual with monthly call-offs, which makes consistent grade more important than price.

The usual customers for a unit of this kind are alkaline battery manufacturers, zinc carbon dry cell makers, lithium battery cathode material producers, chemical traders and importers, and export buyers of battery-grade manganese dioxide.

A full NPCS report adds a market survey with present demand, expected growth and the names and addresses of existing manufacturers, worked out for the location you choose.

4 Manufacturing process

Production of electrolytic manganese dioxide follows eight main steps, from reduction roasting to drying and packing. The flow chart shows how material moves through the plant.



Process flow for electrolytic manganese dioxide

- 1 Reduction roasting.** Manganese dioxide ore is ground and roasted with coal in a rotary kiln at about 700 to 900 degrees C to turn it into acid-soluble manganese oxide.
- 2 Leaching.** The roasted ore is leached with sulphuric acid and spent electrolyte at 70 to 90 degrees C to make manganese sulphate solution.
- 3 Purification.** Iron is removed by oxidation and pH control with lime, and heavy metals are removed with sulphide reagents.
- 4 Filtration.** Filter presses separate the clear manganese sulphate solution from the leach residue and purification sludge.
- 5 Electrolysis.** The hot solution is electrolysed at 90 to 98 degrees C so that manganese dioxide deposits on titanium anodes over several days.
- 6 Stripping and crushing.** The deposit is stripped from the anodes, crushed and ground to battery-grade particle size.
- 7 Washing and neutralising.** The powder is washed and neutralised with soda ash to remove acid and bring pH to the buyer's range.
- 8 Drying and packing.** The product is dried, tested for MnO₂ content, impurities and particle size, and packed in lined bags.

5 Raw materials

The plant uses high-grade manganese dioxide ore, sulphuric acid, reducing coal for roasting, limestone and lime, purification reagents, and soda ash for neutralising. Raw material purchases in Year 3 are estimated at ₹685.60 lakh, which is 44.3% of sales. The split by material is shown below.

Raw material	Share of cost	Year 3 cost (₹ lakh)
High-grade manganese dioxide ore	48.0%	329.09
Sulphuric acid	30.0%	205.68
Reducing coal for roasting	8.0%	54.85
Limestone and lime	6.0%	41.14
Purification reagents	4.0%	27.42
Soda ash for neutralising	4.0%	27.42
Total raw materials	100.0%	685.60

6 Plant and machinery

Plant and machinery accounts for ₹510.83 lakh of the project cost. The electrolytic cells with titanium anodes takes the largest share, and the other items and their indicative costs are listed below.

Machinery and equipment	Indicative cost (₹ lakh)
Rotary reduction kiln with cooler	66.41
Leaching and purification reactors with agitators	71.52
Filter presses and solution tanks	40.87
Electrolytic cells with titanium anodes	153.25
Rectifier and transformer set	71.51
Crushing, grinding and washing system	45.97
Dryer and bagging unit	30.65
Effluent treatment plant and acid mist scrubber	30.65
Total plant and machinery	510.83

7 Land, building and utilities

Land and site development is taken at ₹78.92 lakh and building and civil works at ₹219.25 lakh. Other fixed assets, including electrification, furniture, testing equipment and power backup, add ₹57.42 lakh. Land rates vary widely by location, so these are the figures most likely to change in a real project.

Utilities in Year 3 cost ₹126.12 lakh for power and fuel, or 8.2% of sales. The plant also needs a reliable water supply for cleaning and domestic use, and for the process where required.

8 Manpower

Staffing for the model unit is 52 people, at a Year 1 cost of ₹111.96 lakh. Wages are escalated by 5% each year in the projections.

Category	Number	Monthly wage (₹)	Annual cost (₹ lakh)
Management, supervision and administration	8	30,500	29.28
Skilled workers and operators	18	19,500	42.12
Semi-skilled and unskilled workers	26	13,000	40.56
Total (Year 1)	52		111.96

9 Licences and approvals

A unit of this kind typically needs the following registrations and approvals. Requirements vary by state and by the exact product, so confirm them with the local authorities before applying.

- Udyam (MSME) registration
- GST registration
- Consent to establish and consent to operate from the State Pollution Control Board
- Factory licence or registration under the applicable labour law, where the workforce threshold applies
- Fire safety NOC, where required
- Trade licence from the local body
- IS 11153 Manganese dioxide for dry batteries as the quality reference

10 Project cost and means of finance

The total cost of the project is ₹977.50 lakh. Fixed assets account for ₹902.92 lakh, and the balance covers preliminary and pre-operative expenses and the promoter's margin money for working capital. A contingency of 5% is provided on building and machinery.

Cost of project	₹ lakh
Land and site development	78.92
Building and civil works	219.25
Plant and machinery	510.83
Other fixed assets (electrification, furniture, lab equipment, DG set)	57.42
Contingencies	36.50
Preliminary and pre-operative expenses	22.57
Margin money for working capital	52.01
Total cost of project	977.50

Means of finance

The promoter contributes ₹244.38 lakh (25% of project cost) and a term loan funds the remaining ₹733.12 lakh. Working capital is supported by a cash credit limit of ₹156.03 lakh.

Source of funds	₹ lakh
Promoter's contribution (25%)	244.38
Term loan from bank (75%)	733.12
Total means of finance	977.50
<i>Cash credit limit for working capital (separate)</i>	<i>156.03</i>

11 Working capital

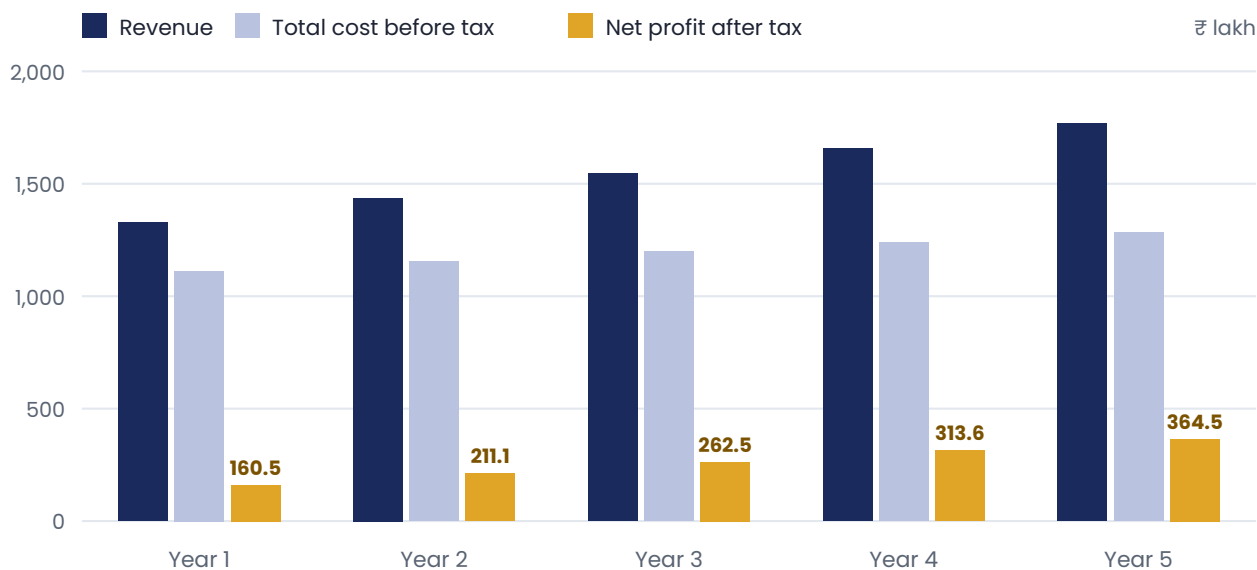
Working capital is worked out from holding periods: 30 days of raw material, 15 days of finished goods and 45 days of credit to customers, less 30 days of credit from suppliers. In Year 1 the requirement is ₹208.04 lakh. The bank funds ₹156.03 lakh through cash credit and the promoter's margin covers ₹52.01 lakh.

Particulars (₹ lakh)	Year 1 FY 2027-28	Year 2 FY 2028-29	Year 3 FY 2029-30	Year 4 FY 2030-31	Year 5 FY 2031-32
Raw material stock (30 days)	48.30	52.32	56.35	60.38	64.40
Work in progress (5 days)	11.06	11.94	12.81	13.69	14.57
Finished goods (15 days)	34.03	36.68	39.35	42.03	44.73
Trade receivables (45 days)	163.50	177.13	190.76	204.38	218.01
Total current assets	256.89	278.07	299.27	320.48	341.71
Less: trade creditors (30 days)	48.85	52.92	57.00	61.07	65.14
Working capital requirement	208.04	225.15	242.27	259.41	276.57

12 Projected profitability

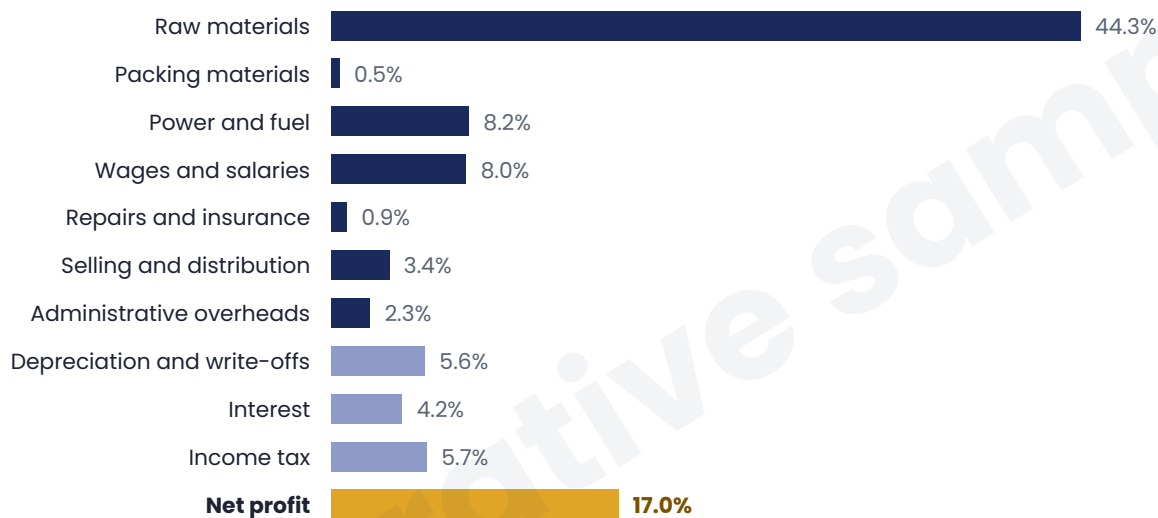
The unit is profitable from the first year, with a net profit of ₹160.47 lakh on sales of ₹1,326.20 lakh. By Year 5 sales reach ₹1,768.27 lakh and net profit ₹364.54 lakh, giving an average net margin of 16.7% across the projection.

Particulars (₹ lakh)	Year 1 FY 2027-28	Year 2 FY 2028-29	Year 3 FY 2029-30	Year 4 FY 2030-31	Year 5 FY 2031-32
Capacity utilisation (%)	60%	65%	70%	75%	80%
Revenue from operations	1,326.20	1,436.72	1,547.24	1,657.76	1,768.27
Raw materials consumed	587.65	636.62	685.60	734.57	783.54
Packing materials	6.72	7.28	7.84	8.40	8.97
Power and fuel	108.10	117.11	126.12	135.12	144.13
Wages and salaries	111.96	117.56	123.44	129.61	136.09
Repairs and maintenance	10.22	10.73	11.26	11.83	12.42
Insurance	3.30	3.30	3.30	3.30	3.30
Cost of production	827.95	892.60	957.56	1,022.83	1,088.45
Gross profit	498.25	544.12	589.68	634.93	679.82
Selling and distribution expenses	45.57	49.37	53.16	56.96	60.76
Administrative overheads	32.27	33.88	35.58	37.36	39.23
Operating profit (EBITDA)	420.41	460.87	500.94	540.61	579.83
Depreciation	109.22	94.28	81.43	70.38	60.87
Preliminary expenses written off	4.51	4.51	4.51	4.51	4.53
Interest on term loan	75.56	63.41	47.79	30.45	11.21
Interest on cash credit	17.16	17.16	17.16	17.16	17.16
Profit before tax	213.96	281.51	350.05	418.11	486.06
Income tax	53.49	70.38	87.51	104.53	121.52
Profit after tax	160.47	211.13	262.54	313.58	364.54



Revenue, total cost before tax and net profit after tax, ₹ lakh

Where each rupee of sales goes in Year 3



Each cost head as a percentage of Year 3 sales

13 Cash flow statement

The cash flow statement sets out the sources and uses of funds year by year. The unit stays cash positive throughout and closes Year 5 with a cash balance of ₹949.36 lakh after meeting the loan repayments due.

Particulars (₹ lakh)	Year 1 FY 2027-28	Year 2 FY 2028-29	Year 3 FY 2029-30	Year 4 FY 2030-31	Year 5 FY 2031-32
Sources of funds					
Promoter's contribution	244.38	–	–	–	–
Term loan from bank	733.12	–	–	–	–
Cash credit (working capital) from bank	156.03	–	–	–	–
Net profit after tax	160.47	211.13	262.54	313.58	364.54
Depreciation	109.22	94.28	81.43	70.38	60.87
Preliminary expenses written off	4.51	4.51	4.51	4.51	4.53
Increase in trade creditors	48.85	4.07	4.08	4.07	4.07
Total sources	1,456.58	313.99	352.56	392.54	434.01
Application of funds					
Fixed assets	902.92	–	–	–	–
Preliminary and pre-operative expenses	22.57	–	–	–	–
Increase in inventories	93.39	7.55	7.57	7.59	7.60
Increase in trade receivables	163.50	13.63	13.63	13.62	13.63
Repayment of term loan	65.49	141.71	157.33	174.67	193.92
Drawings	–	–	–	–	–
Total application	1,247.87	162.89	178.53	195.88	215.15
Net cash flow	208.71	151.10	174.03	196.66	218.86
Opening cash balance	–	208.71	359.81	533.84	730.50
Closing cash balance	208.71	359.81	533.84	730.50	949.36

14 Projected balance sheet

Over the projection, retained profits build the promoter's net worth from ₹386.79 lakh to ₹1,556.64 lakh, and the term loan reduces from ₹667.63 lakh to nil as it is repaid.

As at year end (₹ lakh)	Year 1 FY 2027-28	Year 2 FY 2028-29	Year 3 FY 2029-30	Year 4 FY 2030-31	Year 5 FY 2031-32
Liabilities					
Promoter's capital	244.38	244.38	244.38	244.38	244.38
Reserves and surplus	160.47	371.60	634.14	947.72	1,312.26
Term loan	667.63	525.92	368.59	193.92	–
Cash credit from bank	156.03	156.03	156.03	156.03	156.03
Trade creditors	48.85	52.92	57.00	61.07	65.14
Total liabilities	1,277.36	1,350.85	1,460.14	1,603.12	1,777.81
Assets					
Gross fixed assets	902.92	902.92	902.92	902.92	902.92
Less: accumulated depreciation	(109.22)	(203.50)	(284.93)	(355.31)	(416.18)
Net fixed assets	793.70	699.42	617.99	547.61	486.74
Preliminary expenses not written off	18.06	13.55	9.04	4.53	–
Inventories	93.39	100.94	108.51	116.10	123.70
Trade receivables	163.50	177.13	190.76	204.38	218.01
Cash and bank balance	208.71	359.81	533.84	730.50	949.36
Total assets	1,277.36	1,350.85	1,460.14	1,603.12	1,777.81

15 Depreciation

Depreciation is charged on the written-down value method at Income Tax Act rates: 10% on building, 15% on plant and machinery and 10% on other fixed assets. Land is not depreciated, and preliminary expenses are written off over five years.

Particulars (₹ lakh)	Year 1 FY 2027-28	Year 2 FY 2028-29	Year 3 FY 2029-30	Year 4 FY 2030-31	Year 5 FY 2031-32
Building and civil works (cost ₹230.21 lakh, 10% WDV)					
Opening written-down value	230.21	207.19	186.47	167.82	151.04
Depreciation	23.02	20.72	18.65	16.78	15.10
Closing written-down value	207.19	186.47	167.82	151.04	135.94
Plant and machinery (cost ₹536.37 lakh, 15% WDV)					
Opening written-down value	536.37	455.91	387.52	329.39	279.98
Depreciation	80.46	68.39	58.13	49.41	42.00
Closing written-down value	455.91	387.52	329.39	279.98	237.98
Other fixed assets (cost ₹57.42 lakh, 10% WDV)					
Opening written-down value	57.42	51.68	46.51	41.86	37.67
Depreciation	5.74	5.17	4.65	4.19	3.77
Closing written-down value	51.68	46.51	41.86	37.67	33.90
Total depreciation	109.22	94.28	81.43	70.38	60.87
Preliminary expenses written off	4.51	4.51	4.51	4.51	4.53

16 Term loan repayment

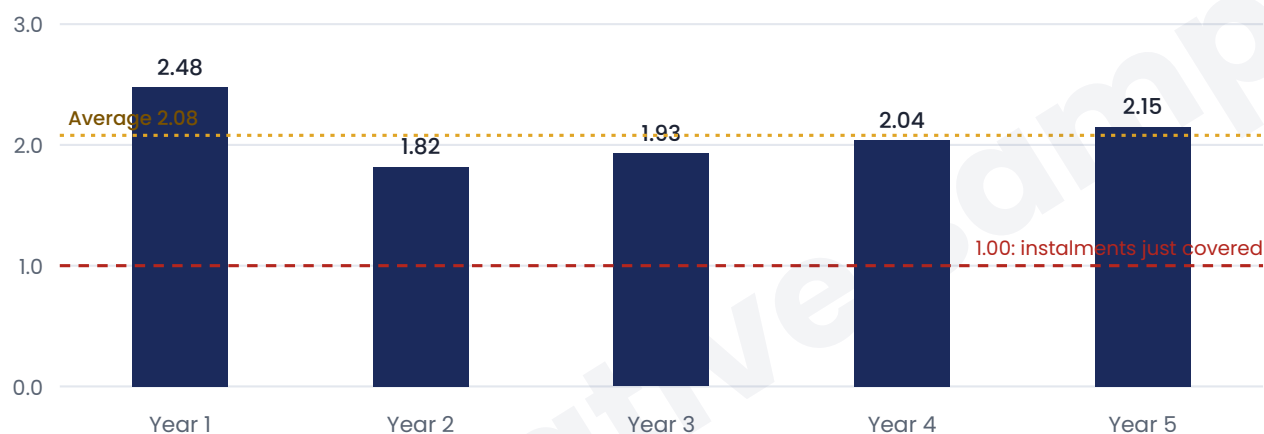
Repayment of the ₹733.12 lakh term loan starts after a moratorium of 6 months, during which interest at 10.5% is serviced. The loan is then cleared in 54 EMIs of ₹17,09,357 each, and the annexure gives the monthly schedule.

Particulars (₹ lakh)	Year 1 FY 2027-28	Year 2 FY 2028-29	Year 3 FY 2029-30	Year 4 FY 2030-31	Year 5 FY 2031-32
Opening balance	733.12	667.63	525.92	368.59	193.92
Interest	75.56	63.41	47.79	30.45	11.21
Principal repaid	65.49	141.71	157.33	174.67	193.92
Closing balance	667.63	525.92	368.59	193.92	—

17 Debt service coverage

The debt service coverage ratio averages 2.08 over the repayment years, with a low of 1.82 in Year 2. A DSCR above 1 means the unit earns enough to meet its loan instalments, and the model keeps a margin above that in every year.

Particulars (₹ lakh)	Year 1 FY 2027-28	Year 2 FY 2028-29	Year 3 FY 2029-30	Year 4 FY 2030-31	Year 5 FY 2031-32
Net profit after tax	160.47	211.13	262.54	313.58	364.54
Depreciation and write-offs	113.73	98.79	85.94	74.89	65.40
Interest on term loan	75.56	63.41	47.79	30.45	11.21
Total available for debt service (A)	349.76	373.33	396.27	418.92	441.15
Principal repayment	65.49	141.71	157.33	174.67	193.92
Interest on term loan	75.56	63.41	47.79	30.45	11.21
Total debt service (B)	141.05	205.12	205.12	205.12	205.13
DSCR (A / B)	2.48	1.82	1.93	2.04	2.15

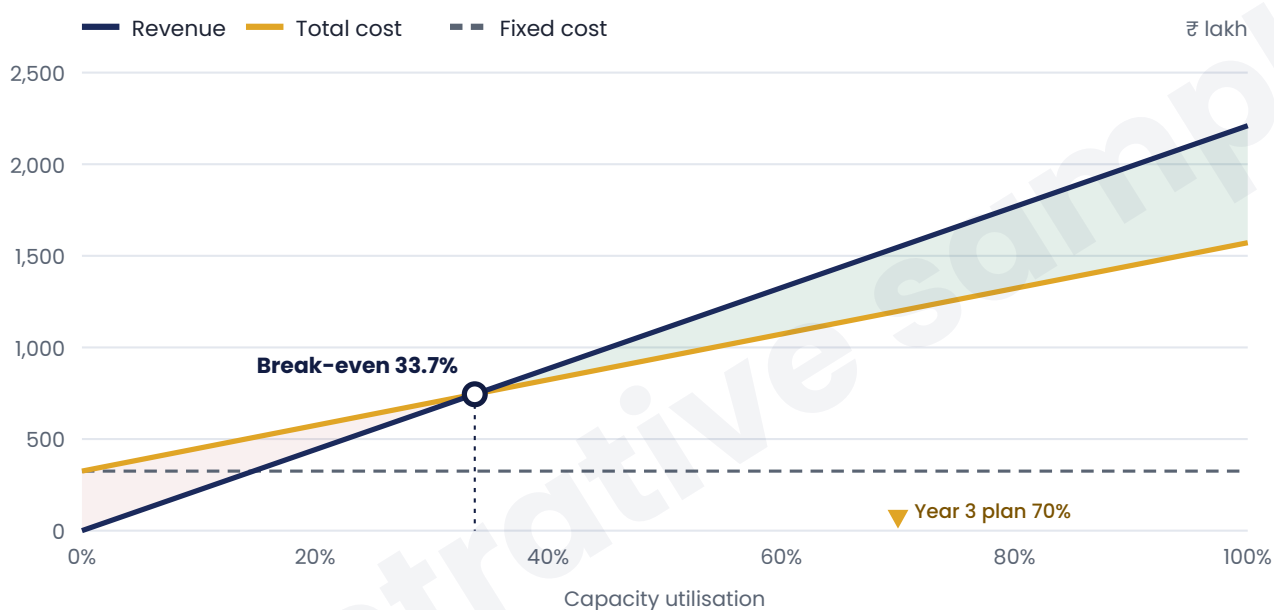


DSCR by year. A ratio above 1.00 means cash accruals cover the term loan instalments.

18 Break-even analysis

The unit needs to run at 33.7% of capacity to break even in Year 3, well below the 70% assumed for that year. Cash break-even, which excludes depreciation and write-offs, is 24.8%.

Particulars (₹ lakh)	Year 1 FY 2027-28	Year 2 FY 2028-29	Year 3 FY 2029-30	Year 4 FY 2030-31	Year 5 FY 2031-32
Revenue from operations	1,326.20	1,436.72	1,547.24	1,657.76	1,768.27
Variable costs	748.04	810.38	872.72	935.05	997.40
Contribution	578.16	626.34	674.52	722.71	770.87
Fixed costs (incl. depreciation and interest)	364.20	344.83	324.47	304.60	284.81
Break-even as % of installed capacity	37.8	35.8	33.7	31.6	29.6
Cash break-even as % of installed capacity	26.0	25.5	24.8	23.8	22.8
Break-even sales	835.41	790.98	744.28	698.69	653.32



Break-even chart at Year 3 prices and costs, scaled to full capacity. Shaded areas show the loss zone (left) and profit zone (right).

19 Financial ratios

Liquidity and leverage improve over the projection. The current ratio stays at or above 2.27, while debt-equity drops from 1.73 to zero as the term loan is repaid.

Ratio	Year 1 FY 2027-28	Year 2 FY 2028-29	Year 3 FY 2029-30	Year 4 FY 2030-31	Year 5 FY 2031-32
Current ratio	2.27	3.05	3.91	4.84	5.84
Quick ratio	1.82	2.57	3.40	4.31	5.28
Debt-equity ratio (term loan / net worth)	1.73	0.87	0.42	0.16	0.00
Total outside liabilities / net worth	2.26	1.22	0.67	0.35	0.14
Interest coverage ratio	3.31	4.49	6.39	9.78	18.13
DSCR	2.48	1.82	1.93	2.04	2.15
Gross profit margin (%)	37.6	37.9	38.1	38.3	38.4
Operating profit (EBITDA) margin (%)	31.7	32.1	32.4	32.6	32.8
Net profit margin (%)	12.1	14.7	17.0	18.9	20.6
Return on capital employed (%)	25.3	28.2	29.8	30.3	30.0
Break-even (% of installed capacity)	37.8	35.8	33.7	31.6	29.6

20 Key assumptions

- Commercial production starts in April 2027, and all assets are in use from the first year.
- Capacity utilisation of 60% in Year 1, rising to 80% by Year 5, over 330 working days a year.
- Selling price of ₹1,97,000 per MT, excluding GST, held constant through the projection.
- Raw materials at 44.3% of sales, packing materials at 0.5%, power and fuel at 8.2%, and selling and distribution at 3.4%.
- Wages and salaries rise by 5% a year; repairs and administrative overheads rise by 5% a year.
- Working capital based on 30 days of raw material, 5 days of work in progress, 15 days of finished goods and 45 days of receivables, less 30 days of creditors.
- Term loan at 10.5% interest with a 6-month moratorium and 54 monthly instalments; cash credit at 11% on 75% of the working capital requirement.
- Depreciation on the written-down value method at Income Tax Act rates; income tax at a flat 25% of profit for simplicity.
- Contingency of 5% on building and machinery; preliminary and pre-operative expenses written off over five years.
- All amounts in ₹ lakh unless stated otherwise, excluding GST.

21 Conclusion

On these illustrative assumptions, an electrolytic manganese dioxide unit of 3.4 MT per day costs ₹977.50 lakh to set up, earns an average return of 26.8% on that investment and pays back in about 3.1 years. An average DSCR of 2.08 and break-even at 33.7% of capacity point to a project that can carry its bank debt. Actual figures depend on the location, the machinery chosen, input prices and the promoter's plans, which is why a full report is prepared for each project.

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A Annexure: monthly loan repayment schedule

Term loan of ₹733.12 lakh at 10.5% a year. Amounts in ₹ lakh.

No.	Month	Opening balance	Interest	Principal	Instalment	Closing balance
1	Apr 2027	733.12	6.41	–	6.41	733.12
2	May 2027	733.12	6.41	–	6.41	733.12
3	Jun 2027	733.12	6.41	–	6.41	733.12
4	Jul 2027	733.12	6.41	–	6.41	733.12
5	Aug 2027	733.12	6.41	–	6.41	733.12
6	Sep 2027	733.12	6.41	–	6.41	733.12
7	Oct 2027	733.12	6.41	10.68	17.09	722.44
8	Nov 2027	722.44	6.32	10.77	17.09	711.67
9	Dec 2027	711.67	6.23	10.87	17.09	700.80
10	Jan 2028	700.80	6.13	10.96	17.09	689.84
11	Feb 2028	689.84	6.04	11.06	17.09	678.78
12	Mar 2028	678.78	5.94	11.15	17.09	667.63
13	Apr 2028	667.63	5.84	11.25	17.09	656.38
14	May 2028	656.38	5.74	11.35	17.09	645.03
15	Jun 2028	645.03	5.64	11.45	17.09	633.58
16	Jul 2028	633.58	5.54	11.55	17.09	622.03
17	Aug 2028	622.03	5.44	11.65	17.09	610.38
18	Sep 2028	610.38	5.34	11.75	17.09	598.62
19	Oct 2028	598.62	5.24	11.86	17.09	586.77
20	Nov 2028	586.77	5.13	11.96	17.09	574.81
21	Dec 2028	574.81	5.03	12.06	17.09	562.75
22	Jan 2029	562.75	4.92	12.17	17.09	550.58
23	Feb 2029	550.58	4.82	12.28	17.09	538.30
24	Mar 2029	538.30	4.71	12.38	17.09	525.92
25	Apr 2029	525.92	4.60	12.49	17.09	513.42
26	May 2029	513.42	4.49	12.60	17.09	500.82
27	Jun 2029	500.82	4.38	12.71	17.09	488.11
28	Jul 2029	488.11	4.27	12.82	17.09	475.29
29	Aug 2029	475.29	4.16	12.93	17.09	462.35
30	Sep 2029	462.35	4.05	13.05	17.09	449.31
31	Oct 2029	449.31	3.93	13.16	17.09	436.14
32	Nov 2029	436.14	3.82	13.28	17.09	422.87
33	Dec 2029	422.87	3.70	13.39	17.09	409.47
34	Jan 2030	409.47	3.58	13.51	17.09	395.96
35	Feb 2030	395.96	3.46	13.63	17.09	382.33
36	Mar 2030	382.33	3.35	13.75	17.09	368.59
37	Apr 2030	368.59	3.23	13.87	17.09	354.72
38	May 2030	354.72	3.10	13.99	17.09	340.73
39	Jun 2030	340.73	2.98	14.11	17.09	326.62

No.	Month	Opening balance	Interest	Principal	Instalment	Closing balance
40	Jul 2030	326.62	2.86	14.24	17.09	312.38
41	Aug 2030	312.38	2.73	14.36	17.09	298.02
42	Sep 2030	298.02	2.61	14.49	17.09	283.53
43	Oct 2030	283.53	2.48	14.61	17.09	268.92
44	Nov 2030	268.92	2.35	14.74	17.09	254.18
45	Dec 2030	254.18	2.22	14.87	17.09	239.31
46	Jan 2031	239.31	2.09	15.00	17.09	224.31
47	Feb 2031	224.31	1.96	15.13	17.09	209.18
48	Mar 2031	209.18	1.83	15.26	17.09	193.92
49	Apr 2031	193.92	1.70	15.40	17.09	178.52
50	May 2031	178.52	1.56	15.53	17.09	162.99
51	Jun 2031	162.99	1.43	15.67	17.09	147.32
52	Jul 2031	147.32	1.29	15.80	17.09	131.52
53	Aug 2031	131.52	1.15	15.94	17.09	115.57
54	Sep 2031	115.57	1.01	16.08	17.09	99.49
55	Oct 2031	99.49	0.87	16.22	17.09	83.27
56	Nov 2031	83.27	0.73	16.36	17.09	66.90
57	Dec 2031	66.90	0.59	16.51	17.09	50.40
58	Jan 2032	50.40	0.44	16.65	17.09	33.74
59	Feb 2032	33.74	0.30	16.80	17.09	16.95
60	Mar 2032	16.95	0.15	16.95	17.09	–