

Economic Evaluation Report

for mRNA_vaccine_DS_production_modelling

March 31, 2025

1. EXECUTIVE SUMMARY (2024 prices)

Total Capital Investment	72,162,000 \$
Capital Investment Charged to This Project	70,513,000 \$
Operating Cost	1,163,420,000 \$/yr
Revenues	0 \$/yr
Cost Basis Annual Rate	63,486 g MP/yr
Unit Production Cost	18,325.65 \$/g MP
Net Unit Production Cost	18,325.65 \$/g MP
Unit Production Revenue	0.00 \$/g MP
Gross Margin	- 1.00 %
Return On Investment	- 1,647.94 %
Payback Time	N/A
IRR (After Taxes)	N/A
NPV (at 7.0% Interest)	0 \$

MP = Flow of Component 'mRNA-LNP' in Stream 'mRNA-LNP'

2. EQUIPMENT SPECIFICATION AND FOB COST (2024 prices)

Main Equipment

Quantity/ Standby/ Staggered	Name	Description	Unit Cost (\$)	Cost (\$)
1 / 0 / 0	SMB-101	SMB Volume = 1.13 L	1,053,000	1,053,000
2 / 0 / 0	UF-102	Ultrafilter Membrane Area = 42.81 m2	143,000	286,000
2 / 0 / 0	UF-103	Ultrafilter Membrane Area = 40.96 m2	140,000	280,000
1 / 0 / 0	R-101	Stirred Reactor Vessel Volume = 17.01 L	95,000	95,000
1 / 0 / 0	R-102	Stirred Reactor Vessel Volume = 4.84 L	95,000	95,000
1 / 0 / 0	V-106	Blending Tank Vessel Volume = 33.84 L	66,000	66,000
1 / 0 / 0	V-104	Blending Tank Vessel Volume = 11.47 L	66,000	66,000
1 / 0 / 0	V-103	Receiver Tank Vessel Volume = 317.20 L	55,000	55,000
1 / 0 / 0	V-105	Receiver Tank Vessel Volume = 303.52 L	54,000	54,000
1 / 0 / 0	V-102	Receiver Tank Vessel Volume = 8.34 L	53,000	53,000
1 / 0 / 0	V-101	Receiver Tank Vessel Volume = 27.71 L	53,000	53,000
1 / 0 / 0	UF-101	Ultrafilter Membrane Area = 4.99 m2	40,000	40,000
		Unlisted Equipment		549,000
			TOTAL	2,745,000

3. FIXED CAPITAL ESTIMATE SUMMARY (2024 prices in \$)

3A. Total Plant Direct Cost (TPDC) (physical cost)

1. Equipment Purchase Cost	2,745,000
2. Installation	1,055,000
3. Process Piping	961,000
4. Instrumentation	1,098,000
5. Insulation	82,000
6. Electrical	275,000
7. Buildings	1,235,000
8. Yard Improvement	412,000
9. Auxiliary Facilities	1,098,000
TPDC	8,960,000

3B. Total Plant Indirect Cost (TPIC)

10. Engineering	2,240,000
11. Construction	3,136,000
TPIC	5,376,000

3C. Total Plant Cost (TPC = TPDC+TPIC)

TPC	14,336,000
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3D. Contractor's Fee & Contingency (CFC)

12. Contractor's Fee	717,000
13. Contingency	1,434,000
CFC = 12+13	2,150,000

3E. Direct Fixed Capital Cost (DFC = TPC+CFC)

DFC	16,487,000
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4. LABOR COST - PROCESS SUMMARY

Labor Type	Unit Cost (\$/h)	Annual Amount (h)	Annual Cost (\$)	%
Operator	69.00	65,497	4,519,303	100.00
TOTAL		65,497	4,519,303	100.00

5. MATERIALS COST - PROCESS SUMMARY

Bulk Material	Unit Cost (\$)	Annual Amount		Annual Cost (\$)	%
0.1 M Spermidin	122.81	240	kg	29,477	0.00
1 M DTT	863.26	137	kg	118,666	0.01
1 M MgCl ₂	0.11	406	kg	44	0.00
1 M Tris HCl	8.86	545	kg	4,823	0.00
1 mg/ml DNA tem	110,550.12	600	kg	66,337,716	5.97
100 mM ATP	12,568.16	600	kg	7,541,740	0.68
100 mM Cl_CapAU	1,360,623.55	611	kg	830,921,316	74.76
100 mM CTP	12,541.50	600	kg	7,525,745	0.68
100 mM GTP	12,566.73	600	kg	7,540,883	0.68
100 mM UTP	229,872.68	600	kg	137,939,054	12.41
250 mM KCl	9.81	80,432	kg	789,392	0.07
Ethanol Lipids	27.49	42,851	kg	1,177,982	0.11
Na Citrate buff	9.79	821	kg	8,031	0.00
PBS	0.12	793,155	kg	95,179	0.01
PPAse Roche Sol	31,417.79	636	kg	19,995,577	1.80
RNAse Inh Roc S	428.27	300	kg	128,500	0.01
Sucrose	0.80	844	kg	675	0.00
T7 RNA P Roch S	136,987.65	227	kg	31,084,968	2.80
Tris-HCl 1x Buf	0.12	2,329,398	kg	279,003	0.03
Water	0.00	5,401	kg	0	0.00
TOTAL				1,111,518,771	100.00

NOTE: Bulk material consumption amount includes material used as:

- Raw Material
- Cleaning Agent
- Heat Transfer Agent (if utilities are included in the operating cost)

6. VARIOUS CONSUMABLES COST (2024 prices) - PROCESS SUMMARY

Consumable	Units Cost (\$)	Annual Amount		Annual Cost (\$)	%
Dft Membrane	400.00	2,109	m2	843,517	2.04
Dft SMB Resin for Small Mol.	25.00	248	L	6,190	0.01
Bag for Mixing 50 L	900.00	12,540	item	11,286,000	27.33
Dft Stirred Bioreactor Bag	6,220.00	792	item	4,926,240	11.93
Dft Cleaning Powder	4.91	105,378	kg	516,937	1.25
Bag for Storage 50 L	400.00	1,760	item	704,000	1.71
Bag for Mixing 500 L	1,500.00	2,112	item	3,168,000	7.67
Bag for Storage 500 L	850.00	2,684	item	2,281,400	5.53
Bag for Mixing 200 L	1,200.00	9,240	item	11,088,000	26.86
Bag for Mixing 400 L	1,400.00	4,620	item	6,468,000	15.67
TOTAL				41,288,284	100.00

7. WASTE TREATMENT/DISPOSAL COST (2024 prices) - PROCESS SUMMARY

THE TOTAL WASTE TREATMENT/DISPOSAL COST IS ZERO.

8. UTILITIES COST (2024 prices) - PROCESS SUMMARY

Utility	Unit Cost (\$)	Annual Amount	Ref. Units	Annual Cost (\$)	%
Std Power	0.10	37,965	kW-h	3,796	100.00
TOTAL				3,796	100.00

9. ANNUAL OPERATING COST (2024 prices) - PROCESS SUMMARY

Cost Item	\$	%
Raw Materials	1,111,519,000	95.54
Labor-Dependent	4,519,000	0.39
Depreciation	1,410,000	0.12
Other Facility-Dependent	1,517,000	0.13
Laboratory/QC/QA	3,164,000	0.27
Consumables	41,288,000	3.55
Waste Treatment/Disposal	0	0.00
Utilities	4,000	0.00
Transportation	0	0.00
Miscellaneous	0	0.00
Advertising/Selling	0	0.00
Running Royalties	0	0.00
Failed Product Disposal	0	0.00
TOTAL	1,163,420,000	100.00



