PROJECT PROFILE
ON
OXYGEN & NITROGEN MANUFACTURING PLANT

PRODUCTS STANDARDS: **Medical grade IP 2010 -**
Certified safe for human use. -
Purity 99-100%
IS 1747 (1972): Nitrogen Gas

PRODUCTION CAPACITY:

Oxygen (liquid / Gases) (Industrial/ Medical)
Annual Capacity (Cum): 63,36,000
Nitrogen (Liquid / Gases)
Annual Capacity (Cum): 96,48,000

PROJECT COST: **Rs. 44,83,00,000**

FOR THE FINANCIAL YEAR : 2020-21

PREPARED BY

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Introduction:

Industrial gas is a group of gases that are commercially manufactured and sold for uses in other applications. The most common industrial gases are: air gases - Oxygen (O_2), Nitrogen (N_2) and Argon (Ar) rare gases - such as Helium (He), Krypton (Kr), Xenon (Xe) and Neon (Ne) and other gases like hydrogen (H_2), Carbon Monoxide (CO), Carbon Dioxide (CO_2) and Nitrous Oxide (N_2O), Chlorine (Cl_2), Hydrogen Chloride (HCl) and Sulphur Dioxide (SO_2), Acetylene (C_2H_2), Methane (CH_4) and Propane (C_3H_8). In addition, there are many different mixtures of these and other gases to meet the needs of specific applications.

Usage in the Industry:

The industrial and medical gases industry serves a very large number of customers in the whole community. Industrial gases are essential for almost all manufacturing. Large quantities of oxygen, nitrogen and argon are used in the basic and infrastructural industries. Shipyards and the automotive industry use acetylene, propane, mixtures of fuel gases and oxygen for cutting and welding. Liquid nitrogen is vital in recycling plastics, packaging and scrap tyres. The chemical industry employs all major industrial gases as a raw material or for inerting. The other smaller market segment consists of cylinder gas and mixtures.

Market Outlook

In India, there are presently over 300 small & medium size plants and approximately 25 large tonnage plants all over the country. These gases are supplied through pipelines to captive customers in adjacent factories; in cryogenic transport tanks for bulk deliveries to long distance customers; or filled in cylinders. The present annual turnover of the gas industry, excluding captive production is about Rs. 3,000 crores ($650 million). With increased industrialization, the demand pattern of industrial gases is also changing fast. Modern application in the food processing industry, agro industries, healthcare and technology are growing at a tremendous pace. This has driven the industry to adopt stringent quality control systems and an efficient distribution network. Major players in India include BOC India, INOX Air Products Ltd., Jindal Praxair Oxygen Co. Ltd., Air Liquide India Holding P.Ltd. Aims Industries Ltd etc.

The Indian gas industry is growing at an average rate of 12 per cent per annum during the last couple of years, with the industrial oxygen growing consistently at 15-17 per cent per

annum. The growth of industrial gas industry can be easily forecast on the basis of projections of the steel and other metallurgical industry.

Steel demand is seen rising by 10% in the fiscal year to march 2011, helped by higher spending on infrastructure will continue to drive growth of the gas industry. Natural gas comprises 9 % of India's primary energy consumption and it will be 14% of energy mix by 2010. Demand for natural gas is also likely to increase at an average annual growth rate of 7.3%.Metals production and fabrication will continue to be the largest market for industrial gases, accounting for 31% of total demand in value terms in coming years. The second largest market will be the chemical processing/petroleum refining segment. The medical/healthcare market, though smaller in size, will be the fastest growing and record gains from the expansion of healthcare services in developing nations and rapidly increasing use of home healthcare respiratory therapies in advanced economics. Hydrogen is gaining prominence and most companies are striving to develop technologies that can efficiently exploit the potential of hydrogen. Increased use of natural gas will create an opportunity for higher production of argon and carbon dioxide. The Industrial gas industry has a very bright future in the coming years.

Global Industrial Gases Market Revenue:

According to the Freedonia Group, Inc., a Cleveland-based industry research firm, world demand for industrial gases is forecast to increase 6.9% annually to $36.8 billion in 2011, with volume exceeding 300-bcm (billion cubic meters). Asia/pacific is the largest consuming region because of rapid growth in developing industrial markets, especially those of china and India.

About the Project Proposal:

It is setting up a unit to manufacture Liquid Nitrogen, Liquid Oxygen, Industrial and Medical Oxygen, Industrial and high purity Nitrogen gas, which shall have an aggregate capacity of 1,59,84,000 Cubic Meter (20000 MT) per annum on a land measuring 2 Acres. The total cost of the project is estimated at Rs. 44.83 Crores and term loan of Rs.29.00 Crores, at a debt : equity of 1.83 : 1.

Project Cost: *(Rs in Crores)*

Description	Amount
Capital Investment	40.94
Contingencies @ 3%	1.20
Preliminary & Pre-op Expenses	2.13
Margin for WC	0.56
Total	**44.83**

Manufacturing Process:

The four products viz. a) Compressed Oxygen, b) Liquid Oxygen, c) Nitrogen and d) Liquid Nitrogen are all produced from air in the same plant. Air, the raw material is liquefied cryogenically and the separation of the two components liquid oxygen and liquid nitrogen takes place in a fractional distillation column. Compressed oxygen and nitrogen gases are bottled into cylinders by compressors / pumps after vaporization of the respective liquid fractions.

The air is first compressed in 3 stages to a pressure of 30kg/cm2. Thereafter the removal of water vapor and carbon dioxide take place in a battery of molecular sieves. The out-going carbon dioxide and water vapor free air is further compressed to a pressure of 100 kg/cm2 and cooled substantially by external refrigeration. This high-pressure air is cooled further in heat exchangers by the outgoing product gases. Bulk of this cold air is allowed to expand through an expansion engine and the remaining air is routed through an expansion valve. The downstream air of the expansion engine attains a pressure of 5 kg/cm2 and a considerably reduced temperature. The other stream of air going through the expansion valve (Joule-Thomson valve) is expanded to also attain a pressure of 5kg/cm2) whereby partial liquefaction of air takes place.

Both the streams of air are mixed and introduced as a liquid vapor mixture to the bottom column of the double rectification column (fractional Distillation Column). Due to mass and heat transfer at every perforated tray in the column the nitrogen rich liquid vapor accumulate at the top trays and an oxygen rich liquid-vapor mixture collect at the sump of the column. The liquid nitrogen accumulating at the upper portion of the bottom column is drawn out as product for storage in Vacuum insulated cryogenic tanks. For production of nitrogen gas, this liquid nitrogen is pumped from the storage tank through vaporizers for gasification and bottling into cylinders.

The oxygen rich liquid-vapor mixture at the sump of the bottom column is routed to the top column of the distillation column, which is at a lower pressure of 0.5kg/cm2. In this low-pressure column further separation of oxygen and nitrogen vapor, take place through a mass and heat transfer process at the various trays within the column. The separated oxygen vapors again settle at the bottom of this column and condense to form liquid oxygen due to exchange of heat with the colder liquid nitrogen formed at the top of the bottom column. This liquid oxygen accumulating at the bottom portion of the top column is drawn out as product for storage in Vacuum insulated cryogenic tanks. For the production of compressed oxygen, this liquid oxygen can be vaporized by the heat exchange between the incoming process air and compressed by oxygen compressors for bottling into cylinders. Or else the stored liquid oxygen can be pumped through vaporizers for gasification and bottling into cylinders.

Depending upon requirements, the production modes of the plant can be altered to produce: 1) liquid nitrogen and compressed oxygen where the in-built vaporizers are used to fill compressed oxygen and 2) liquid oxygen only, where external vaporizers are used to fill compressed oxygen.

Raw material

The raw material for the Oxygen and Nitrogen (gas and liquid) is atmospheric air. Besides this, the plant will require consumables like lubricants, greases, catalysts and chemicals, which are available indigenously.

Utilities

Water

A cooling tower will be installed with following operating conditions:

Flow Rate / Cont. Consumption	285	M^3/hr
Supply / Inlet temperature	+27	^oC
Temperature Rise	10	^oC

Installed Capacity

The installed capacity is discussed herein below:

Proposed	Nitrogen (Liquid / Gases)	Oxygen (liquid / Gases) (Industrial/ Medical)	Total
Capacity (Cum / Hr)	1340	880	2220
Production Hrs per Day (3 Shifts)	20	20	20
Working days per annum	360	360	360
Annual Capacity (Cum)	96,48,000	63,36,000	1,59,84,000
Annual Capacity (Tonnes)	10,980	9,050	20,030

Capacity utilisation (%)

Financial Year	First Year	Second Year	Third Year	Fourth Year onwards
Percentage	50%	60%	70%	75%

Implementation Schedule

It is estimated that the plant will be completed in 18 months from start of implementation. Step wise implementation schedule of the project

Licensing/ Registration

All the major necessary licenses and permits are to be applied. A list of the same is provided below.

Description	Status
Village NOC	From Gaon Panchayat
Trade License	From Local Authority
Consent to Establish (Pollution NOC)	State Pollution Control Board
Factory License	Approach to Chief Inspection of Factories, State Govt
Power Load	Approach to Power Distribution Company
Udyog Aadhaar Memorandum (UAM)	Website: udyogaadhaar.gov.in

POWER REQUIREMENT:

The total Electric Power requirement will be about 3.5 MW. The proposed plant being a continuous process plant, supply of electric power at 33 or 132 KV through a dedicated feeder is required.

WATER REQUIREMENT:

About 2,00,000 liters/day of water will be required for operation of the plant, which is proposed to be met from own bore-well. The ground water is to treated in a water treatment plant and is to be re-circulated through a Cooling Tower.

MANPOWER REQUIREMENT:

It is estimated that number of persons to be employed in this project is 50 considering 3 shift operations. The break-up of manpower will be as follows:

(a) Managerial ----- 5

(b) Clerical ----- 5

(c) Skilled ----- 15

(d) Un-Skilled ----- 25

Total 50

Cost of the project:

Description	Rs in Crores
Land & Site Development	0.83
Civil Cost	2.15
Equipment & Electrification	34.61
Other Fixed Assets	3.35
Contingencies @ 3%	1.20
Preliminary & Pre-op Expenses	2.13
Margin for WC	0.56
Total	**44.83**

Land & Site Development:

It is proposed to set up the unit in a plot of land. A cost has been considered for land development, approach road, gate, boundary fencing, etc.

The cost details of land and site development is as given below.

(Amount in Rs.)

Sl.No.	Particulars	Amount
1	Construction of Approach/ Internal Road	36,45,946
3	Land Developments:-	46,13,158
	Total	82,59,104

Cost breakup of civil work:

A factory shed of 4000 sqm. is proposed to be built for the Air Liquefaction / Separation plant. An amount of Rs. 215,18,879 has been kept towards cost of construction of linths and super structures, machine foundations and office buildings.

(Amount in Rs.)

Sl.no.	Particulars	Total
1	Building/ Shed	181,01,737
2	Cooling Water Tower of capacity 30KL	7,20,000
3	Machine found. for Compressor, Motor, MSB, Turb-Booster	12,50,000
4	Foundation of Cold Box of dia.3.5m & Ht.25m :--	5,58,157
5	Foundation of Storage Tank:--	8,88,985
	Grand Total	215,18,879

Plant & Machineries:

The plant & machinery cost has been estimated based on the quotations and estimates received by the Company. The total cost comes to Rs. 28.52 crores, a breakup of the plant and machinery is given below:

(Amount in Lakhs)

Description	Basic	Tax & others	Total
Recycle Compressor, PHE & Liquefier Exchanger, Cold Box Assembly, Upper & Lower Column, Turbine & Booster Assembly	1,430.25	462.57	1,892.82
Main Air Compressors, Air Filter, Warm end skid, PP Vessel, DCA, N2/Water Tower, Drain Vaporiser, Control System, PLC & HMI	469.88	82.48	552.36
Storage Tank: 77 KL Capacity (4 Nos)	208.00	59.72	267.72
Overhead Crane	NA	NA	15.00
Inter Connecting Pipe line Flange nut-bolt, gasket, drain pipe for complete plant	NA	NA	8.00
Product Pipe Line (2 Sets)	NA	NA	6.00
Cryogenics Liquid transfer pump (4 Nos)	NA	NA	32.00
Cylinder filling pump with vaporiser manifold etc.	NA	NA	15.00

Insulation	NA	NA	5.00
Cylinder testing station	NA	NA	7.75
Installation & Erection	NA	NA	50.00
		Total	958.83

e) Electrification: An amount of Rs. 6.10 Crores is estimated towards construction of dedicated feeder from supply end to receiving end, erection of terminal equipment at sending end and construction of a 33KV/11KV/0.415KV substation within the factory premises at the receiving end. The total cost under this head is estimated at Rs.6.10 Crores as under:

(Rs. in Lakhs)

Sl. No	Description	Total
A.	Sub-Station Bay Extension	149.70
B.	Overhead Line from Substation To Substation	115.15
C.	132 kv / 11 kv Substation in Plant Premises	257.95
D.	Internal Electrification	86.75
	Grand Total (A + B + C + D)	**609.55**

Water System:

An amount of Rs.100 lakhs has been considered for making arrangement of deep tube well, installation of pump, motor, softener and filtration unit, cooling tower, etc.

Sl. No	Description	Qty	Rate	Amt. Rs in Lakhs
1.	Water Installation			
a)	Bore Well with pump	2	4.50	9.00
b)	Small Water Pump Monoblock	4	0.25	1.00
c)	Water Treatment Plant	1	15.00	15.00
d)	Main Water Pump with Motors	2	3.00	6.00
c)	Cooling Tower	1	15.00	15.00
d)	Water Pipe Line	LS		5.00
e)	Valves, Gasket, Nut-bolts	LS		2.00
f)	Installation, etc.			15.00
			Total	**68.00**

Other Fixed Assets:

An amount of Rs.235lakhs has been considered on this account including computers, printers, UPS, software, etc.

Sl. No	**Description**	**Qty**	**Rate**	**Amt. Rs in Lakhs**
A.	Laboratory Equipment			5.00
B.	Fire fitting Equipment			8.00
C.	Work-shop Equipment			4.50
D.	Computers & printers			1.50
E.	Building lightening arrestor			5.00
F.	Transport Tankers*	4	58.77	235.08

G.	Aluminium Vessels			8.00
	Grand Total			**335.08**

* The breakup of Transport Tankers' cost is as under:

Description	Qty	Rate	Amount (Rs.)
Tank Liquid Nitrogen/Oxygen tank of Capacity 19100 Litres of design pressure 18.0 bar (g)	2	33,80,000.00	67,60,000.00
Tank Liquid Nitrogen/Oxygen tank of Capacity 19500 Litres of design pressure 10.39 kg/Cm2g	2	24,74,000.00	49,48,000.00
Tax	4	58,500.00	2,34,000.00
Carrying Expenses	4	1,00,000.00	4,00,000.00
Chassis from Tata Motors LPT 3118 SLTCAB NA 56WB 109RR 10R20 ABS Pack Discount	4	25,97,500.00	103,90,000.00
Tax	4	1,04,000.00	4,16,000.00
Registration Permit & Cabin making expenses	4	90,000.00	3,60,000.00
Total			**235,08,000.00**

Contingencies (Rs. 1.20 crores):

Provision for contingencies has been considered @ 3% over the cost of civil works, plant & machinery, Electric installations and Misc. Fixed Assets to provide safeguard against escalation of prices or any other unforeseen expenditure amounting to Rs.120.34 Lakhs.

Pre-Operative Expenses (Rs.2.13 crores):

The pre-operative expenses of the company is estimated at Rs.2.13 crores, which shall comprise of interest during construction, upfront fee, consultants' fees, etc, as under:

Description	Rs in lakhs
Establishment Cost	5.00
Travelling, Conveyance, etc.	12.00
Misc. and Administration	4.00
Rent, Rates and taxes	7.00
Legal and Professional charges	3.00
Upfront Fee	14.50
Interest During Construction (IDC)	167.02
Total	**212.52**

Interest during construction and draw down:

Interest during construction has been assumed at 11% p.a. with debt draw down schedule from quarter ending March 2016 to March 2017, with debt drawal at DE of 1.83 : 1. The draw down schedule and IDC is as follows:

(*Rs in Lakhs*)

Description / Quarter ending	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	5th Quarter	Total
Land & Site Development	12.39	20.65	12.39	20.65	16.52	82.59
Civil	10.76	43.04	64.56	64.56	32.28	215.19
Plant & Machineries and Electric Installations	284.24	754.12	1038.36	1038.36	346.12	3461.20
Misc. Fixed Assets	0.00	100.52	117.28	100.52	16.75	335.08
Pre-Operative Expense (Excluding IDC)	11.38	11.38	9.10	9.10	4.55	45.50
IDC	0.00	9.97	30.01	53.13	73.91	167.02
Contingencies	0.00	0.00	0.00	60.17	60.17	120.34
Working Capital Margin	0.00	0.00	0.00	0.00	55.91	55.91
Total	318.76	939.67	1271.70	1346.49	606.22	4482.84
Total Cumulative Fund Requirement	318.76	1258.44	2530.13	3876.62	4482.84	4482.84
Capital/Equity	318.76	444.54	894.00	1369.81	1582.83	1582.83
Term Loan	0.00	813.89	1636.13	2506.81	2900.00	2900.00
Debt:Equity	0.00	1.83	1.83	1.83	1.83	1.83

Working Capital Margin:

Working Capital margin has been calculated on the basis of bank finance for working capital, based on the calculations for the first year of operations for the new plant to the extent of 25% on inventory of raw materials, consumables and finished goods and 40% on receivables. The margin money is estimated at Rs. 55.91 Lakhs.

Means of Finance

The project is proposed to be funded from term loans from banks, financial institutions and Promoters' Contribution in the ratio of 1.83:1. The proposed means of the finance for the project will be as under:

(Rs in Crores)

Description	Amount
Term Loan	29.00
Equity/Working Capital	15.83
Total	44.83
Debt:Equity	1.83

Working Capital

The traditional method of working capital assessment has been adopted for the assessment for working capital requirement which is based on the assessment of the holding levels of the various items of current assets which are eligible for bank finance and the margin requirement in respect thereof. The holding level has been assessed as under:

Description	Holding level (Months)
Receivables	0.95

Finished Goods	0.10
Consumables	4.00
Creditors	0.45

Selling prices
The selling prices have been considered on the conservative side and less compared to the prevalent market rates at which the Company is currently selling its products from its existing unit.

Consumables
Consumables like lubricants, greases, catalysts and chemicals will be required, which is taken at 3.00 paise per Cubic Meter of goods manufactured.

Salary and wages
Provision for labor and supervision is based on the operational and maintenance manpower requirement of the unit. In addition to salary and wages as applicable to various grades, a provision has also been made towards fringe benefits. This has been taken as follows:

Description	No. of person	Salary per month	Rs Lakhs per Annum
Manager	1	18000	2.16
Asstt Manager	1	13500	1.62
Operator	4	10000	4.80
Asstt operator	4	8000	3.84
Lab Chemist	1	7500	0.90
Cylinder filler	4	7000	3.36
Asstt cylinder filler	4	6500	3.12
Sales & Admn officer	1	6000	0.72
Accounts officer	1	9000	1.08
Security	4	5000	2.40
Sub Total	25		24.00
Add: Benefits	25%		6.00
Total			30.00

Other direct costs:
Other direct costs have been considered at 15.00 paise per Cubic Meter of goods manufactured.

Depreciation: Depreciation has been considered at straight line method as per the Companies Act.
Selling, distribution and general expenses: These have been assumed 12.50% of net revenue.

Interest: Interest has been considered at 11% p.a.

Sensitivity Analysis:

A sensitivity analysis has been carried out to ascertain the effect of the following scenarios on the major financial parameters of the company. The summary of the sensitivity analysis is provided hereunder:

Particulars	Min. DSCR	Avg. DSCR
Base Case	2.36	2.71
Scenario 1: Decrease in Sales Revenue by 10%	1.59	1.79
Scenario 2: Increase in Operating Cost by 10%	1.99	2.24
Scenario 3: Increase in Interest cost by 10%	2.27	2.62

Sensitivity analysis has been done considering a factor of 10% decrease in sales revenue and 10% increase in operating costs. As can be seen above, the debt service capability of the projects is comfortable even under adverse scenarios considered. Hence, it can be concluded that the proposed project will be able to withstand adverse circumstances and the debt serviceability is satisfactory, even under adverse circumstances.

Break Even Analysis:

ITEMS	2017-18	2018-19	2019-20	2020-21
	(Proj.)	(Proj.)	(Proj.)	(Proj.)
Capacity Utilisation	50.00%	60.00%	70.00%	75.00%
Cost of Goods Sold	1632.94	1951.33	2276.38	2438.39
Variable Cost	643.05	764.91	886.84	948.68
Contribution	989.89	1186.42	1389.54	1489.72
Fixed Cost	813.32	842.02	852.90	895.58
Break Even (%)	82.16%	70.97%	61.38%	60.12%
BE Sales	1341.67	1384.89	1397.24	1465.89
BE Sales at installed capacity	41.08%	42.58%	42.97%	45.09%
Depreciation	279.14	279.14	279.14	279.14
Cash Break Even %	53.96%	47.44%	41.29%	41.38%
Cash Break Even at Installed Capacity	26.98%	28.47%	28.90%	31.03%

Internal Rate of Return:

Particulars	1st Year	2nd Year	3rd year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year
INFLOWS									
PAT		141.25	275.52	429.31	475.31	509.02	548.53	552.53	556.59
Depreciation		279.14	279.14	279.14	279.14	279.14	279.14	279.14	279.14
Interest		319.00	304.70	272.58	232.76	188.38	137.17	81.55	25.67
Terminal Value									
Land									82.59
Other Fixed Assets									2606.60
Working Capital									797.01
TOTAL INFLOW		739.39	859.36	981.03	987.21	976.53	964.83	913.22	4347.60
OUTFLOWS									

Capital Expenditure	4426.92								
Working Capital Requirement		140.56	27.61	168.17	41.42	168.18	41.44	168.20	41.45
TOTAL OUTFLOW	4426.92	140.56	27.61	168.17	41.42	168.18	41.44	168.20	41.45
NET CASH FLOW	(4426.92)	598.83	831.75	812.86	945.79	808.36	923.40	745.02	4306.15
IRR	16.49%								

Machine/Equipment Suppliers:

1. Airgases Projects (P) Ltd
   Block F P125 3rd Floor, New Alipore, Kolkata 70053
2. Cryolor Asia Pacific
   100 kms Milestone,
   GST Highway NH 45 Kadaimalaiputtur,
   Acharapakkam, Tamil Nadu 603 301 India
3. M/s ABB India Limited
4. VRV Asia Pacific Pvt. Ltd.
5. Super Cryogenics Sys P Ltd