

## **CALCINED BAUXITE**

### **1. INTRODUCTION:**

India currently imports 60% of its Calcined Bauxite from China. Spurred by expansion of domestic steel production, a scarcity of acceptable quality of bauxite from China and raising import cost, drives are now under way in India to produce high grade bauxite from domestic bauxite sources. At present, India is very minor producer of non-metallurgical bauxite, despite having occurrence of high grade bauxite in west coast and central India. This is attributed to limited effort to test high grade bauxite occurrence in region outside the main bauxite producing area around Gujarat. The product has good demand growth, so there is good scope for new entrepreneurs.

### **2. PRODUCT AND ITS APPLICATION:**

Calcined bauxite is an important raw material for two main products, refractory and abrasives. Smaller volumes are consumed in other applications including proppant, welding fluxes and antiskid surface. While the process of calcining bauxite for each of these applications is fundamentally the same (i.e. it involve the same basic burning process), the physical and chemical characteristic of each grade vary. Calcined bauxite is classified by the major end use abrasive and refractory.

### **3. DESIRED QUALIFICATIONS FOR PROMOTER:**

Promoter must have basic knowledge of mineral process and operation and quality of bauxite. It is desirable to have Graduate in any Science. If promoter having experience in refractories industry, it will be added qualification.

#### **4. INDUSTRY LOOK OUT AND TRENDS**

With production, consumption, revenue (million USD), market share and growth rate of Calcined Bauxite in these regions, from 2012 to 2022 (forecast), covering North America, Europe, China, Japan, Southeast Asia, India Global Calcined Bauxite market competition by top manufacturers, with production, price, revenue (value) and market share for each manufacturer; the top players including Futong Industry, LKAB Minerals, Baud Minerals, Plomp Mineral Services, Omnicrete

On the basis of product, this report displays the production, revenue, price, market share and growth rate of each type, primarily split into <1mm , 1-3mm, 3-5mm, >5mm On the basis of the end users/applications, this report focuses on the status and outlook for major applications/end users, consumption (sales), market share and growth rate for each application, including Abrasive, Cement, Metallurgy, Refractory.

#### **5. MARKET POTENTIAL AND MARKETING ISSUES, IF ANY:**

The vast resource of laterite and bauxite occurs in various parts of the Country and India occupies 5th position in the World bauxite map. Despite availability of large bauxite resources there are limited occurrences of high grade bauxite deposits. Gujarat occupies the top position in resources and production of high alumina bauxite suitable for valued added refractory, abrasive industry. However, this bauxite has significant calcium content, which deteriorates its value for refractory industry. Some high alumina and high titania deposits are found in Maharashtra and Central India (Chhattisgarh, Jharkhand & Madhya Pradesh) region and small scattered deposits are also exploited in various parts of the country. In many cases the non-metallurgical grades are specially selected high quality bauxite from metal grade deposits for which normally higher prices can be obtained. With the fast depletion of good quality bauxite resources, it has become necessary to use suitable beneficiation process, mainly to bring down iron and titania content in Indian bauxite. In the current scenario, China is the leading country to supply refractory bauxite in the World after Russia, India and Guyana. Guyana is the main competitor to China in the International market and further new production from UC Rusal due on stream in 2012. After the China, Russia, India and Guyana, other producers of refractory grade bauxite in the world are Brazil, Greece, Malaysia, and Australia. Brazil has small refractory grade production for the

domestic market and also for proppant production. In the present paper, the high grade bauxite deposits of India are highlighted and the Indian Calcined bauxite is compared with world producers.

India is 5<sup>th</sup> largest resources of bauxite in the World and comprises more than 3000 million ton resources. Most of these deposits, particularly those located in the Eastern Ghats of India are suitable for alumina production. There are limited resources of high grade bauxite, suitable for refractory-abrasive industries. In the state of Gujarat high alumina, low iron and low titanium bauxite occur and they are widely used for calcination for refractory and abrasive industries, although this bauxite is contaminated with calcium content. The high alumina bauxite of Chhattisgarh, Madhya Pradesh, Jharkhand and Maharashtra, generally have high titania and also significant iron content. Some of the high grade bauxite deposits of Chhattisgarh and Jharkhand are not accessible due to forest and tribal issues however, some Gujarat deposits suitable for value added non-metallurgical industry, is already getting exhausted. In the present paper, various aspects of calcined bauxite are discussed. India's present position is compared with leading high grade bauxite producers of World i.e. China and Guyana. Based on

## **6. RAW MATERIAL REQUIREMENTS:**

Iron oxide levels must be lower than 2.5%, compared with ten times that for metallurgical grades, and the alkali content has to be minimal. Deposits which can satisfy these requirements are not widespread; hence there is relative scarcity of refractory grade bauxite sources.

**Utility:** Power 1000 units: Fuel 90 liters

## **7. MANUFACTURING PROCESS:**

Bauxite calcination plant is established near the mines or set up near the market. Bauxite of different grades is tested and then is crushed manually or by jaw crusher in smaller sizes in inches. Oil fired vertical shaft kiln (VSK)refractory lining inside portion having about 33 meter conical vertical chimney, is used for the firing or calcination of bauxite at a temperature of

about 900 dig C. The chimney of VSK is so arranged that the speed of exhaust gases and fumes in the chimney may travel @ 9 to 12m/sec. The diameter of chimney is so calculated that the lower/bottom portion of chimney is one third of the total stack of chimney. Skip bucket with rope, which is driven by electric motor, is arranged for loading of stone pieces for firing of calcination. These stone pieces are loaded from the top of kiln; this process is done regularly as per the requirement of stone calcination.

## 8. MANPOWER REQUIREMENT:

The enterprise requires 12 employees as detailed below:

Sr. No.	Designation of Employees	Monthly Salary ₹	Number of employees required				
			Year-1	Year-2	Year-3	Year-4	Year-5
1	Machine Operators	12,000	2	2	2	3	3
2	Helpers	8,000	6	6	8	8	10
1	Sales/ Purchase man	10,000	2	2	2	1	1
2	Accounts/Stores Asst	12,500	1	1	1	1	1
3	Office Boy	9,500	1	1	1	1	1
	<b>Total</b>		12	12	14	14	16

## 9. IMPLEMENTATION SCHEDULE:

The project can be implemented in 4 months' time as detailed below:

Sr. No.	Activity	Time Required (in months)
1	Acquisition of premises	1.00
2	Construction (if applicable)	2.00
3	Procurement & installation of Plant & Machinery	1.00

4	Arrangement of Finance	2.00
5	Recruitment of required manpower	1.00
	Total time required ( <i>some activities shall run concurrently</i> )	3.00

## 10. COST OF PROJECT:

Total project cost of is 64.00 lakhs.

Sr. No.	Particulars	₹ in Lacs
1	Land	4.50
2	Building	8.50
3	Plant & Machinery	27.00
4	Furniture, Electrical Installations	3.00
5	Other Assets including Preliminary / Pre-operative expenses	2.00
6	Working Capital	19.00
	<b>Total</b>	<b>64.00</b>

## 11. MEANS OF FINANCE:

Bank term loans are assumed @ 75% of fixed assets and current assets. The proposed funding pattern is as under:

Sr. No.	Particulars	₹ in Lacs
1	Promoter's contribution	16.00
2	Bank Finance	48.00
	<b>Total</b>	<b>64.00</b>

## 12. WORKING CAPITAL CALCULATION:

The project requires working capital of 19.00 lacs as detailed below:

Sr. No.	Particulars	Gross Amt	Margin %	Margin Amt	Bank Finance
1	Inventories	8.00	25.00	2.00	6.00

2	Receivables	8.00	25.00	2.00	6.00
3	Overheads	3.00	100%	3.00	-
4	Creditors	-	40%	-	-
	<b>Total</b>	19.00		7.00	12.00

### 13. LIST OF MACHINERY REQUIRED:

Sr. No.	Description	Qty.	Rate (₹)	Value (₹)
	<b><u>Machinery and Equipments (All Indigenous)</u></b>			
<b>(a)</b>	<b><i>Production Unit</i></b>			
1	Oil fired vertical shaft kiln with Refractory lining inside portion of kiln having 33 meter height chimney made of steel Fabricated plate form type having all arrangement with skip bucket and burners etc. Capacity-30 Ton per day	2 No.	7,50,000	15,00,000
2	Jaw crusher for crushing the stone or pebbles with 10 HP motor and starter etc.	1 No.	1,25,000	1,25,000
Sr. No.	Description	Qty.	Rate (₹)	Value (₹)
3	Rotary self-driven for sieving the bauxite having different mesh sizes with 1.5 HP motor and starter etc.	1 No.	50,000	50,000
4	Wheel barrow for handling of raw material and finished product	4 Nos.	15,000	60,000
5	Balance for weighing up to 500kg.	2 Nos.	5,000	10,000
6	Overhead water tank; capacity 1000 liters. Water storage having well boring jet with 2 HP motor and starter, and pipe line fitting etc.	1 No.	30,000	30,000
7	Beg sewing machine	1 No.	30,000	30,000
8	Generator set capacity 10 kVA	1 No.	50,000	50,000
9	Other tools, fixtures, dies, hand tools, racks etc.	L.S.	20,000	20,000
<b>(b)</b>	<b><i>Testing Equipments</i></b>	L.S.	10,000	10,000
<b>(c)</b>	<b><i>Pollution Control Equipments</i></b>			

1	Exhaust Fan	5 Nos.	3,000	15,000
2	Dust catcher	1 No.	40,000	40,000
3	Scrubber	1 No.	1,80,000	1,80,000
4	Ducting	L.S.	15,000	15,000
5	Fencing for plantation	L.S.	30,000	30,000
6	Hand gloves, eye goggles etc.	L.S.	10,000	10,000
<b>(d)</b>	<b>Energy Conservation Equipments</b>	<b>L.S.</b>	10,000	10,000
	TAXES AND TRANSPORTATION			5.15%
	<i>Subtotal Machinery and Equipments</i>			<b>27,00,000</b>
	<b>Furniture / Electrical installations</b>			
a)	Office furniture	LS	50,000	50,000
b)	Stores & Spares	LS	30,000	50,000
c)	Computer & Printer	1 No	1,00,000	1,00,000
	<i>subtotal furniture and electrical installations</i>			<b>2,00,000</b>
	<b>Other Assets</b>			
a)	Licenses and other fees	2 Nos.	50,000	1,00,000
	<i>sub-total Other Assets</i>			<b>1,00,000</b>
	<b>Total</b>			<b>30,00,000</b>

All the machines and equipment are available from local manufacturers. The entrepreneur needs to ensure proper selection of product mix and proper type of machines and tooling to have modern and flexible designs. It may be worthwhile to look at reconditioned imported machines, dies and tooling. Some of the machinery and dies and tooling suppliers are listed here below:

- Kamdhenu Agro Machinery  
Plot No. 6, Near Power House,  
Wathoda Road, Wathoda  
Nagpur - 440035  
Maharashtra, India
- Future Industries Private Limited  
Shed No. 15, Ambica Estate,  
Corporation Municipal Plot,

Opposite Sadvichar Hospital,  
Naroda, Ahmedabad - 382330,  
Gujarat, India

- The Global Pharma Equipments  
Star Industrial Estate,  
D-32, Naik Pada,  
Near Hanuman Mandir,  
Opposite Dwarka Industrial Estate,  
Vasai East, Vasai - 401208,  
Maharashtra, India

#### 14. PROFITABILITY CALCULATIONS:

<b>Financial statements ( Cost of production @ 80 % )</b>		
<b>Sr. No.</b>	<b>Particulars</b>	<b>Rs.</b>
<b>A.</b>	<b>Variable cost</b>	
1	Raw material and utilities	22,00,000
2	Spares and maintenance	2,40,000
3	Selling expenses	3,10,000
	<b>Total variable cost (A)</b>	<b>27,50,000</b>
<b>B.</b>	<b>Fixed cost</b>	
1	Salaries and wages	16,60,000
2	Interest on term loan and working capital loan @ 10%	4,80,000
3	Depreciation	3,90,000
4	Administrative expenses	1,60,000
	<b>Total fixed cost (B)</b>	<b>26,90,000</b>
<b>C.</b>	<b>Total cost of production (A+B)</b>	<b>54,40,000</b>
<b>D.</b>	<b>Selling price per kg. (in Rupees)</b>	<b>20</b>
<b>E.</b>	<b>Annual sales turnover</b>	<b>60,00,000</b>
<b>F.</b>	<b>Net profit before tax (E-C)</b>	<b>5,60,000</b>
<b>G.</b>	<b>Breakeven point in %</b>	<b>56.6%</b>



## Five Year Projections:

Sr. No.	Particulars	UOM	Year-1	Year-2	Year-3	Year-4	Year-5
1	Capacity Utilization	%	50%	50%	60%	70%	80%
2	Sales	₹. In Lacs	37.50	37.50	45.00	52.50	60.00
3	Raw Materials & Other direct inputs	₹. In Lacs	13.75	13.75	16.50	19.25	22.00
4	Gross Margin	₹. In Lacs	23.75	23.75	28.50	33.25	38.00
5	Overheads except interest	₹. In Lacs	9.00	9.00	10.00	11.60	11.60
6	Interest @ 10 %	₹. In Lacs	4.80	4.80	3.50	2.80	1.60
7	Depreciation	₹. In Lacs	9.00	8.00	6.50	4.20	3.00
<b>8</b>	<b>Net Profit before tax</b>	<b>₹. In Lacs</b>	<b>1.05</b>	<b>1.95</b>	<b>8.50</b>	<b>14.65</b>	<b>21.8</b>

The basis of profitability calculation:

The growth of selling capacity will be increased 10% per year. (This is assumed by various analysis and study, it can be increased according to the selling strategy.)

Energy Costs are considered at Rs 7 per Kwh and fuel cost is considered at Rs. 65 per litre. The depreciation of plant is taken at 10-12 % and Interest costs are taken at 14 -15 % depending on type of industry.

## 15. BREAKEVEN ANALYSIS:

The project shall reach cash break-even at 48.42 % of projected capacity as detailed below:

Sr. No.	Particulars	UOM	Value
1	Sales at full capacity	₹. In Lacs	75.00
2	Variable costs	₹. In Lacs	27.50
3	Fixed costs incl. interest	₹. In Lacs	26.90
<b>4</b>	<b>BEP = FC/(SR-VC) x 100 =</b>	<b>% of capacity</b>	<b>56.6%</b>

## **16. STATUTORY / GOVERNMENT APPROVALS**

As per the allocation of business rules under the Constitution, labour is in the concurrent list of subjects. It is dealt with by the MOLE at the Central and Departments of Labour under State Governments in respective States / UTs. The MOLE has enacted workplace safety and health statutes concerning workers in the manufacturing sector, mines, ports and docks and in construction sectors.

Further, other Ministries of the Government of India have also enacted certain statutes relating to safety aspects of substances, equipment, operations etc. Some of the statutes applicable in the manufacturing sector are discussed below :

### **The Static and Mobile Pressure Vessels (Unfired) Rules, 1981**

These (SMPV) Rules are notified under the Explosives Act, 1884. These rules regulate storage, handling and transport of compressed gases. These rules stipulate requirements regarding construction and fitments, periodic testing, location, fire protection, loading and unloading facilities, transfer operations etc. in respect of pressure vessels whose water capacity exceeds one thousand litres. These rules are enforced by the Chief Controller of Explosives under the Ministry of Industry and Commerce, Govt. of India (PESO).

### **The Manufacture, Storage and Import of Hazardous Chemicals Rules (MSIHC), 1989**

These MSIHC Rules are notified under the Environment (Protection) Act, 1986. These rules are aimed at regulating and handling of certain specified hazardous chemicals. The rules stipulate requirements regarding notification of site, identification of major hazards, taking necessary steps to control major accident, notification of major accident, preparation of safety report and on-site emergency plan; prevention and control of major accident, dissemination of information etc. These rules are notified by the Ministry of Environment and Forests (MOEF) but enforced by the Inspectorates of Factories of respective States / UTs in the manufacturing sector.

### **The Factories Act, 1948 and State Factories Rules**

The Factories Act, 1948 is very comprehensive legislation dealing with the matters of safety, health and welfare of workers in factories. The Act places duties on the occupier to ensure safety, health and welfare of workers at work. Some of the salient provisions of the Act include:

- Guarding of machinery
- Hoists and Lifts; Lifting Machines and Appliances
- Revolving Machinery
- Pressure Plant
- Excessive Weight
- Protection of Eyes
- Precautions against dangerous fumes, gases etc.
- Explosive or inflammable dust, gas etc.
- Precautions in case of fire
- Safety of buildings and machinery
- Permissible limits of exposure of chemical and toxic substances
- Entrepreneur may contact State Pollution Control Board where ever it is applicable.

## **17. BACKWARD AND FORWARD INTEGRATIONS**

Chemical companies often become integrated and undergo other activities outside the chemical industry. Increased competition prompts many companies to reduce supply chain costs by looking outside the chemical sector at suppliers and customers. While most companies within the chemicals sector primarily produce chemicals, some companies also conduct other manufacturing activities. The exact proportion of chemicals sector companies that are integrated with other sector activities is unknown, but many companies actively seek vertical integration. Many manufacturers pursue vertical integration to secure suppliers and customers for their products.

Mergers and acquisitions are a common way for companies to undertake new chemical ventures. By purchasing their chemical suppliers, some manufacturers secure future chemical feedstock for their products or other chemicals that they use in manufacturing. The company making the

purchase obtains valuable expertise and equipment. Some mining and petrochemical production is more cost-effective when integrated within a chemical company.

Energy and feedstock costs are often a significant expense for chemical companies. Integrating chemical production with activities that secure supplies of chemical feedstock and energy is relatively common as chemical companies grow. Chemical companies are located near mines, oil fields, ammonia factories and water supplies. This reduces transportation costs and increases the reliability of supplies by reducing the distance between feedstock and the factory.

Some companies, such as Sino-Coking Coal and Coke Chemical Industries Incorporated, own their mines. BHP Billiton operates a broad range of mines and is primarily a mining company. It does, however, also produce petrochemical feedstock for the chemical industry and therefore operates within the chemical industry as well. These companies technically operate within both the chemical and mining industries in their normal business operations.

Integrating a chemical company with other activities provides several direct benefits for the company and is becoming increasingly common. High energy costs necessitate greater control of energy resources and minimal reliance on expensive transportation. Chemical companies experience volatile profitability due to fluctuations in feedstock and energy expenses. Some companies control this volatility through careful supply chain management and by charging supply surcharges. Actively researching and developing alternative feedstock and energy supplies helps the company reduce costs.

Vertical integration supports these activities by eliminating redundant activities at multiple companies and increasing efficiency. By consolidating activity among multiple, similar operations, chemical companies achieve cost savings that contribute to higher profitability. End products are often very profitable, and some chemical companies purchase their former customers to take advantage of the marked-up prices of products further along in the supply chain.

Integration may become more common for many chemical companies as competition strengthens and traditional feedstock becomes more expensive. Market demand for chemical

feedstock increases as emerging market economies grow and result in increased consumer spending around the world.

## **18. TRAINING CENTERS AND COURSES**

There is no such training required to start this business but, basic chemical bachelor's degree is plus point for enterpriser. Promoter may train their employees in such specialized institutions to grow up the business. There are few specialised Institutes provide degree certification in chemical Technology, few most famous and authenticate Institutions are as follows:

- Department of chemical LD college of engineering  
No.120, Circular Road, University Area, Navrangpura,  
Opposite Gujarat University, Ahmedabad, Gujarat 380015
- MIT College of chemical Engineering, **Pune**  
Gate.No.140, Raj Baugh Educational Complex,  
Pune Solapur Highway,  
Loni Kalbhor, Pune – 412201  
Maharashtra, India

Udyamimitra portal (link: [www.udyamimitra.in](http://www.udyamimitra.in)) can also be accessed for handholding services viz. application filling / project report preparation, EDP, financial Training, Skill Development, mentoring etc.

Entrepreneurship program helps to run business successfully is also available from Institutes like Entrepreneurship Development Institute of India (EDII) and its affiliates.

### **Disclaimer:**

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no

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