

ALUMINIUM & ALUMINA



Indian Minerals Yearbook 2022

(Part- II :Metals and Alloys)

61st Edition

ALUMINIUM AND ALUMINA

(ADVANCE RELEASE)

**GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES**

Indira Bhavan, Civil Lines,
NAGPUR – 440 001

PHONE/FAX NO. (0712) 2565471
PBX : (0712) 2562649, 2560544, 2560648
E-MAIL : cme@ibm.gov.in
Website: www.ibm.gov.in

February, 2024

1 Aluminium and Alumina

Aluminium Industry in India is strategically well-placed and is one of the largest producers in the world with discernible growth plans and prospects for the future. India's rich bauxite mineral base renders a competitive edge to the industry as compared to its counterparts globally. The Indian Aluminium Industry scaled lofty notches since the establishment of the first manufacturing company, namely, Indian Aluminium Company (INDAL) in 1938. In 2004, all business activities of INDAL have been merged subsequently with Hindalco Industries Limited (Hindalco).

Four major primary producers, National Aluminium Co. Ltd, Hindalco Industries Ltd, Bharat Aluminium Co. Ltd and Vedanta Aluminium Ltd (VAL) are at the forefront in aluminium production. The primary producers have a strong presence in the sheet business and are enlarging their roles in the foil segment. The primary producers are also in the extrusion segment in which a large number of secondary manufacturers participate with fragmental capacities.

The overall total annual installed capacity of aluminium plants in the country has decreased to 41.45 lakh tonnes from 41.65 lakh tonnes in previous year. The production of aluminium comes from the plants viz, NALCO, HINDALCO, BALCO, & VEDANTA. Producer-wise capacity of aluminium is furnished in (Table-1).

The installed capacity of alumina plants in the country was 74.75 lakh tpy. Producer-wise capacity of alumina is furnished in (Table-2).

PRODUCTION

Aluminium

The production of aluminium at 4016 thousand tonnes in 2021-22 registered an increase of 11% as compared to that in the previous year. Seven plants reported production of aluminium during the year. (Tables - 3 & 4).

Table – 1: Installed Capacity of Aluminium (By Producers)

		(In '000 tonnes)
Producer	Plant	Annual capacity
Total		4145
Public Sector		
National Aluminium Co. Ltd	Angul (Odisha)	460
Private Sector		
Bharat Aluminium Co. Ltd	Korba (CG) - I	590
	Korba (CG)- II	
Hindalco Industries Ltd	Aditya (Odisha)-	1345
	Hirakud (Odisha)-	
	Mahan (M.P) -	
	Renukoot(U.P) -	
Vedanta Aluminium Ltd	Jharsuguda-I (Odisha) -	1750
	Jharsuguda-II (Odisha) -	

Source: Information received from the companies/Annual Reports.

Table – 2: Installed Capacity of Alumina (By Producers)

		(In '000 tonnes)
Producer	Plant	Annual capacity
Total		7475
Public Sector		
National Aluminium Co. Ltd	Damanjodi (Odisha)	2275
Private Sector		
Bharat Aluminium Co. Ltd	Korba (Chhattisgarh)	200 [#]
Hindalco Industries Ltd	Renukoot -	3000
	(Uttar Pradesh)	
	Belagavi -	
	(Karnataka)	
	Muri -	
	(Jharkhand)	1500
	Utkal Alumina -	
	(Odisha)	
Vedanta Aluminium Co. Ltd	Lanjigarh (Odisha)	2000

Source: Information received from the companies/Annual Reports.

ALUMINIUM & ALUMINA

**Table – 3: Production of Aluminium
2019-20 to 2021-22**

(Quantity in tonnes; Value in ₹ '000)

Year	Production	
	Quantity	Value
2019-20	3635089	455960160
2020-21	3619237	415967702
2021-22 (P)	4016621	714320466

**Table – 4: Production of Aluminium
2020-21 and 2021-22
(By Plants)**

(In tonnes)

Producer	Plant	Production	
		2020-21	2021-22 (P)
National Aluminium Co. Ltd	Angul	418522	460020
Hindalco Industries Ltd	Aditya	355881	365466
	Hirakud	154126	172071
	Mahan	356354	367168
Bharat Aluminium Co. Ltd	Renukoot	362587	389470
	Korba	565112	580426
Vedanta Aluminium Ltd	Jharsuguda	1403271	1682000

Alumina

The production of alumina at 5208 thousand tonnes in 2021-22 increased by 7% as compared to that in the previous year. NALCO continued to be the leading producer of alumina accounting for 41% of the total production during the year under review. (Tables-5 & 6).

**Table – 5: Production of Alumina(including Calcined alumina)
2019-20 to 2021-22**

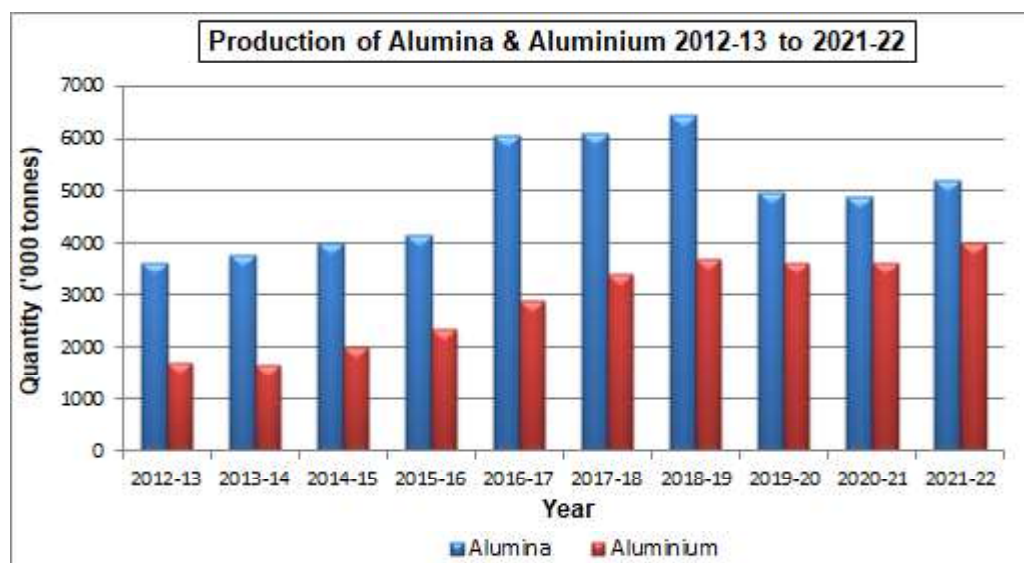
(Quantity in tonnes; Value in ₹'000)

Year	Production	
	Quantity	Value
2019-20	6670576	130410346
2020-21	6520842	118069838
2021-22(P)	7229508	159576853

**Table – 6: Production of Alumina
2020-21 and 2021-22
(By Plants)**

(In tonnes)

Producer	Plant	Production	
		2020-21	2021-22 (P)
National Aluminium Co. Ltd	Damanjodi	2202220	2110000
Hindalco Industries Ltd	Belagavi	253000	307600
	Muri	222126	262373
	Renukoot	511831	559717
Vedanta Aluminium Ltd	Utkal Alumina	1643000	2021908
	Lanjigarh	1688665	1967910



INDUSTRY

Aluminium is the fastest growing non-ferrous metal in India and the same is evident by its growing and widespread use. Most of the Aluminium Smelter are located near their respective alumina refineries. Ten aluminium smelters are operated by four companies viz. NALCO, BALCO, HINDALCO & VEDANTA. NALCO is the only company in the Public Sector with installed capacity of 4,60,000 tpy. BALCO, earlier a Public Sector company, is now under Private Sector. The aluminium plants of NALCO and BALCO have their alumina-aluminium complexes at Damanjodi-Angul (Odisha) and Korba (Chhattisgarh), respectively.

NALCO is one of the largest integrated Bauxite-Alumina-Aluminium- Power Complex in the country. The Company has 4,60,000 tpy, Aluminium Smelter at Angul and 22,75,000 tpy Alumina Refinery located at Damanjodi in Koraput, Odisha.

Hindalco Aluminium smelting operations are located at Renukoot (Uttar Pradesh), Aditya Aluminium (Odisha), Mahan Aluminium (Madhya Pradesh) and Hirakud (Odisha). Newly installed smelters at Aditya Aluminium and Mahan Aluminium have state-of-the-art AP36 technology. The Hindalco's total primary aluminium (metal) capacity has enhanced to around 13,45,000 tpy from earlier capacity of 5,62,000 tpy. This increase was primarily on account of production from Mahan and Aditya smelter commissioned during the year 2014-15. In addition to aluminium, Renukoot Integrated Aluminium Complex also produces semi-fabricated products viz. conductor redraw rods, sheet, extrusion, etc. The Alupuram (Kerala) smelter is closed but extrusion unit currently operates at a capacity of 8,000 tpy.

Hindalco's plants are equipped with sophisticated rolling mills and finishing equipment. The plants are located at Hirakud (Odisha), Belur (West Bengal), Mouda (Maharashtra), Renukoot (Uttar Pradesh) & Taloja (Maharashtra). Hindalco's finished products include, alumina, primary aluminium in the form of ingots, billets & wire rods, value-added products, such as, rolled products, extrusion and foils. Hindalco is the largest manufacturer of entire range of Flat Rolled Products. Flat Rolled Products facilities at Hirakud (Odisha) and Mouda (Maharashtra) are being modernised to

produce world class Can Body stock and Ultra Thin Gauge Foils, respectively. The Hirakud plant produces Flat Rolled Products (FRP), rolled products, extrusions products and wire rods. Hindalco has a conductor redraw capacity of 56,400 tpy at Renukoot plant and sheet rolling capacity of 2,05,000 tpy spread over at Renukoot (80,000 tpy), Belur (45,000 tpy), Taloja (50,000 tpy) and Mouda (30,000 tpy) plants. The Company also has two plants for aluminium extrusion with capacity of 31,000 tpy comprising units at Renukoot with 23,000 tpy capacity and Alupuram (Kerala) with 8,000 tpy capacity.

Hindalco's foil unit located at Silvasa (Dadra & Nagar Haveli) has an installed capacity of 30,000 tpy and produces foils with thickness varying from 9 microns to 200 microns. Kollur plant in Medak district (Andhra Pradesh) has capacity of 4,000 tpy and produces an array of high-quality foils, from cigarette and blister foil to lidding foil in thicknesses from 50 to 7 microns.

The overall BALCO's smelter capacity augmented to 5,90,000 tpy with the commissioning of Korba-II smelter has capabilities to produce ingots, wire-rods billets, bushbars and rolled products. The Korba-I plant showed consistent production during the year. The Company has two power plants for commercial power generation of which one produces power for captive consumption, refining, smelting, fabrication, etc. and the other 1,200 MW power plant is under construction. The ramp up of BALCO-II smelter was completed during the year 2018.

With the ramping up of the Jharsuguda-II smelter with capacity of 1.25 million tpy, the total smelter capacity of Vedanta in Odisha, has been enhanced to 1.75 million from 50,000 tpy capacity. MALCO is under care and maintenance by Vedanta since May, 2017. It generates 100 MW power from 4 units of 25 MW each through power plants located at Mettur (Tamil Nadu), and is one of the largest Private Sector power suppliers in Tamil Nadu.

Jindal Aluminium Ltd (JAL) established its factory for manufacture of aluminium extrusion in the year 1968 at Bengaluru. JAL has 11 aluminium extrusion presses with an installed capacity of 1,20,000 tpy. The Company is the leader in aluminium extrusions, meeting country's about 30% demand.

ALUMINIUM & ALUMINA

JAL has taken a step forward by diversifying into Aluminium rolled products. Jindal commissioned the state-of-the-art Aluminium sheet and foil manufacturing facility with installed capacity of 40,000 tpy, at Dabaspet, Bengaluru, 35 km from the

existing extrusion plant. The information on installed capacity of Aluminium semis by different plants is furnished in (Table-7).

Table – 7: Capacity for Aluminium Semis

Producer/product	Annual installed capacity
HINDALCO INDUSTRIES LTD	
Rolled product	205000
Extruded products	31000
Conductor redraw rods	56400
Aluminium foils	40000
Aluminium wheels (No. of pieces)	-
NALCO	
Aluminium wire rods	100000
Aluminium billets	30000
Aluminium strips (smelter)	26000
Aluminium strips (RPU)	52000
Rolled products	45000
MALCO	
Rolled products	12000
Properzi rods	36000
Bus bars-Aluminium wire rods	32850
BALCO	
Extruded products	8000
Rolled products	72500
Properzi rods	111500
Foil product	600
Conductors	1200
Aluminium wire rods	43200
JINDAL ALUMINIUM LTD	
Aluminium Extruded products	128000
Foil product	40000

Source: Information received from individual plants/Annual Reports.

DEVELOPMENT & EXPANSION

National Aluminium Company Limited (NALCO): NALCO is in the process of setting up of 5th Stream expansion of its existing Alumina Refinery which would reportedly add 10.0 lakh tonnes to its existing installed capacity of 22.75 lakh tonnes per year (total capacity 32.75 lakh tonnes). This expansion would be based on improved Medium Pressure Digestion technology of M/s Rio Tinto Alcan International Limited (RTAIL).

Sourcing of bauxite for 5th Stream expansion of alumina refinery has been envisaged from Pottangi Bauxite Mines. The availability of bauxite from Pottangi Mines is expected beyond the scheduled commissioning of 5th Stream expansion. Hence, sourcing of bauxite from South Block of Panchpatmali Mines has been planned through setting up of a crushing & conveying system.

The Pottangi Bauxite mine (75 million tonnes) has been reserved by Government of India in favour

of NALCO for meeting the bauxite requirement of 1 million tonnes alumina refinery under expansion. The mining plan has already been approved. The pre-project activities are underway. The mine is likely to be operational in the 4th quarter of financial year 2023-24.

Mining Lease of Utkal-D coal block has been granted by the Govt of Odisha over an area of 301.28 Ha and the lease is executed on 25.03.2021 thereafter Utkal coal block will be operationalised after obtaining of statutory clearances.

NALCO, a JV Company Mishra Dhatu Nigam Ltd (MIDHANI) named Utkarsha Aluminium Dhatu Nigam Ltd (UADNL) in August 2019 for establishment of 60,000 TPA for setting up of High End Aluminium Alloy Plant in JV mode for Defence, Aerospace & Automobile Sectors. The plant is expected to be commissioned by financial year 2024-25. The Company has formed JV with Neelachal Ispat Nigam Ltd (NINL) to set up a Coal Tar Distillation plant of 20,000 TPA based on the Coal Tar generated in NINL's Coke Oven Plant.

NALCO and Odisha Industrial Infrastructure Development Corporation (IDCO) have formed a JV Company for establishment of Angul Aluminium Park Pvt. Ltd (AAPPL) for promotion of downstream industries in the State of Odisha. The project is expected to be completed by financial year 2021-22.

HINDALCO : In the field of aluminium, Hindalco operates in primary aluminium and downstream aluminium segments and is one of the world's largest integrated aluminium producer. Hindalco's subsidiary Novalis with 61% recycling capability, is the largest aluminium recycler and producer of rolled aluminium products in the world. Hindalco launched India's first indigenous lightweight and eco-friendly aluminium bulker in India. This bulker saves up to 13,000 litres of fuel, generates 20 tonnes lower GHGs and is BS-VI compliant.

Hindalco is planning to expand its Aluminium downstream business with a focus on Value added product over the next 3-7 years. Products would cater to customised requirement for varied and complex applications of Aluminium. We plan to invest around ₹ 8,000-10,000 crore in expanding flat rolling capacity at Hirakud, new extrusion plant at Silvassa and in a greenfield site at Mundra with a recycling facility.

The Hirakud plant capacity for flat rolled products is estimated to be 340 KTPA. The planned capacity of the extrusion plant at Silvassa is 34 KTPA, which would have three extrusion presses to service premium customers in building and construction, automobile and transport, electrical, consumer and industrial good sectors. In addition, the new extrusion and recycling unit at Mundra is awaiting land acquisition process and would have a capacity of 93 KTPA.

VEDANTA : Vedanta Aluminium Ltd (VAL) is the largest aluminium producer in India with a capacity of 1.75 million tonnes per annum. The aluminium smelting unit at Jharsuguda has come a long way to establish itself as the world's largest single-location smelter. With an already installed capacity of 1.75 mtpa, backed by two smelters – 0.5 million tonnes per annum and 1.25 million tonnes per annum (SEZ) and two power plants with a combined capacity of 3,615 MW, which is over 1.3 million tonnes per annum. It could be achieved further by scaling up to the production capability of the smelter and the refinery has been significantly enhanced in the last few years. With the ramp up of both smelters, production of aluminium has increased during the last couple of years. Similarly, production of Alumina has also increased due to debottlenecking of the refinery operations. The bauxite requirements for alumina refinery are met from captive mines, domestic source and imports.

BALCO operates through its plant at Korba in Chhattisgarh with a smelter capacity of 0.57 million tonnes per annum and power generation capacity of 2,010 MW. The state-of-the-art alumina refinery at Lanjigarh feeds the aluminium smelters at Jharsuguda and BALCO and forms a crucial link in the value chain. It is one of the world's largest one-site integrated alumina refining complexes with a current capacity of 2 million tonnes per annum that can be ramped up to 5 million tonnes per annum.

USES

Aluminum is the second most used metal in the world after steel. Aluminium is more environment-friendly than steel, plastic and other materials. The metal that made flying possible, is sustainable, light and energy efficient. Aluminium has widespread uses throughout the economy and is equally important to both the industrial and consumer sectors. Aluminium is used in the Aerospace Industry as well as other

industries requiring light metal. On the industrial side, aluminium is heavily used in electrical power transmission, machinery & equipment and construction. Aluminium usage in automobiles is rising and is expected to increase internationally. India's auto sector consumes about 4% aluminium. Over the past five years considerable progress has been made in aluminium-intensive vehicle production.

Housing, in particular, make heavy use of the lightweight material as a substitute for steel and wood in doors, windows and sidings. Aluminium is also used in a variety of retail products including cans, packaging, air conditioners, furniture and automobile. In addition, India has pioneered the replacement of copper by aluminium in power transmission & distribution which has enhanced the demand for aluminium. There are nearly 600 cable and conductor manufacturing units in the country, having a total capacity of about 4,00,000 tpy. The major end-use of aluminium is as rolled sheets, extrusions and foils. India Foils, Pennar Aluminium and Century Extrusions are the major players in the extrusion & foil market.

CONSUMPTION

Key sectors to drive aluminium consumption in India are Auto, Power, Electronics, Railways, Aerospace & Defence Construction, Solar Energy and Aluminium packaging.

China was the largest producer as well as consumer during the year, contributing about 57% share of the world production (36.15 million tonnes) and 55% of the world consumption (35.71 million tonnes) of aluminium. The world excluding China is expected to see aluminium consumption growth of around 1% in the year 2019 from around 2% in the year 2018 due to likely moderation in demand from North America and Europe.

In India, the power, packaging, transport, construction, machinery and equipment sectors are key demand drivers of aluminium. The domestic imports of aluminium products, including scrap, are growing significantly, which is a major concern for the domestic aluminium producers. In advanced economies, aluminium is increasingly replacing wood and steel in Building Sector. Aluminium cans and containers are used extensively, world over. Aluminium is also the ideal packaging material for pharmaceuticals and processed foods.

In India, aluminium was consumed mainly in the Electrical sector (48%), followed by Automobile & Transport sector (15%), Construction (13%), Consumer Durables (7%), Machinery & Equipment (7%), Packaging (4%) and others (6%). In the Electrical sector, aluminium usage is in overhead conductor, and power cable used in generation, transmission and distribution of electricity. Aluminium is also used in switchboards, coil windings, capacitors, etc.

As per Technology Vision Document 2035, the per capita consumption of aluminium in India is among the lowest in the world with only 2.2 kg as compared to the world average of roughly 8 kg and with that of the developed nations which is 22-25 kg.

Alumina is produced from bauxite. About one tonne of alumina is produced from 3 to 3.5 tonnes of bauxite and about one tonne of aluminium is produced from about two tonnes of alumina.

RESEARCH & DEVELOPMENT

The Hindalco's Research & Development (R&D) activities are focused on providing innovative, cost-effective and sustainable solutions to support consistent growth of business. The R&D activities include process, product and application development, to develop short-term as well as long-term solutions to the issues faced by Non-ferrous sector, such as, raw material quality, new product development, cost-effective management of waste generated during processing, recovery of values from by-products as well as any waste products, developing better understanding of the science of processes, reducing the specific energy consumption & carbon footprint etc.

Hindalco operates three Hindalco Innovation Centres (HIC) (i) HIC–Alumina at Belagavi, Karnataka, undertakes specialised works on R&D of bauxite ore, alumina refining and specialty alumina, hydrate products as well as waste management; (ii) HIC–SemiFab located at Talaja, near Mumbai, Maharashtra, handles projects in the areas of tribology, metallurgy related to aluminium fabricated products and new applications and modelling; (iii) Innovation Centre at HIC–Copper at Birla Copper, Dahej, has its focus on maximisation of copper recovery as well as recovery of various metal values,

such as, selenium, tellurium, nickel, bismuth etc. from the effluent generated in the plant.

The R&D activities undertaken at Hindalco during the year include (i) Developing a superior Aluminium – Jute packaging material by combing aluminium foil with jute. Aluminium foils are impervious to moisture, bacteria and gases while jute is an environment-friendly natural material with elastic properties. (ii) Aluminium foil for Li-ion batteries–Hindalco developed aluminium foils which can be used for the packaging of Lithium-ion (Li-ion) batteries. These foils are approved by the Indian Space Research Organisation (ISRO) and the Automobile Research Association of India (ARAI). These foils are expected to reduce the use of plastic in the manufacturing of Li-ion batteries and increase battery life.

NALCO is exploring to set up world class, state-of-the-Art research and development centre in the field of bauxite, alumina, aluminium, downstream products, power, waste utilisation and in other allied areas. Some of the in-house R&D activities carried out by NALCO include R & D trial for Development of APz×No technology in smelter plant for DC energy reduction in electrolysis process successfully completed in 30.01.2021 against MoU 2020-21.

The five ongoing Research & Development projects sponsored by Ministry of Mines (SSAG) at JNARDDC, Nagpur, are as follows (i) Nano Processing of Industrial Rejects for use as additives in Mixdesigns for improved pozzolanic reaction efficiency with VNIT (ii) Fabrication of Advanced Ceramic Nano-coatings for Automotive Applications with Christ University (iii) Techno-economic Survey of Aluminium Scrap Recycling in India with MRAI (Metal Recycling Association of India) (iv) To study the fire retardancy of nano-ATH in polymers with CIPET (Central Institute of Plastics & Engineering Technology) (v) Bench-scale study on extraction of pure Silica and smelter grade Aluminium Fluoride from Coal Fly Ash (CFA)– S&T (Mines).

RECYCLING

Aluminium is 100% recyclable and consumes 95% less and releases 95% less greenhouse gases as compared to primary aluminium and there is no loss of properties or quality during the recycling

process. Products of aluminium, such as, UBC (Used Beverages Can), aluminium foils, plates and automotive components can be easily recycled, thereby, saving energy and reducing greenhouse emissions. Aluminium recycling process is less capital intensive than primary metal production as the process requires only 5% of energy, i.e., 13–15 thousand units of power for producing one tonne of aluminium through primary route. Recycling of aluminium saves about 6 kg of bauxite/kg and 14 kWh of electrical energy /kg of primary aluminium. Besides, it keeps the emission levels of greenhouse gases as low as 5% from the actual emission experienced during primary production. Further, recycling facilitates reduced stress on the use of bauxite and thereby preserving about six lakh tonnes of bauxite resources every year.

India's metal recycling rate is about 25%. Altogether the rise in aluminium production from old scrap has grown from one million tonnes in 1980 to 20 million tonnes in 2019. All the activity related to aluminium scrap recovery are limited to the Unorganised sectors, catering mostly to the utensil and casting industries. The proportion of recycled aluminium has been increasing over the years. It is expected that in the years to come, it will reach a figure of about 35–40% of total aluminium consumption. Currently, there is only one recycling unit of Hindalco in the Organised Sector at Talaja with 25,000 tonnes annual capacity. Although the plant at Talaja was facing challenges due to less availability of scrap, the production from the unit has improved and the plant is now operating at 80% of the rated capacity as against earlier capacity of 60%. Hindalco is planning to set up greenfield recycling unit at Mundra with a capacity of 93 KTPA.

Most recycling units in India operate on outdated, or primitive technology which leads to high levels of pollution and energy consumption. This is an area that needs to be addressed by the Indian Aluminium Industry. Due recognition of recycling could encourage users of aluminium particularly in transport, housing, packaging and durable sectors to broaden the organised markets for the scrap generated.

WORLD REVIEW

World production of alumina was 140 million tonnes in 2021. China continued to be the leading

producer with a share of about 55% which is followed by Australia (14%), Brazil (7%), India (5%) and Russia (2%) & UAE (2% each). World production of aluminium was at 67 million tonnes in 2021. China continued to be the leading producer with a share of about 57% which is followed by Russia, (5%), India (5%) & Canada (5%). (Tables-8 & 9).

To provide a generalised view of the development in various countries, the countrywise description source from latest available publication of Minerals Yearbook 'USGS-2018' is furnished below:

Australia

Production of aluminium showed a marginal decline in Australia in 2019 compared with that in 2017. The increase was attributed to the restart of capacity in 2017 at the Portland, Victoria, smelter; production increased by 46% compared with that in 2017. On January 19, 2017, capacity that was shut down after a power failure on 1st, December 2016, was restarted at the 3,85,000-t/yr smelter. By mid-October 2017, the smelter was producing at 85% of its capacity, the same rate as before the shutdown. The smelter was a joint venture of Alcoa of Australia Ltd (55%), CITIC Nominees Pty. Ltd (22.5%), and Marubeni Aluminium Australia Pty. Ltd (22.5%). Alcoa of Australia was owned by Alcoa (60%) and Alumina Ltd (40%).

Bahrain

Aluminium Bahrain B.S.C. (Alba) continued construction on a sixth potline that would have a capacity of 5,40,000 t/yr when completed in 2019. The project also included an expansion of Alba's captive powerplant. Production from some pots started in December, and full ramp-up of the new capacity was scheduled for 2020. The project would increase the smelter's capacity to 1.5 million metric tons per year from 9,60,000 t/yr.

Brazil

Primary aluminium production decreased by 18% as compared with that in 2017. In April, Norsk Hydro temporarily shut down 2,30,000 t/yr of capacity at the 4,60,000-t/yr Albras aluminium smelter in Barcarena, citing a shortage of alumina. In March,

Norsk Hydro temporarily shut down one half of the capacity at the adjacent 6.3-Mt/yr Alunorte alumina refinery, citing high water levels in the red mud impoundment after heavy rainfall. The Albras smelter, a joint venture between Norsk Hydro (51%) and Nippon Amazon Aluminium Co. Ltd (49%), would return to full production once the Alunorte refinery resumed full production.

In July, the Government extended the elimination of a 6% tariff on unwrought primary aluminium imports through the end of June 2019. A quota of 2,82,500 t of unwrought primary aluminium would be permitted to be imported without payment of the tariff. Since 2014, the Government has eliminated the 6% tariff on imported aluminium for a limited amount of metal during a specific time, citing the shutdown of smelting capacity caused by high power prices. The most recent quota was for 1,73,000 t of primary aluminium imports from July 1, 2017, through 30th June 2018. The elimination of the tariff caused prices in Brazil to decrease even though the capacity at the Albras smelter was shut down in April.

Novelis was planning to expand the secondary smelting and rolling capacity in Pindamonhangaba. Smelting capacity would increase to 4,50,000 t/yr from 3,90,000 t/yr, and rolling capacity would increase to 6,80,000 t/yr from 580,000 t/yr. The mill produced beverage can sheet and other aluminium packaging products from UBCs and other scrap. The project was scheduled to start in February 2019 and was scheduled for completion in 2021.

China

Primary aluminium production in 2018 was 35.8 Mt, 11% more than the 32.3 Mt in 2017. Aluminium production increased from an average rate of 98,200 metric tons per day (t/d) in the first quarter of the year to 1,02,000 t/d for the remainder of the year. Smelters in 31 cities, mainly in the eastern and central Provinces, shut down 30% of their capacity from 15th November, 2017, until 15th March, 2018. The Government cited winter pollution control efforts for ordering the shutdown of capacity at primary aluminium smelters, alumina refineries and powerplants. When the restrictions on production

expired, some of the capacity affected by the policy was restarted. At the end of the year, the Government instituted a similar production cut from 5th October, 2018, to 31st March, 2019, to reduce pollution during the winter. The policy required aluminium smelters and alumina refineries to close 30% of their capacity and carbon anode plants to close 50% of their capacity. The policy applied to facilities in 26 cities. In order to contain smelter capacity, the Government had implemented a capacity replacement quota system in recent years. To expand capacity, companies were required to purchase capacity replacement quotas from companies that had shut down older, inefficient capacity. In the last quarter of the year, decreasing aluminium prices and increasing production costs were cited for capacity shutdown at several smelters throughout China. An estimated 3.2 Mt/yr of capacity was shutdown during the year for economic reasons.

Import restriction were cited for aluminum scrap imports declining by 28% as compared with those of the prior year. Scrap availability from domestic sources enough that secondary smelters did not need to import scrap, and imports were expected to decline in future years. China was considering a complete ban on imports of solid waste, including aluminium scrap, by 2021. Environmental concerns and goals to advance the domestic recycling industry were cited for the proposed ban on scrap imports.

Oman

Production increased by 50% compared with that in 2017 because capacity at the 3,75,000-t/yr Sohar smelter was restarted after a power failure on 4th August, 2017, resulted in a shutdown. Production was restarted in mid-September 2017, and the ramp-up was completed by April 2018. The Sohar smelter was a joint venture among Oman Oil Co. S.a.O.C. (40%), Abu Dhabi National Energy Co. PJSC (40%) and Rio Tinto (20%).

United Arab Emirates

Aluminum production increased slightly compared with that in 2017 because new capacity completed in 2016 was ramped-up. Emirates Global

Aluminium PJSC completed a modernisation and expansion project at the Jebel Ali smelter in October 2017.

The project replaced 520 smelting pots in two potlines with pots that were more energy efficient and produced fewer emissions of perfluorocarbons. Capacity of the smelter increased by 58,000 tpy.

Table – 8: World Production of Alumina (By Principal Countries)

(In '000 tonnes of Al ₂ O ₃ content)			
Country	2019	2020	2021
World: Total (rounded off)	131200000	134600000	140700000
China	71474166	73131946	77480000
Australia	20239198	120836304	20624088
Brazil	9170800	10185000	11171300
India ^{*(d)}	6706500	6624500	7325000
Russia	27550000	2873000	3054000
UAE	1100000	1920000	2300000
Saudi Arabia	1798340	1782041	1879000
Ireland	1860970	1822368	1878000
Ukraine	1690000	1725000	1800000
Spain	1595000	1553000	1536000
Other countries	12799824	12167385	11180265

*Source: BGS World Mineral Production, 2016-2020.
(d) Years ended 31st March following that stated
* During 2018-19, 2019-20 and 2020-21 India's production of alumina was 6,446, 6,670 and 6,520 thousand tonnes, respectively.*

FOREIGN TRADE

Exports

Export of alumina increased by 18% to 1,487 thousand tonnes in 2021-22 from 1,265 thousand tonnes in the previous year. Exports were mainly to UAE (50%), Oman (16%), China (9%) and Malaysia (6%).

Export of aluminium and alloy increased drastically by 46% to 3,454 thousand tonnes from 2,735 thousand tonnes. Exports in 2021-22 were mainly to Korea (15%), China (14%), Turkey (9%), USA (8%) and Greece. (Tables-10 to 12).

ALUMINIUM & ALUMINA
Table – 9: World Production of Aluminium (Primary)
(By Principal Countries)

(In '000 tonnes)

Country	2019	2020	2021
World: Total (rounded off)	62900000	65200000	67000000
China	35043604	37080401	38502600
Russia	3635089	3638000	3640000
India* ^(d)	3635089	3154493	3583800
Canada	2853771	2520000	3157762
UAE	2600000	1548000	1561222
Bahrain	1365005	1585017	1558529
Australia	1569591	1330000	1431000
Norway	1312000	1010563	1431000
Saudi Arabia	967000	1010563	998000
USA	1126032	1026217	907846
Other countries	880615	8703598	9095927

Source: BGS World Mineral Production, 2016-2020

(e) Years ended 31 March following that stated. # estimated

* During 2018-19, 2019-20 and 2020-21 India's production of aluminium was 3,696, 3,635 and 3,619 thousand tonnes, respectively.

Table – 10: Exports of Alumina
(By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1265941	28280781	1487035	47334417
UAE	706087	15048867	745938	22936746
Oman	183711	3891344	244982	8394532
China	69353	1658847	133323	4018156
Qatar	61208	1284659	30714	909852
Malaysia	61330	1203104	95678	2864082
Egypt	61683	1182271	92027	2953898
Taiwan	23266	921583	22700	941879
U K	30935	734852	31312	730576
Korea	14037	564754	18490	797254
Other countries	53496	1758538	39682	1891347

Figures rounded off

ALUMINIUM & ALUMINA

**Table – 11: Exports of Aluminium and Alloys Incl. Scrap
(By Countries)**

Country	2020-21 (R)		2021-22 (P)	
	Qty (ton)	Value (₹'000)	Qty (ton)	Value (₹'000)
All Countries	2735588	427759670	3454121	791688112
Korea	603730	79903721	544473	113328421
USA	160795	37510442	270434	82666048
China	219829	29862598	487586	94661686
Turkey	25514	4442749	320151	66426511
Mexico	77356	12689868	146144	30200871
Italy	28592	5005313	158098	36801783
Greece	66598	596608	159919	36386353
Japan	62609	8470779	118441	23606891
Netherlands	21300	4652293	127039	32504416
Croatia	2	1934	94334	21766254
Other countries	1469263	235623365	1027502	253338878

*Figures rounded off***Table – 12: Exports of Aluminium
(By Items)**

Item	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All items	2735588	427759670	3454121	791688112
Aluminium & Alloys : Unwrought	2324305	317093138	2932260	622444035
Aluminium Alloys Unwrought	240867	36269198	466857	107772630
Aluminium Ingots	2081831	280582856	2462842	514076586
Aluminium Unwrought Nes	1607	241084	2561	594819
Aluminium & Alloys : Worked	231811	45462208	308958	80005080
Aluminium & Alloys :Worked (Bars, Rods, Plates)	164374	28138974	221750	52848855
Aluminium & Alloys :Worked (Bars, Rods, Profiles)	47824	13330801	65170	21514780
Aluminium Worked (Bars, Rods, Profiles etc.)	19613	3992433	22038	5641445
Aluminium & Alloys, Worked, Nes	170757	63784997	199044	86361195
Aluminium & Scrap	5428	598217	9529	1604369
Aluminium Powders & Flakes	3287	821110	4330	1273433

Figures rounded off

ALUMINIUM & ALUMINA

Imports

Import of alumina increased by 9% to 2,549 thousand tonnes in 2021-22 from 2,334 thousand tonnes in the previous year. Imports were mainly from Australia (38%), Vietnam (27%), Indonesia (26%), China (3.6%) and Netherlands (1%).

Imports of aluminium & alloys including scrap also increased like alumina by 13% to 2,334 thousand tonnes in 2021-22 from 2,060 thousand tonnes in the previous year. The imports were mainly from USA(21%), China (11%), Malaysia (4%), UAE (8%), UK (8%), Saudi Arabia (7%) and Republic of Korea (2.4%) (Tables- 13 to 15).

**Table – 13: Imports of Alumina
(By Countries)**

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value ('000)	Qty (t)	Value ('000)
All Countries	2334786	57491719	2549567	82447635
Australia	1323262	30057614	957664	27069771
Indonesia	490792	10803369	654730	19029897
Vietnam	378634	8817322	682631	22554543
China	62128	3706946	92555	6313320
Netherlands	19710	972577	25074	1428683
Germany	5686	752942	7122	949584
U S A	3418	531390	4302	823975
Canada	3630	441073	3102	416853
Baharain	28092	302334	50774	672294
Other countries	18499	1098489	28362	1699986

Figures rounded off

**Table – 14: Imports of Aluminium Alloys Incl. Scrap
(By Countries)**

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value ('000)	Qty (t)	Value ('000)
All Countries	2060227	299126164	2334438	452887747
China	228165	54307692	250509	76342593
USA	332610	36918693	479644	72677925
U A E	181587	25032890	188607	36663829
Malaysia	127515	19415186	79672	15939942
UK	147742	16647921	179648	27522218
Saudi Arabia	128621	16357314	157267	29347969
Korea	51085	11663612	58355	16508772
Thailand	40730	8824410	53597	16521970
Baharain Is	53510	8042213	54589	12034735
Netherlands	76260	8196043	78386	11589611
Other countries	692402	93720190	754164	137738183

Figures rounded off

ALUMINIUM & ALUMINA

**Table – 15: Imports of Aluminium
(By Items)**

Item	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All items	2060227	299126164	2334438	452887747
Aluminium & Alloys:Unwrought	265121	39500561	213611	45666154
Aluminium Alloys Unwrought	36521	5567424	50835	10244963
Aluminium Ingots	224566	33335909	161124	35041224
Aluminium Unwrought Nes	4034	597228	1652	379967
Aluminium & Alloys:Worked	369440	83394272	390525	116853619
Aluminium & Alloys:Worked (Bars,Rods,Plates)	134777	29387734	126761	37013014
Aluminium & Alloys:Worked (Bars,Rods,Profiles)	191905	45018990	191905	71007555
Aluminium Worked(Bars,Rods,Profiles Etc)	42758	8987548	42758	8833050
Aluminium &Alloys,Worked,Nes	52537	27206116	52537	32363370
Aluminium & Scrap	1369546	148399920	1369546	257308920
Aluminium Powders & Flakes	3583	625295	3583	695684

Figures rounded off

FUTURE OUTLOOK

Aluminum is one of the most abundant metals found in the Earth's crust. In terms of weight, it accounts for nearly 8% of the earth's crust. The wide availability and numerous properties of aluminum make it a widely used metal across the world. Aluminum is used in various applications such as packaging, household products, electronics, and transportation.

It possesses several properties such as high conductivity, ease of recycling, and corrosion resistance; however, aluminum carries drawbacks such as moderate tensile strength and moderate machinability. This limits its direct usage in various end-user industries.

Aluminum is an ideal substitute for materials such as steel and iron, primarily due to its lower self-weight and high-strength properties. Prices of aluminum fluctuate primarily due to its application in several end-user industries.

Over the past few years, the metal has been used in combination with diverse alloying elements, including silicon, copper, magnesium, and zinc.

This combination helps in advancing the properties of aluminum, including high tensile strength, high fatigue strength, and high-temperature sustainability.

Alumina and Aluminium Market is expected to witness significant growth in the coming years, primarily driven by the growing demand for (Refractory, Metallurgy and Other). Based on the type, the market can be segmented into 6 (Metallurgical Grade, Refractory Grade, Grinding Grade, Cement Grade, Other). As per Research and Markets report the Aluminum Furniture Market is projected to reach USD 101.03 billion by 2030 from USD 63.13 billion in 2022, at a CAGR of 6.05% during the forecast period.