

ALUMINIUM & ALUMINA



Indian Minerals Yearbook 2020

(Part- II :Metals and Alloys)

59th 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

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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 remained same at 41 lakh tonnes and remained unchanged for three consecutive years, i.e, 2017-18 to 2019-20. The production of aluminium comes from the plants viz, NALCO, HINDALCO, BALCO, & VEDANTA whereas the MALCO plant remained non-operational during the year 2019-20. Producer-wise capacity of aluminium is furnished in Table-1.

The installed capacity of alumina plants in the country was 75.60 lakh tpy. However, the operational capacity was 72.75 lakh tpy and plant capacity of 2.85 lakh tpy remained non-operational. Producer-wise capacity of alumina is furnished in Table-2.

PRODUCTION

Aluminium

The production of aluminium at 3,635 thousand tonnes in 2019-20 registered an decrease of 2% 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, 2019-20 (By Producers)

		(In '000 tonnes)
Producer	Plant	Annual capacity
Total		4100
Public Sector		
National Aluminium Co. Ltd	Angul (Odisha)	460
Private Sector		
Bharat Aluminium Co. Ltd	Korba (CG) - I 245	570
	Korba (CG)- II 325	
Hindalco Industries Ltd	Aditya (Odisha)- 360	1280
	Hirakud (Odisha)- 215	
	Mahan (M.P) - 360	
	Renukoot(U.P) - 345	
Madras Aluminium Co. Ltd	Mettur (Tamil Nadu)	40 [#]
Vedanta Aluminium Ltd	Jharsuguda-I (Odisha) - 500	1750
	Jharsuguda-II (Odisha) - 1250	

*Source: Information received from the companies/Annual Reports.
MALCO has closed its smelter since December, 2008.*

Table – 2: Installed Capacity of Alumina, 2019-20 (By Producers)

		(In '000 tonnes)
Producer	Plant	Annual capacity
Total		7560
Public Sector		
National Aluminium Co. Ltd	Damanjodi (Odisha)	2275
Private Sector		
Bharat Aluminium Co. Ltd	Korba (Chhattisgarh)	200 [#]
Hindalco Industries Ltd	Renukoot - 700	3000
	(Uttar Pradesh)	
	Belagavi - 350	
	(Karnataka)	
	Muri - 450	
	(Jharkhand)	
	Utkal Alumina - 1500	
	(Odisha)	
Madras Aluminium Co. Ltd	Mettur (Tamil Nadu)	85 [#]
Vedanta Aluminium Co. Ltd	Lanjigarh (Odisha)	2000

Source: Information received from the companies/Annual Reports.

Plants remained non-operational during the year.

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**Table – 3: Production of Aluminium
2017-18 to 2019-20**

(Quantity in tonnes; Value in ₹ '000)

Year	Production	
	Quantity	Value
2017-18	3400618	430308076
2018-19	3696181	528227924
2019-20 (P)	3635089	455960160

**Table – 4: Production of Aluminium
2018-19 and 2019-20
(By Plants)**

(In tonnes)

Producer	Plant	Production	
		2018-19	2019-20 (P)
National Aluminium Co. Ltd	Angul	437961	408410
Hindalco Industries Ltd	Aditya	361770	365733
	Hirakud	166718	171160
	Mahan	357118	363327
Bharat Aluminium Co. Ltd	Renukoot	409058	413752
	Korba	571480	565112
Vedanta Aluminium Ltd	Jharsuguda	1392076	1347595

Alumina

The production of alumina at 6,670 thousand tonnes in 2019-20 increased by about 3.40 % as compared to that in the previous year. NALCO continued to be the leading producer of alumina accounting for 32% of the total production during the year under review (Tables-5 & 6).

**Table – 5: Production of Alumina(including
Calcined alumina)
2017-18 to 2019-20**

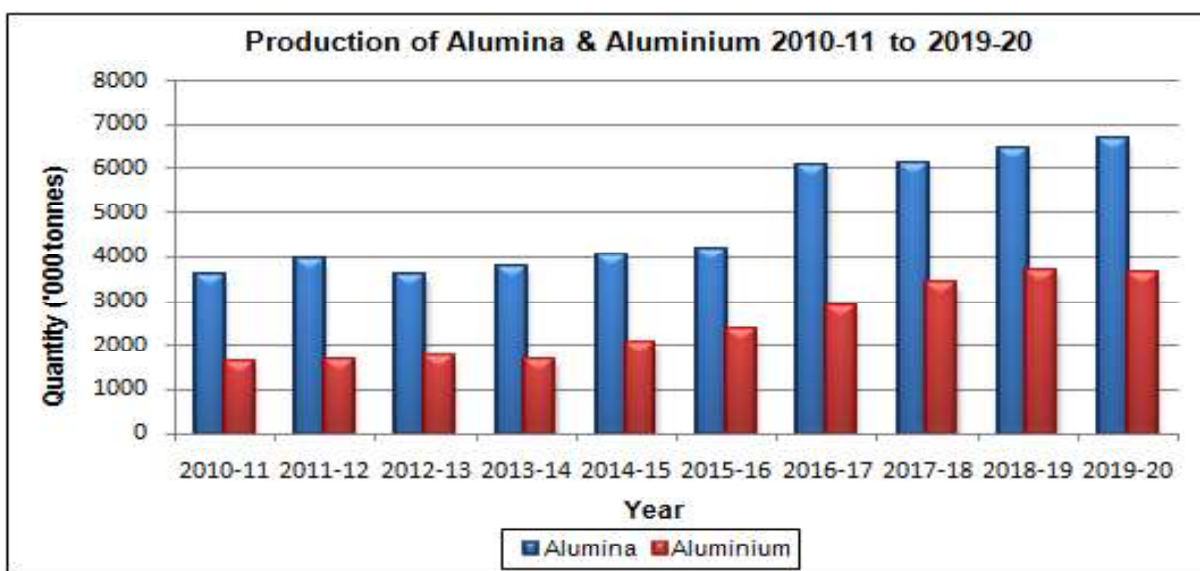
(Quantity in tonnes; Value in ₹'000)

Year	Production	
	Quantity	Value
2017-18	6119449	119895282
2018-19	6446370	153674440
2019-20(p)	6670576	130610346

**Table – 6: Production of Alumina
2018-19 and 2019-20
(By Plants)**

(In tonnes)

Producer	Plant	Production	
		2018-19	2019-20 (P)
National Aluminium Co. Ltd	Damanjodi	2107000	2103500
Hindalco Industries Ltd	Belagavi	312300	285600
	Muri	286915	87663
	Renukoot	685885	690611
Vedanta Aluminium Ltd	Utkal	1553600	1692500
	Lanjigarh	1500670	1810702



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 13,00,000 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 Silvassa (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 5,70,000 tpy with the commissioning of Korba-II smelter with 3,25,000 tpy capacity, has capabilities to produce ingots, wire-rods billets, bushbars and rolled products. The Korba-I plant with 2,45,000 tpy capacity 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, a Vedanta Group Company, has not reported production of alumina and aluminium in 2018-19. 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

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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. 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
(In tonnes)	
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 undertaking 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.

NALCO plans for brownfield expansion of Smelter at Angul by adding a 5th Potline (5 lakh tonnes)

and upgradation of pot amperage of existing 4 Potlines from 180 KA to 220 KA (1 lakh tonnes) along with expansion of Captive Power Plant by addition of 2 units of 660 MW each or any other configuration.

NALCO has also prepared a detailed Project Report (DPR) for establishment of Aluminium Downstream Projects in Kamakhyanagar block of Dhenkanal district in Odisha.

Mining Lease of Utkal-D coal block has been granted by the Govt of Odisha over an area of 301.28 Ha and 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) for setting up of High End Aluminium Alloy Plant in JV mode for Defence, Aerospace & Automobile Sectors. 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.

The Company is in process of augmenting its wind power generation capacity from 198.40 MW to 223.90 MW by adding another wind power project of capacity 25.5 MW at Kayathar, Tamil Nadu.

The Company has plans to expand its manufacturing base in Wire Rod segment. With this objective, Alloy Wire Rod manufacturing facility of 60,000 tonnes per year of EC grade Aluminium Wire Rod or 40,000 tonnes per year Aluminium alloy wire rod at 100% utilisation have been planned.

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.

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's plans to expand alumina refinery capacity at Belagavi from 3.5 lakh tonnes per annum to 6.5 lakh tonnes per annum have been put on hold, pending Government's approval relating to bauxite mines. Hindalco's three greenfield projects are well on their way towards full capacity utilisation.

Hindalco won back the Krishnashila coal linkage of 3.1 million tonnes per annum auction conducted in 2018. Currently, three captive mines – Gare Palma IV/4, Gare Palma IV/5 and Kathautia – are fully operational. The captive mine at Dumri is in the process of obtaining necessary statutory clearances and is expected to be operational in the year 2019-20. The Company is also developing a coal mine for captive consumption jointly with Mahanadi Coalfields Ltd and Neyveli Lignite Corporation Ltd. Hindalco's 96% of annual coal requirement is secured through long-term linkages and captive mines.

Utkal Alumina (Odisha), announced expansion of Utkal Alumina by 500 kt during the year. Utkal alumina is sourcing bauxite from Baphlimali Bauxite Deposit in Odisha. Utkal Alumina International Ltd continues to be the most economical and an efficient alumina producer globally as it is working at maximum capacity producing 1.5 million tpy of alumina and providing strong support to Hindalco's smelting facilities, leading to better cost optimisation.

Hindalco announced plans to set up an extrusion and recycling plant at Mundra, Gujarat and signed an MoU with the Government of Gujarat for the same and also signed an MoU with the Government of Odisha to set up an FRP unit at Sambalpur. In addition, Hindalco engages the Aditya Birla Group's Corporate Research and Development Centre, Aditya Birla Science and Technology Company Private Limited ("ABSTCPL"), for conducting R&D in select areas of work through chartered R&D projects. These are based on the domain expertise and R&D facilities available in ABSTCPL.

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, it over 1.3 million tonnes per annum. Could be achieved further scaling up to the

production capability of the smelter and 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 6 million tonnes per annum. Alumina Refinery along with 90 MW co-generation power plant is located at Lanjigarh in Odisha State. BALCO's operations include two bauxite mines viz, Mainpat with 7,50,000 tonnes capacity and Bodai Daldali (Kawardha) with capacity of 12,50,000 tonnes; four Captive Power Plants of 270 MW, 540 MW, 600 MW and 300 MW; and refining, smelting & fabrication (570 kt) facilities in Central India.

Chotia, a coal block with capacity of 17.7 million tonnes per annum, is the captive coal block acquired by BALCO. BALCO has an NABL accredited quality laboratory for raw materials & finished goods.

USES

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. 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 Taloja, 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 combining 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 (i) R&D Project on ‘1st stage trial production of Strontium modified 6XXX series Aluminium Billet & first billing’ has been successfully completed. (ii) R&D Project on ‘Fabrication and trial commercial use of a highly porous pervious concrete material from fly ash & first billing’ has been successfully completed. (iii) Collaborative project with NIT Rourkela “Embedded system for compressed air consumption monitoring in smelter plant” has been implemented (iv) In-house project of Alumina Refinery Plant, i.e., “Replacement of synthetic flocculants by wheat bran flocculant” was implemented in all three streams of plant. (v) In-house project of Smelter Plant, i.e., “Improvement of oxidation behaviour of anodes” has been implemented in both GAPs of smelter plant. (vi) Eleven new collaborative R&D projects were taken up during the year. As on 31st March, 2019, five in-house projects and twenty-four collaborative projects were in progress.

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 Taloja with 25,000 tonnes annual capacity. Although the plant at Taloja 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%.

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. The Government of Gujarat, in September, 2018 signed an MoU with Hindalco Industries Ltd for setting up of 3,00, 000 tonnes per annum aluminium recycling plant in Gujarat.

WORLD REVIEW

World production of alumina was 131 million tonnes in 2019. China continued to be the leading producer with a share of about 55% which is followed by Australia (15%), Brazil (7%), India (5%) and Russia & Jamaica (2% each). World production of aluminium was at 62.90 million tonnes in 2019. China continued to be the leading producer with a share of about 56% which is followed by Russia, Canada and India (6%) each & UAE (4%) (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 2018 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.

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

Country	(In '000 tonnes of Al ₂ O ₃ content)		
	2017	2018	2019
World: Total (rounded off)	128100	131000	131200
China	69056	73608	71474
Australia	20486	20062	20239
Brazil	11061	8258	9171
India* ^(d)	6119	6446	6707
Russia	2822	2763	2755
Jamaica	1782	2484	2173
Ireland, Republic of	1880	1818	1861
Saudi Arabia	1484	1774	1798
Ukraine	1676	1715	1690
Other countries	11710	12075	13294

Source: BGS World Mineral Production, 2015-2019.

(d) Years ended 31st March following that stated

** During 2017-18, 2018-19 and 2019-20 India's production of alumina was 4,620, 4,893 and 4,978 thousand tonnes, respectively.*

**Table – 9: World Production of Aluminium (Primary)
(By Principal Countries)**

(In '000 tonnes)

Country	2017	2018	2019
World: Total (rounded off)	62600	64100	62900
China	35190	36447	35044
Russia	3584	3627	3637
India ^{*(e)}	3401	3696	3629
Canada	3212	2923	2854
UAE	2600	2640	2600
Australia	1488	1574	1570
Bahrain	981	1011	1365
Norway	1253	1295	1300
Saudi Arabia	916	932	1126
USA	741	899	1126
Other countries	10198	9970	9726

Source: BGS World Mineral Production, 2015-2019.

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

* During 2017-18, 2018-19 and 2019-20 India's production of aluminium was 3,401 , 3,696 and 3,635 thousand tonnes, respectively.

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 ram-pup 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.

FOREIGN TRADE

Exports

Export of alumina decreased marginally by 4% to 1,330 thousand tonnes in 2019-20 from 1,389 thousand tonnes in the previous year. Exports were mainly to UAE (51%), Malaysia (16%), China (14%) and Egypt (9%).

Export only of aluminium and alloys including scrap increased by 1% to 2,371 thousand tonnes from 2,338 thousand tonnes. Exports in 2019-20 were mainly to Malaysia (29%), Republic of Korea (21%), USA (10%), Taiwan and Japan (3% each) (Tables-10 to 12).

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**Table – 10: Exports of Alumina
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1389106	46982494	1330038	30900412
UAE	582203	19800516	677615	15051302
Malaysia	116557	3272628	214503	4578599
China	1283	85927	186328	4072835
Egypt	275900	9303621	122738	2675711
Taiwan	25754	1005614	23151	976638
Iran	63239	2435704	30794	902481
Indonesia	31902	1045819	31637	684289
Korea Rep. of	14843	583129	15021	629038
USA	39978	1272243	9746	468735
Saudi Arabia	3377	141442	7149	262881
Other countries	234070	8035851	11357	597901

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2337860	398756254	2371140	361046711
Malaysia	430770	64398504	686139	90572780
Korea, Rep. of	242822	36677937	495519	65253021
USA	274010	54795640	243638	45108318
Taiwan	93678	14263840	74518	9967245
Japan	81309	12359802	73874	9638346
Mexico	131480	21323784	63111	9103079
Brazil	48353	7658142	61582	8548413
Bangladesh	54886	12291972	41185	8268418
Italy	106936	17610457	50843	7336831
UAE	20232	5325328	23588	6436133
Other countries	853294	152050849	557145	100814125

Figures rounded off

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

Item	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All items	2337860	398756254	2371140	361046711
Aluminium & Alloys : Unwrought	1956926	299304134	1961100	258975276
Aluminium Alloys Unwrought	408009	65013293	289388	39904471
Aluminium Ingots	1538455	232653264	1663950	217981546
Aluminium Unwrought Nes	10462	1637577	7762	1089259
Aluminium & Alloys : Worked	183153	38006916	212110	40300787
Aluminium & Alloys :Worked (Bars, Rods, Plates)	112775	21106147	121922	20021986
Aluminium & Alloys :Worked (Bars, Rods, Profiles)	48899	12564525	73807	16972514
Aluminium Worked (Bars, Rods, Profiles etc.)	21479	4336244	16380	3306287
Aluminium & Alloys, Worked, Nes	188159	59813230	188082	60230000
Aluminium & Scrap	5939	714977	6108	655924
Aluminium Powders & Flakes	3682	916997	3741	884723

Figures rounded off

Imports

Import of alumina decreased drastically by 35% to 1,844 thousand tonnes in 2019-20 from 2,857 thousand tonnes in the previous year. Imports were mainly from Australia (46%), Vietnam (27%), Indonesia (18%), China (3%) and Netherlands (2%).

Imports of aluminium & alloys including scrap also decreased considerably like alumina by 7% to 2,152 thousand tonnes in 2019-20 from 2,318 thousand tonnes in the previous year. The imports were mainly from USA(16%), China (14%), Malaysia (8%), UAE & UK (7% each), Saudi Arabia (5%), Australia (4%) and Republic of Korea (3%) (Tables- 13 to 15).

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2856522	102946451	1844483	49829389
Australia	1362788	45010604	854941	19241870
Vietnam	702060	22811269	489849	12585192
Indonesia	372746	13817813	338352	8928324
China	321358	15408305	53409	3221286
Netherlands	32162	1626122	33338	1859524
Germany	8956	888718	7268	859060
USA	21994	1545381	3975	703358
Saudi arabia	629	11639	29112	619889
France	10612	515104	10991	545612
Canada	3273	366577	2678	318780
Other countries	19944	944919	20570	946493

Figures rounded off

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2317659	381662640	2152466	310945514
China	379563	82446906	310132	67591926
USA	263196	36074297	334242	36470104
Malaysia	209320	33888089	178837	25776839
UAE	209519	32190836	156533	20499485
UK	171873	23917405	161092	18437477
Korea, Rep. of	77264	17743217	73870	14482615
Saudi Arabia	129721	18105831	115094	13509706
Thailand	39556	8391666	45389	9318102
Australia	99215	13486308	83211	9237107
Hong Kong	42518	8078031	43174	9156081
Other countries	695923	107340054	650890	86466072

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

Item	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All items	2317668	381662640	2152466	310945514
Aluminium & Alloys:Unwrought	316962	50258167	266472	37128027
Aluminium Alloys Unwrought	40389	7173970	38264	5847391
Aluminium Ingots	268537	41798188	223679	30671776
Aluminium Unwrought Nes	8036	1286009	4529	608860
Aluminium & Alloys:Worked	556301	117975247	455280	95531412
Aluminium & Alloys:Worked (Bars,Rods,Plates)	179362	38155519	150397	30722228
Aluminium & Alloys:Worked (Bars,Rods,Profiles)	225842	53002819	232570	51178619
Aluminium Worked(Bars,Rods,Profiles Etc)	151096	26816910	72312	13630565
Aluminium & Alloys,Worked,Nes	91491	39901090	78638	37346575
Aluminium & Scrap	1348971	172681033	1347923	140090404
Aluminium Powders & Flakes	3994	847104	4153	849096

Figures rounded off

FUTURE OUTLOOK

Aluminium plays a meaningful role when usages of aluminium are showcased as it is labelled the Salt of the new earth. As per the industry sources, the primary aluminium demand in India is expected to reach 6 million tonnes by 2025, which is equivalent to 4.1 kg per capita aluminium consumption. The per capita aluminium consumption in India during 2019-20 is around 2.7 kg which is much below the global average of 11 kg. Thus, Indian market offers a huge potential for demand growth of Aluminium Industry. To reach the global average of 11 kg per capita, India will require an additional annual consumption of 16 million tonnes, and if achieved India would become the second largest consumer in the world.

Aluminium contributes to nearly 2% of manufacturing GDP and with projected consumption growth, the share (% of manufacturing GDP) may go higher. It is envisaged to expand the aluminium capacity from 4 MTPA to 12 MTPA by 2030. India is saving fuel to become a major global low-cost aluminium production hub and a major contributor to the Nation's GDP.

Aluminium consumption is most likely to increase as a result of Government's key flagship programmes like Make in India, National Capital Goods Policy, Development of 100 smart cities and Government's commitment to reach a 100 GW solar capacity by 2022 from 20 GW today. The Government's thrust in reinforcing the Power Sector, which is a dominant consumer of aluminium in India, augers well for Aluminium Industry.

Aluminium has forward linkages with key sectors like aviation, defence, auto, electricity, construction, packaging, machinery, marine etc. and backward linkages with mining, chemical, power, machinery etc. By speeding up investment in sectors with high backward and forward multipliers, the industrialisation process can be speeded up which would in turn enable accelerating economic growth. The cumulative demand for aluminium is set to rise by several hundred thousand tonnes by 2030.