

ALUMINIUM & ALUMINA



# Indian Minerals Yearbook 2015

(Part- II : Metals & Alloys)

54<sup>th</sup> Edition

## ALUMINIUM AND ALUMINA

(FINAL RELEASE)

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# 1 Aluminium and Alumina

The aluminium industry in India is strategically well-placed and ranks fifth largest 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 aluminium industry in India 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 of 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 in the country has risen to 26.27 from 19.07 lakh tpy during 2014-15. The actual production of aluminium comes from a plant capacity of 24.87 lakh tpy as 1.40 lakh tpy capacity is presently non-operational. Producer-wise capacity of aluminium is given in Table-1.

The installed capacity of alumina plants in the country was 65.60 lakh tpy, out of which plant capacity of 62.75 lakh tpy reported alumina production during the year. Alumina plant capacity of 2.85 lakh tpy remained non-operational (Table-2).

## PRODUCTION

### Aluminium

The production of aluminium at 20.27 lakh tonnes in 2014-15 registered an increase of 22% as compared to that in the previous year. Seven plants reported production of aluminium during the year. Of these, one plant in public sector accounted for about 16% of the total production in 2014-15. The remaining 84% production was reported by the private sector (Tables - 3 & 4).

During the year under review, except Vedanta Ltd all other smelters reported higher production as compared to the previous year. Two more plants viz. Aditya and Mahan of Hindalco Industries started reporting production during the year.

**Table – 1 : Installed Capacity of Aluminium, 2014-15 (By Producers)**

		(In '000 tonnes)
Producer	Plant	Annual capacity
<b>Total</b>		<b>2627</b>
<b>Public Sector</b>		
National Aluminium Co. Ltd	Angul (Odisha)	460
<b>Private Sector</b>		
Bharat Aluminium Co. Ltd	Korba (Chhattisgarh)	345**
Hindalco Industries Ltd	Aditya (Odisha)-360	1282
	Hirakud (Odisha)-217	
	Mahan (M.P) - 360	
	Renukoot(U.P) - 345	
	Alupuram (Kerala) - closed	
Madras Aluminium Co. Ltd	Mettur (Tamil Nadu)	40#
Vedanta Aluminium Ltd	Jharsuguda (Odisha)	500

**Source:** Information received from the companies/Annual Reports.

\*\*Korba plant-I capacity of 100 thousand tonnes per year is non-operational.

# MALCO has closed its smelter since December, 2008.

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**Table – 2 : Installed Capacity of Alumina, 2014-15  
(By Producers)**

(In '000 tonnes)

Producer	Plant	Annual capacity
<b>Total</b>		<b>6560</b>
<b>Public Sector</b>		
National Aluminium Co. Ltd	Damanjodi (Odisha)	2275
<b>Private Sector</b>		
Bharat Aluminium Co. Ltd	Korba (Chhattisgarh)	200#
Hindalco Industries Ltd	Renukoot - 700 (Uttar Pradesh)	3000
	Belgavi - 350 (Karnataka)	
	Muri - 450 (Jharkhand)	
	Utkal Alumina - 1500 (Odisha)	
Madras Aluminium Co. Ltd	Mettur (Tamil Nadu)	85#
Vedanta Aluminium Ltd	Lanjigarh (Odisha)	1000*

**Source:** Information received from the companies/Annual Reports/Ministry of Mines Annual report.  
# Plants remained non operational during the year.  
\*Plans to enhance capacity of alumina refinery from 1 million to 5 million tonnes per annum.

## Alumina

The production of alumina at 40.24 lakh tonnes in 2014-15 increased by about 6% as compared to the previous year. A plant of Hindalco and the plant of Vedanta Ltd. reported higher production of Alumina as compared to the previous year. NALCO continued to be the leading producer of alumina accounting for 45% of the total production during the year under review.

**Table – 3 : Production of Aluminium  
2012-13 to 2014-15**

(Quantity in tonnes; Value in `'000)

Year	Production	
	Quantity	Value
2012-13	1720427	202241542
2013-14	1667300	186608433
2014-15(P)	2026803	244049823

**Table – 4 : Production of Aluminium  
2013-14 and 2014-15  
(By Plants)**

(In tonnes)

Producer	Plant	Production	
		2013-14	2014-15(P)
National Aluminium Co. Ltd	Angul	316492	327052
Hindalco Industries Ltd	Aditya	-	72804
	Hirakud	152381	169070
	Mahan	-	185529
	Renukoot	403367	408769
Bharat Aluminium Co. Ltd	Korba	252807	326368
Vedanta Aluminium Co. Ltd	Jharsuguda	542253	537211

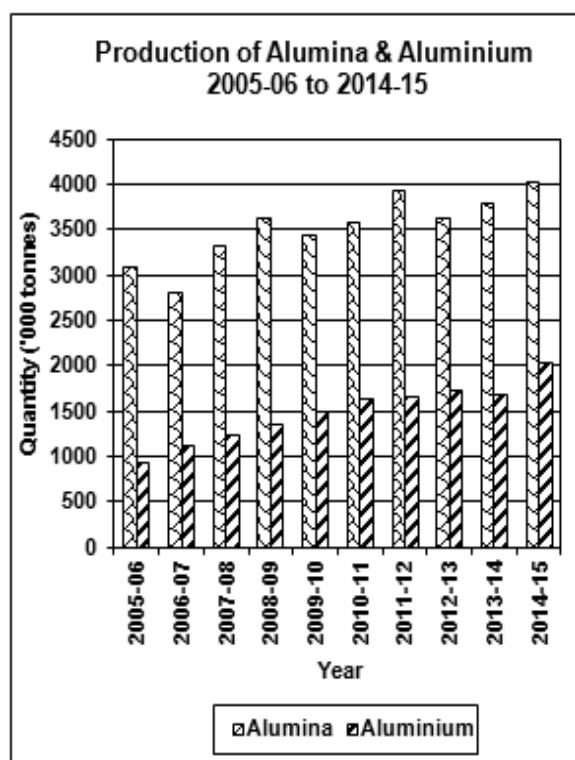
**Table – 5 : Production of Alumina  
2012-13 to 2014-15**

(Quantity in tonnes; Value in ₹'000)

Year	Quantity	Value
2012-13	3609815	59637781
2013-14	3779301	65460247
2014-15(P)	4024215	71268236

**Table – 6 : Production of Alumina  
2013-14 and 2014-15  
(By Plants)**

Producer	Plant	Production (In tonnes)	
		2013-14	2014-15(P)
National Aluminium Co. Ltd	Damanjodi	1912600	1826500
Hindalco Industries Ltd	Belgavi	308700	275200
	Muri	299548	313700
	Renukoot	734393	631900
Vedanta Aluminium Co. Ltd	Lanjigarh	524060	976915



## INDUSTRY

Seven aluminium smelters having total installed capacity of 26.27 lakh tpy operated by four companies were operational in the country in 2014-15. Of these, NALCO is the only company in the Public Sector with installed capacity of 460,000 tpy. BALCO, earlier a

Public Sector company, is now under Private Sector with stake holdings apportioned between Sterlite Industries (India) Ltd (51%) and Government of India (49%). The remaining five smelters of Hindalco and VAL are in the Private Sector. The aluminium plants of NALCO and BALCO have their alumina-aluminium complexes at Damanjodi-Angul (Odisha), and Korba (Chhattisgarh), respectively.

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 are operating on state-of-the-art AP36 technology. The Hindalco's primary aluminium (metal) capacity augmented to around 1300,000 tpy from 562,000 tpy during the year 2014-15. This increase was primarily on account of production from Mahan and Aditya smelter initiated during the year 2014-15. In addition to aluminium, Renukoot (Uttar Pradesh), Intergrated 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. The overall BALCO's smelter capacity is 345,000 tpy with capabilities to produce ingots, wire-rods billets, bushbars and rolled products. The Korba-I plant of BALCO's smelter with 100,000 tpy capacity is not operational, while the 245,000 tpy Korba-II plant is presently operating. MALCO, a Vedanta Group Company has not reported production of alumina and aluminium in 2014-15. However, the company operates power plants for commercial power generation. 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. 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

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finished products include, alumina, primary aluminium in the form of ingots, billets and wire rods, value added products such as rolled products, extrusion, and foils. Hindalco is the largest manufacturer of entire range of Flat rolled products. The Hirakud Flat Rolled Products (FRP), produce 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 205,000 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) 8,000 tpy capacity.

Hindalco's Flat Rolled Products facilities at Hirakud (Odisha) and Mouda (Maharashtra) are being developed to produce world class can body stock and ultra thin gauge foils, respectively.

Hindalco's foil unit located at Silvassa (Dadra & Nager 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.

Jindal Aluminium Ltd (JAL) has 10 aluminium extrusion presses with an installed capacity of 100,000 tpy. The company is the largest manufacturer of aluminium extrusions, meeting country's 30% of total demand. Jindal commissioned the state of the art Aluminium sheet and foil manufacturing facility at its plant near Bengaluru. The company produce Aluminium flat rolled products i.e sheets, coils, and chequered sheets under 5mm thickness. The available information on installed capacity of semis is given in Table-7.

**Table – 7 : Capacity for Aluminium Semis during 2014-15**

(In tonnes)

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

*Source: Information received from individual plants/Annual Reports.*

## DEVELOPMENT & EXPANSION

NALCO's expansion activities are as per schedule. The company's augmented alumina refinery capacity enhanced from 21 lakh tonnes to 22.75 lakh tonnes per year during the year. The surplus alumina that remains after internal consumption sold to third parties in the export market and small portion sold to the domestic market. Upgradation of capacity of aluminium smelter from 4.6 lakh tonnes to 5.67 lakh tonnes per year under current-ampereage upgradation project is under progress. NALCO plans to set up 5 lakh tonnes per year smelter and 1050 MW power plant at Sundargarh district in Odisha. The company set up wind power plants of capacities 50.4 MW & 47.6 MW at Gandikota (Andhra Pradesh) & Jaisalmer (Rajasthan) during the year. NALCO has been granted mining lease over Gudam and KR Konda bauxite resources in Andhra Pradesh and Pottangi in Odisha. Based on bauxite resources, the company plans to develop a 42 lakh tpy bauxite mine and 14 lakh tpy alumina refinery complex in Andhra Pradesh. The company has port facilities at Visakhapatnam to export alumina at the rate of 1.4 million tpy. NALCO is planning to set up 1.0 million tonnes alumina refinery in Kachchh district of Gujarat, based on supply of bauxite from Kachchh region by Gujarat Mineral Development Corporation (GMDC). The company plans to set up a 14 MW wind power project in mined out area of its working bauxite mines in Damanjodi area of Odisha.

Hindalco's plans to expand alumina refinery capacity at Belagavi from 3.5 lakh tpy to 6.5 lakh tpy are on hold, awaiting government's approval relating to bauxite mines.

Hindalco's three greenfield projects are well on their way towards full capacity utilisation. Utkal Alumina (Odisha), 1.5 million tpy alumina refining project along with 90 MW captive co-generation plant completed during the year. Utkal alumina is sourcing bauxite from Baphlimali Bauxite Deposit in Odisha. The company set up 3.60 lakh tpy aluminium smelter at Bargawan along with 900 MW captive power plant at Mahan in Madhya Pradesh, based on captive coal consumption from Sidhi district, Madhya Pradesh. The other integrated aluminium project, namely, Aditya Alumina & Aluminium Project, alumina refinery at Koraput, 3.60 lakh tpy aluminium smelter at Lapanga, Odisha along with 900 MW captive power plant were commissioned during the year. A joint venture

agreement on bauxite mines was signed with OMC. Hindalco won 4 coal blocks viz Kathautia, Dumri, and Gare Palma IV/4 & Gare Palma IV/5 during the coal auction held during the year. The company is also developing and mining coal for captive consumption jointly with Mahanadi Coalfields Ltd and Neyveli Lignite Corporation Ltd. Another greenfield project, viz Jharkhand Aluminium Project at Sonahatu, 55 km from Ranchi, entails setting up a 7.20 lakh tpy aluminium smelter with 1650 MW captive power plant. It is supported by 5 million tpy captive coal mine of Auranga Coalfields in Jharkhand in with Tata Power. Land acquisition was in progress, and for other clearances application was filed.

BALCO of Vedanta Group [controlled by Sterlite Industries (India) Ltd] is undertaking programmes for modernisation and expansion. The present capacity of the Korba smelter is 3.45 lakh tpy. The Korba-I plant of BALCO with smelter capacity of 100,000 tpy is not operational, while the 245,000 tpy Korba-II plant is presently operating. Majority of the bauxite required for BALCO's smelter are acquired from its two captive mines in the state of Chhattisgarh. In addition, BALCO is proposing to install 3.25 lakh tpy aluminium smelter within the existing premises of Korba Aluminium Complex and construction of coal-based 1200 MW captive power plant along with two coal mines viz. Chotia & Gare Palma Blocks, in the state of Chhattisgarh. Environment clearance for the 211 million tonnes coal block has been received and second stage of forest department clearance is under progress.

Vedanta Aluminium Ltd (VAL) has 10 lakh tpy alumina refinery associated with 75 MW captive power plant at Lanjigarh in district Kalahandi, Odisha and 5 lakh tpy capacity aluminium smelter and 1215 MW captive power plant at Jharsuguda. In addition, Vedanta Aluminium has plans to expand its alumina refining capacity from 10 lakh tpy to 50 lakh tpy, subject to government approval by increasing the capacity of the current alumina refinery from 10 lakh tpy to 20 lakh tpy through de-bottlenecking and by constructing a 30 lakh tpy alumina refinery and an associated 210 MW captive power plant. The construction of alumina refinery project is on hold and awaiting approvals. Work on setting up another 12.5 lakh tpy aluminium smelter in Jharsuguda, Odisha is under progress.

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Further, Vedanta Aluminium entered into an agreement with the Orissa Mining Corporation (OMC) regarding the establishment of the alumina refinery, an aluminium smelter and associated captive plants in the Lanjigarh and Jharsuguda of Odisha.

### USES

Aluminium has widespread uses throughout the economy and is equally important to both the industrial and consumer sectors. On the industrial side aluminium is heavily used in electrical power transmission, machinery & equipment and construction. Housing, in particular, make heavy use of the lightweight material as a substitute for steel and wood in doors, windows and siding. On the consumer side aluminium is used in a variety of retail products including cans, packaging, air conditioner, furniture and vehicles. 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 400,000 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.

Foil is a very thin sheet of rolled aluminium supplied in its pure form or as alloys. The thickness of foil ranges from the thinnest currently produced at about 0.0065 mm to thickest 0.2 mm. Material thicker than 0.2 mm is defined as sheet or strip.

### CONSUMPTION

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 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. The per capita consumption of aluminium in India is among the lowest in the world with only 1.4 kg as compared to world average roughly of 8 kg with 22-25 kg in developed nations.

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

### RESEARCH & DEVELOPMENT

The Hindalco's research and development work was mainly aimed at new product development; conservation of materials and resources; improvement in energy conservation; waste minimisation and reutilisation; environment preservation and sustenance, etc.

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 allied areas. Some of the in-house R&D activities carried out by NALCO in Alumina and Smelter plant are as follows: Alumina Refinery: (i) Studies to find out an alternate synthetic flocculants to replace Wheat Bran, the natural flocculant (ii) Extraction of Vanadium sludge from Bayer Process Liquors (iii) Studies carried out with various flocculant for use in high rate thickeners and deep cone washers. Smelter Plant (i) Anode bench scale studies for anode quality improvement (ii) Studies for improvement in quality of raw material to carbon plants (iii) Regular metallographic studies of cast products for quality improvement (iv) Mathematical model developed for estimation of anode to cathode distance electrolysis cells (v) Project initiated for implementation of siphon system of liquid metal transfer in cast house to reduce melt loss (vi) Liquid temperature measurement commenced in potlines. Similarly collaborative, in-house R&D activities like (i) Development of Heat Treatment Process for destruction of toxic cyanide and recovery valuables (ii) Development of metal matrix composites (iii) Technique and tool for perfluorocarbons measurements in aluminium electrolysis cells (iv) Assessment of billet quality in DC cast (v) Infra red thermography studies at alumina refinery (vi) Upgradation of alumina in NALCO fly ash through bio-leaching of silica and subsequent recovery of alumina through pyro Hydrometallurgical routes.

## RECYCLING

The Working Group for XII Five Year Plan (2012-17) on Non-ferrous Metals set up by the Ministry of Mines, Government of India, had made strong recommendation on the need to encourage recycling in India as a long-term solution for conserving energy and resources. In India, though aluminium industry is over six decades old, the recycling sector with modern state-of-the-art technology is still in its nascent stage.

Aluminium is 100% recyclable 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 emission. Aluminium recycling process is less capital intensive than primary metal production as the process requires only 5% of energy, between 13-15 thousand units of power for producing one tonne of aluminium through primary route. Besides, it keeps the emission levels of greenhouse gases to a low of 5% from the actual emission experienced during primary production. Further, recycling facilitates reduced stress on the use of bauxite and thereby preserving six lakh tonnes of bauxite resources every year.

India's metal recycling rate is about 25%. All the activity related to aluminium scrap recovery are limited to the unorganised sector, 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 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%.

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

Globally, primary aluminium production in 2014 has increased substantially to 53 million tonnes from 48.6 million tonnes in 2013. The principal producers were China (52%), Russia (7%), Canada (5%), India, Australia & USA (3% each), Bahrain & Brazil (2% each) and Iceland, South Africa (1% each) (Table- 8). The world production of alumina increased considerably to 107.1 million tonnes in 2014 in terms of contained  $Al_2O_3$  from 100.1 million tonnes in 2013. China accounted for 47%, followed by Australia (19%), Brazil (10%), USA & India (4% each) and Jamaica & Russia (2% each) in the production of alumina in 2014 (Table- 9).

**Table- 8: World Production of Aluminium (Primary)  
(By Principal Countries)**

	(In '000 tonnes)		
Country	2012	2013	2014
<b>World: Total</b>	<b>46200</b>	<b>48600</b>	<b>53000</b>
Australia	1864	1777	1704
Bahrain	890	913	931
Brazil	1436	1304	962
Canada	2781	2967	2858
China	20251	23155	27517
Iceland	803	736	749
India*	1720	1516	1598
Norway	1111	1155	1250
Russia	4024	3724	3488
South Africa	665	822	745
USA	2070	1946	1710
UAE	1814	1845	2296
Other countries	6771	6740	7192

*Source: World Mineral Production, 2010-2014.*

*\* During 2012-13, 2013-14 and 2014-15 India's production of aluminium was 1,667,1,516 and about 2,027 thousand tonnes, respectively.*



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

(In '000 tonnes of Al<sub>2</sub>O<sub>3</sub>)

Country	2012	2013	2014
<b>World: Total</b>	<b>94049</b>	<b>100123</b>	<b>107171</b>
Australia	20915	21528	20476
Brazil	10321	9942	10439
Canada	1499	1555	1563
China	37696	43379	50737
Germany	1000	1000	1000
India*	3610	3700 <sup>c</sup>	4000 <sup>c</sup>
Ireland	1251	1265	1271
Jamaica	1758	1855	1851
Kazakhstan	1510	1590	1419
Russia	2719	2659	2572
Spain	1100	1400	1400
Surinam	1203	1149	1149
USA	4372	4388	4393
Ukraine	1429	1493	1455
Venezuela	808	580	660
Other countries	2860	2640	2787

*Source: World Mineral Production, 2010-2014.*

\* During 2012-13, 2013-14 and 2014-15 India's production of alumina was 3,610, 3,779 and about 4,024 thousand tonnes, respectively.

The country-wise developments in Aluminium & Alumina sector are as follows:

### **Australia**

Primary aluminum production in Australia declined by 4% in 2014 compared with production in 2013 and was 9% less than production in 2012 owing to smelter shutdowns during 2013 and 2014. In August 2014, Alcoa permanently shut down the 190,000 tpy Point Henry primary smelter and an adjacent rolling mill in Geelong, Victoria. Another rolling mill and a 55,000 tpy secondary smelter in Yennora, New South Wales, also were shut down permanently in the fourth quarter.

### **Brazil**

Primary aluminum production decreased to 26% less than that in 2013 and the lowest level since 1990. High power costs were cited for decreased production at several smelters. The shutdowns of primary smelting capacity were cited for increased imports of aluminum to supply consumers in Brazil. Citing the increased demand

for imports, the Government eliminated a 6% tariff on unalloyed primary aluminum imports. Alcoa and BHP Billiton temporarily shut down an additional 143,000 tpy of capacity at their jointly owned 447,000 tpy Alumar smelter in Sao Luis, Maranhao State, 142,000 tpy of capacity at the smelter having been temporarily shut down in the third quarter of 2013. Novelis permanently shut down its 18,000 tpy primary aluminum smelter in Ouro Preto, Minas Gerais State. High power costs, inefficient capacity size, and the company's desire to focus on secondary aluminum production were cited as the reasons for the shutdown.

### **Canada**

Rio Tinto permanently shut down one 24,000 tpy potline at the Kitimat smelter, British Columbia, as part of a modernization and expansion project. Rio Tinto signed a 6 year power supply agreement with the Government of Quebec for the Arvida smelter in Saguenay. An environmental permit was also renewed that would allow the smelter to operate through the end of 2020. The government of Quebec approved power supply agreements between Alcoa and Hydro-Quebec. The agreements were for Alcoa to purchase power for the 413,000 tpy Becancour and the 260,000 tpy Deschambault smelters from Hydro-Quebec through 2030. Alcoa planned modernisation projects, which were expected to be completed in 2019, to increase the efficiency of the smelters, though the capacity of the smelters would not increase. A previously announced project—to construct a new potline to replace two potlines at the Baie-Comeau smelter that were permanently shut down in mid-2013—was cancelled

### **China**

Primary aluminum production in 2014 was 10% more than that in 2013. Secondary aluminum production was 8.7% more than that produced in 2013. Primary smelting capacity increased to 35.84 Mtpy at year end 2014. Capacity increases were focused in Gansu, Henan, and Shandong Provinces and Xinjiang Uyghur Autonomous Region and more than offset permanent shutdowns of

obsolete high-cost capacity in Guizhou, Henan, and Shaanxi Provinces. Several expansions were expected to be completed during 2015 in Gansu and Shandong Provinces and Xinjiang Uyghur Autonomous Region. Government of China started an electricity pricing policy that would increase the price smelters pay for power based on the amount of power consumed per tonne of aluminum production. The policy was an effort to limit production from inefficient smelters in order to conserve power and reduce pollution.

Government policies continued to encourage the permanent shutdown of inefficient, older, smaller smelters that were mostly located in the eastern and southern parts of the country. The Government also issued policies prohibiting the construction of new smelters and the expansion of existing smelters until 2017. The Banking Regulatory Commission issued rules prohibiting loans for expansion projects in the aluminum industry that were not approved and also tied loan terms to approval. Approved existing smelters must comply with standards set for access to power supplies, capacity, energy efficiency, environmental emissions, and technology by year end 2015.

### **France**

Trimet was expanding capacity of the St. Jean-de-Maurienne smelter to 145,000 tpy from 90,000 tpy. Completion of the project was expected at year end 2014 or early in 2015. Trimet acquired the smelter from Rio Tinto in December 2013.

### **Germany**

Novelis completed construction of a recycling center and casthouse adjacent to its rolling mill in Nachterstedt. The 400,000 tpy facility would supply rolling ingot to Novelis' adjacent rolling mill and another rolling mill in Sierre, Switzerland. The Nachterstedt rolling mill capacity was to be expanded to 350,000 tpy from 230,000 tpy in 2015 to meet increased consumption by automobile manufacturers.

### **Iceland**

Century was expanding the Grundartangi smelter to 326,000 tpy from 286,000 tpy, and by year end 2014, had a capacity of 298,000 tpy. The project was expected to be completed by 2019.

### **Indonesia**

Indonesia Asahan Aluminium Ltd (Inalum) planned to expand capacity of its aluminum smelter in Asahan, North Sumatra, to 650,000 tpy from 250,000 tpy. Construction was expected to begin in early 2015 and to be completed in 2017. In addition to expansion of the smelter, Inalum also planned to build a 1.2 Mtpy alumina refinery in Mempawah, West Kalimantan, which was expected to be completed in 2017.

### **Italy**

The temporary closure of Alcoa's 150,000 tpy Portovesme smelter was made permanent. Alcoa, which had shut down the smelter in November 2012 citing high power costs, determined that it was unlikely to be able to obtain power at competitive rates in the future

### **Japan**

Nippon Light Metals Inc. (NLM) permanently shut down the Kanbara smelter in March. The 7,000 tpy smelter opened in 1940 and produced high-purity aluminum (99.95%) used for electronics applications. NLM would continue to serve its customers by purifying standard 99.7%-pure ingot .

### **Malaysia**

Primary aluminum production in Malaysia increased by 48% compared to that in 2013 owing to the restart of one smelter and startup of new capacity at another smelter. Press Metal Berhad's 120,000 tpy Mukah smelter ramped up to full capacity in March, having restarted in November 2013 following a power failure on June 27, 2013. Press Metal Berhad's Samalaju smelter was expanded to 320,000 tpy from 240,000 tpy in early 2014. The smelter was being expanded to 520,000 tpy with completion expected by year end 2015; additional expansion to 640,000 tpy was planned for completion in 2018.

### **Mexico**

Toyota Tsusho Corp. started construction of a 48,000 tpy secondary aluminum smelter in Zacatecas. The smelter would produce ingot for automotive parts manufacturers and other consumers in Mexico and for export, including to the United States. Production was expected to start in June 2015.

## Netherlands

Aluminum Delfzijl (Aldel) (a subsidiary of Klesch Group) shut down its 110,000 tpy primary smelter in Groningen after it filed for bankruptcy protection on December 30, 2013. High power prices and low aluminum prices were cited for the bankruptcy and shutdown. In November, Klesch announced production from the primary smelter would restart in early 2015 pending a deal to obtain power from Germany .

## Nigeria

An arbitration panel ruled in favour of United Company RUSAL Plc in the dispute over the ownership of the 96,000 tpy Alcon smelter in Ikot Abasi. In 2013, the Supreme Court of Nigeria overturned the sale of 77.5% of the Government's 92.5% share of the smelter to RUSAL, ruling that it violated Nigeria's privatisation law because BFI Group Corp. had offered a higher bid for the smelter. However, after the Court ruling, BFI Group did not pay for the disputed share of the smelter, and ownership was awarded back to RUSAL.

## Russia

Primary aluminum production in Russia decreased by 6% compared to that in 2013 owing to shutdowns of high-cost capacity during 2013. RUSAL continued modernising Soderberg potlines at the Bratz and Krasnoyarsk smelters, which each had a capacity of 1.05 Mtpy. The modernised pots decreased emissions by 3% and increased power efficiency. The project started in 2005 and was scheduled to be completed in 2020.

RUSAL continued construction of the Boguchansky smelter, with the start of production from the first 147,000 tpy potline planned for 2015. The smelter would have a capacity of 588,000 tpy when completed. A schedule for the additional capacity was not available. The smelter would be powered by the 3,000 MW Boguchanskaya hydroelectric powerplant on the Angara River .

## Saudi Arabia

Alcoa (25.1%) and its partner Saudi Arabian Mining Co. (Riyadh) (74.9%) completed the ramp up of the 740,000-tpy smelter in Ras al Khair in the second quarter of 2014. The ramp up of the Ras al Khair smelter accounted for aluminum production in Saudi Arabia increasing by 478,000 tonnes (256%) compared to that in 2013. Production from an adjacent rolling mill also started during the second quarter and construction was completed by year end. The rolling mill would produce sheet for automotive and construction markets, containers and packaging, and foil stock.

## UAE

Primary aluminum production in the UAE increased by 25% in 2014 compared to that in 2013. Dubai Aluminum Co. Ltd (a subsidiary of Emirates Global Aluminium Co. Ltd) expanded the Al Taweelah smelter to 1.32 Mtpy from 0.8 Mtpy and started production from the new capacity in June.

## FOREIGN TRADE

### Exports

Exports of alumina increased to 15.62 lakh tonnes in 2014-15 from 12.94 lakh tonnes in the previous year. Exports in 2014-15 were mainly to China (41%), UAE (39%), Iran (8%) Egypt (6%) and Bahrain (4%). Exports of aluminium and alloys including scrap increased in 2014-15 to 10.33 lakh tonnes from 7.07 lakh tonnes in 2013-14. Exports in 2014-15 were mainly to Korea Rep. of (24%), Mexico (16%), USA (8%), Bulgaria (6%) and UAE, Turkey, Colombia (3% each) (Tables- 10 to 12).

### Imports

Imports of alumina decreased considerably to 7.90 lakh tonnes in 2014-15 from 11.69 lakh tonnes in the previous year. Imports were mainly from Australia (86%), China (7%) and Netherlands (4%). Imports of aluminium & alloys and scrap increased to 15.95 lakh tonnes in 2014-15 from 13.48 lakh tonnes in the previous year. The imports were mainly from UAE (15%), China (14%), UK & Saudi Arabia (7% each), Malaysia & USA (5% each) Oman & Bahrain (4% each) and Korea Rep of (3%) (Tables- 13 to 15).

## ALUMINIUM &amp; ALUMINA

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

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1294651</b>	<b>25423465</b>	<b>1561612</b>	<b>32974205</b>
China	292517	5754620	640156	13422515
UAE	642487	12197868	606135	12344284
Iran	100621	2047955	125072	2753161
Egypt	90850	1706911	91610	1811009
Bahrain	122634	2094601	61014	1273950
USA	8161	289386	8043	302248
Korea, Rep of	5790	186946	4930	159317
Thailand	6509	233987	2930	104105
Saudi Arabia	2833	109269	2422	81588
Japan	1624	76073	1771	76894
Other countries	20625	725848	17529	645134

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

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>707217</b>	<b>116253038</b>	<b>1033006</b>	<b>173770732</b>
Korea, Rep. of	167221	20605951	249324	34671703
Mexico	83608	10873467	167325	24656272
USA	46463	12264132	81486	18795382
Bulgaria	7912	1021622	58156	8356355
UAE	34915	6183898	29429	5833947
Turkey	17705	2516559	33271	5151997
Tanzania	3856	796442	22762	4019272
Colombia	16057	2024213	27013	3872314
Croatia	14	5525	23877	3520148
Germany	7968	2838302	8946	3209919
Other countries	321498	57122927	331417	61683428

## ALUMINIUM &amp; ALUMINA

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

Item	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Items</b>	<b>707217</b>	<b>116253038</b>	<b>1033006</b>	<b>173770732</b>
Aluminium & alloys: Unwrought	411228	51660135	685490	97487214
Aluminium alloys Unwrought	73587	9995232	80484	12424441
Aluminium Ingots	334707	41257816	599274	84249417
Aluminium Unwrought, NES	2934	407087	5732	813356
Aluminium & alloys: Worked	140149	23928454	138438	25116589
Aluminium & alloys: Worked (bars, rods, plates)	87178	13407646	73332	11645012
Aluminium & alloys: Worked (bars, rods, plates, profiles)	32588	7192652	42962	9762172
Aluminium & alloys: Worked (bars, rods, plates, profiles, etc.)	20383	3328156	22144	3709405
Aluminium & Alloys, Worked, NES	148772	39481324	199266	49544983
Aluminium Scrap	3416	348300	5443	632873
Aluminium Powder & Flakes	3652	834825	4369	989073

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

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1169523</b>	<b>27542194</b>	<b>790305</b>	<b>21244790</b>
Australia	1076855	22623946	679921	14945831
China	44398	2133085	54212	2730164
Netherlands	28124	1101750	29081	1154478
Germany	9239	772706	9172	950708
USA	1711	371547	5107	568532
France	6793	289718	8268	340709
Belgium	46	3127	491	184068
Canada	781	91111	1400	145766
Japan	218	43683	921	103320
Italy	260	33363	276	34703
Other countries	1098	78158	1456	86511

## ALUMINIUM &amp; ALUMINA

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

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1348372</b>	<b>186322210</b>	<b>1595296</b>	<b>228778062</b>
China	160925	32696899	223652	43766994
UAE	218930	25873122	238815	30675897
UK	86388	10123659	115119	13543212
Saudi Arabia	97080	10899518	110390	13089277
Malaysia	42124	5966845	76563	11343104
Korea, Rep. of	42013	9668329	43572	11050391
USA	60402	7301329	76268	9962642
Oman	74145	9184056	56624	8029007
Bahrain	40752	5609826	56261	7891044
Germany	39414	7180872	41501	7205268
Other countries	486199	61817755	556631	72221226

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

Item	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Items</b>	<b>1348372</b>	<b>186322210</b>	<b>1595296</b>	<b>228778062</b>
Aluminium & alloys: Unwrought	348893	44806715	343428	47614074
Aluminium alloys Unwrought	17924	2492338	24732	3700542
Aluminium Ingots	329631	42136288	312371	43081643
Aluminium Unwrought, NES	1338	178089	6325	831889
Aluminium & Alloys: Worked	233362	49724753	336465	67560356
Aluminium & alloys: Worked (bars, rods, plates)	54920	12962221	104264	21224745
Aluminium & alloys: Worked (bars, rods, profiles)	131286	28723782	159924	34000083
Aluminium & alloys: Worked (bars, rods, plates, profiles, etc.)	47156	8038750	72277	12335528
Aluminium & Alloys, Worked, NES	43040	15861897	44490	18374811
Aluminium scrap	721628	75689007	869477	94923579
Aluminium Powders & Flakes	1449	239838	1436	305242

## **FUTURE OUTLOOK**

As per the industry sources, the primary aluminium demand in India is expected to reach 6 million tonnes by 2025, which equates 4.1 kg of per capita aluminium consumption in 2025, whereas, at present per capita aluminium consumption is around 1.3 kg and aluminium demand of 1.8 million tonnes underscores the immense potential for demand growth in India.

India occupies fifth position in terms of bauxite reserve with deposit of about 3 billion tonnes with a share of 3.19 % of world reserves. Odisha and Andhra Pradesh accounts for more than 90% of country's metallurgical grade resources. While gibbsitic bauxite resources in the world are depleting, vast gibbsitic deposits in India assume particular interest because of its ease in processing. Since gibbsitic bauxite

processing has specific advantage of low energy consumption, the alumina refineries enjoy sustainable comparative cost advantage.

It is projected that aluminium production capacity in India at the end of the 12<sup>th</sup> Plan Period viz, 2016-17 would be about 4.7 million tonnes. This would require about 9.2 million tonnes of alumina. So, if all the announced alumina capacity additions fructify, India would be surplus in alumina and would be a significant player in alumina trade. To produce 13.3 million tonnes of alumina at the end of the 12<sup>th</sup> Plan period, the bauxite requirement would be about 40 million tonnes. The Report of the Sub Group for the 12<sup>th</sup> Plan Period has recommended that all efforts should be directed towards ensuring bauxite availability to the alumina refineries.