

BAUXITE, ALUMINA & ALUMINIUM INDUSTRY OF INDIA AND FUTURE PROSPECTS OF DEVELOPMENT

**DR. ASHOK NANDI, PRESIDENT
INTERNATIONAL BAUXITE, ALUMINA AND
ALUMINIUM SOCIETY (IBAAS)**

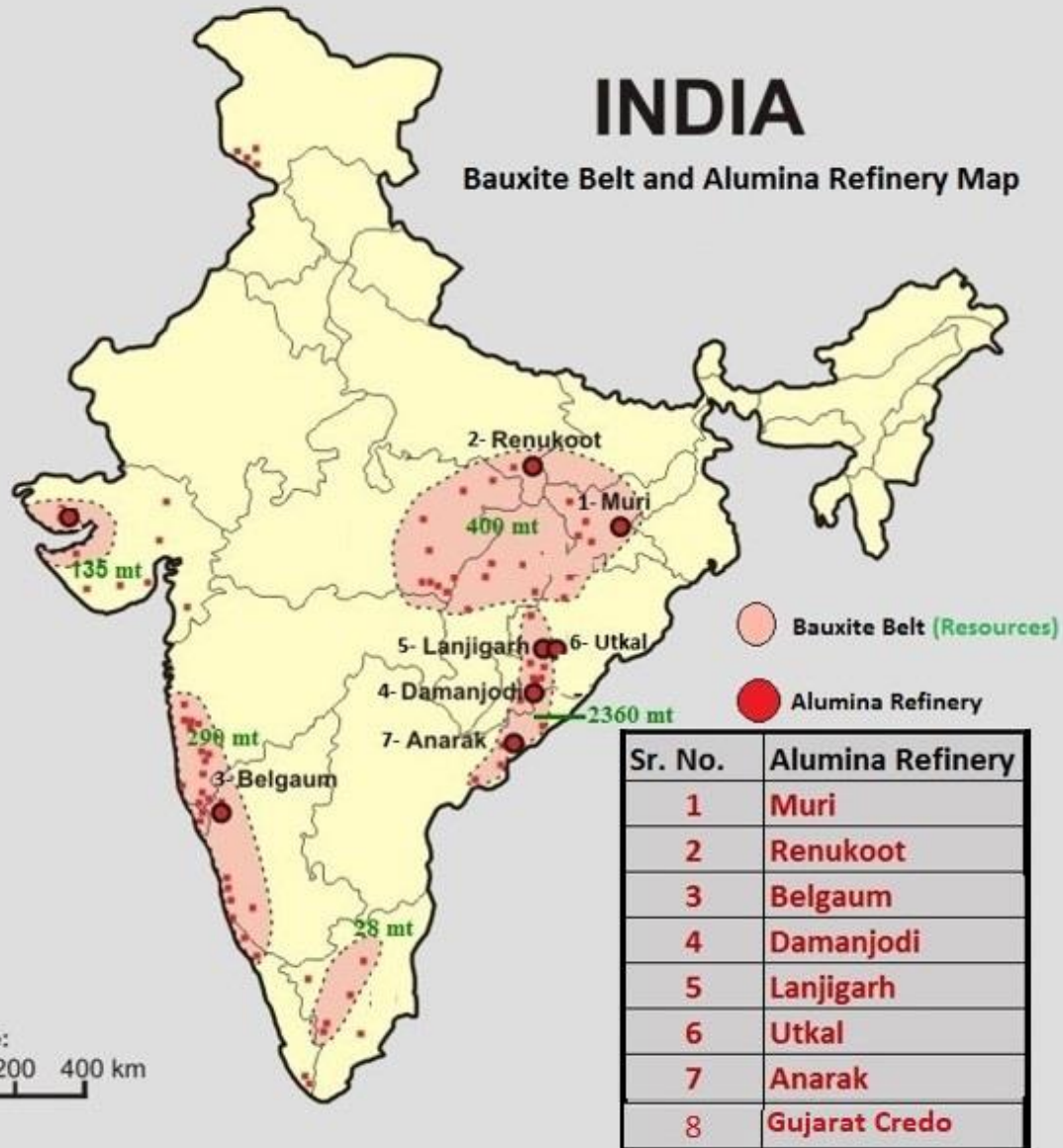
ashok.nandi@ibaas.info

Introduction

- **ALTHOUGH INDIA IS ENDOWED WITH LARGE BAUXITE RESOURCES (~3.8 BILLION TONS), COUNTRY IS EXTRACTING ONLY 22 MILLION TONS BAUXITE PER ANNUM (MTPA). THIS IS THE MAIN REASON FOR THE SLOW GROWTH OF ALUMINA INDUSTRY AND BAUXITE IS IMPORTED TO SUSTAIN THE PRESENT ALUMINA PRODUCTION.**
- **INDIAN HAS INSTALLED CAPACITY OF 8.9 MT OF ALUMINA PER ANNUM, THERE IS A CLEAR SCOPE TO SET UP MORE ALUMINA PRODUCTION FACILITIES IN INDIA.**
- **THE INSTALLED CAPACITY OF PRIMARY ALUMINIUM IN INDIA IS 4.13 MTPA. HOWEVER, IN 2020, ABOUT 3.65 MT OF PRIMARY AND ABOUT 1.1 MT OF RECYCLED METAL WAS PRODUCED. INDIA HAS ONE OF THE LARGEST ALUMINIUM RE-CYCLING INDUSTRY.**
- **IT IS PROJECTED THAT BY 2030, ALUMINIUM REQUIREMENT IN INDIA MAY REACH TO 10 MILLION TONS AND IT MAY BE NECESSARY TO PRODUCE ABOUT 20MTPA ALUMINA AND ABOUT 50-60 MTPA BAUXITE TO SUSTAIN INCREASING METAL DEMAND. LIKE CHINA, INDIA MAY ALSO PARTLY DEPEND ON IMPORTED BAUXITE TO RUN ALUMINA REFINERIES.**

Bauxite Deposits & Alumina Refineries India

INDIA
Bauxite Belt and Alumina Refinery Map



**Panchpatmali
Bauxite Mine of
NALCO**

**Damanjodi
Alumina Refinery
NALCO**



Bauxite Scenario

- THE PRESENT METALLURGICAL GRADE BAUXITE PRODUCTION IN INDIA IS NOT ENOUGH TO MEET THE REQUIREMENTS OF SOME ALUMINA REFINERIES, PARTICULARLY LANJIGARH PLANT OF VEDANTA AND BELGAVI (BELGAUM) OF HINDALCO.
- IT IS LIKELY THAT ANRAK ALUMINA REFINERY OF ANDHRA PRADESH WILL ALSO COME INTO STREAM THIS YEAR AND REQUIRES ABOUT 2 TO 3 MILLION TONS OF IMPORTED BAUXITE PER ANNUM. THEY MAY BLEND IMPORTED ORE WITH LOCAL LOW GRADE BAUXITES AND LATERITES TO PRODUCE ABOUT 1.5 MTPA ALUMINA.
- NALCO WAS ALLOTTED POTTANGI BAUXITE DEPOSIT AND THIS MAY START PRODUCING BAUXITE FOR THE BROWNFIELD EXPANSION OF ALUMINA PRODUCTION AT DAMANJODI ALUMINA REFINERY.
- IN COMING YEARS THERE WILL BE AN EXPANSION OF BAUXITE MINING OF UTKAL ALUMINA, THANKS TO PLANNED INCREASE IN ALUMINA PRODUCTION IN HINDALCO.
- SMALL MINES OF CENTRAL INDIA MAY SLOWLY REDUCE BAUXITE PRODUCTION, HOWEVER, ONE SMALL NEW ALUMINA REFINERIES IS PLANNED HERE.
- GUJARAT AND COASTAL MAHARASHTRA BAUXITE HAVE LIMITED USE AT PRESENT AND EXPORT OF METALLURGICAL GRADE BAUXITE MAY ALSO STOP.

Present and Projected Future Bauxite Production



S.No.	Name of Mine(s)/State	Resources	Owners	Production 2020	Anticipated Production 2025	Anticipated Production 2030	Comments
		MT		MTPA	MTPA	MTPA	
1	Panchpatmali, Odisha	314 and ~140 (Left Over)	Captive Mine of NALCO	7.4	7.5	7.5	South Block Started
2	Pottangi, Odisha	76	NALCO	0	3	3.5	Likely to start
3	Baphlimali, Odisha	195 (Likely to increase)	Captive Mine of Utkal HINDALCO	4.8	9	13.5	Looks Realistic
4	Kodingamali, Odisha	81	Odisha Mining Corporation (OMC)	3	4.5	6	To be expanded in coming years
5	Kutrumali, Odisha	80	Not yet Alloted	0	4.5	9	Likely to start
6	Sasbahumali, Odisha	81	OMC	0	0	3	Optimistic
7	Karlapat, Odisha	207	OMC	0	3	4.5	Optimistic
8	Small Mines of Central, Eastern & Western India	650	HINDALCO, BALCO/VEDANTA	5.5	4.5	2	Boehmitic Bauxite. Small scattered mines of varying quality
9	Gujarat Bauxite	~100 (Kutch & Jamnagar)	GMDC & Others	1	1.5	1.5	Includes low grades, Non-met & Credo refinery
10	Maharashtra Bauxite	~50	Small Mine Owners	0.5	0.5	0.5	Metallurgical Bauxite export may stop.
Total				22.2	38	51	

Alumina Scenario in India

- THE PRESENT INSTALLED CAPACITY OF ALUMINA IS ABOUT 8.9MTPA ALUMINA, HOWEVER, COUNTRY IS PRODUCING ONLY 6.8 MTPA MAINLY DUE TO SHORTAGE OF FEED BAUXITE.
- IN INDIA NALCO'S DAMANJODI IS THE BIGGEST ALUMINA REFINERY, WHICH IS UNDERGOING EXPANSION TO ACHIEVE 3.3 MTPA ALUMINA BY 2023-24.
- THE UTKAL ALUMINA REFINERY OF INDIA IS THE CHEAPEST ALUMINA PRODUCERS IN THE WORLD AS THEY GET GIBBSITIC BAUXITE AT ABOUT US\$9 PER TON. THIS PLANT IS GOING FOR FIRST STAGE OF EXPANSION TO 3MTPA.
- LANJIGARH REFINERY OF VEDANTA IS PRODUCING ONLY ABOUT 1.81MTPA ALUMINA AT PRESENT DUE TO LIMITED AVAILABILITY OF BAUXITE. THE PROJECT HAS AN AMBITIOUS PLAN TO PRODUCE 5 MTPA ALUMINA.
- ANRAK ALUMINA REFINERY MAY START THEIR ALUMINA PRODUCTION THIS YEAR MAINLY BASED ON IMPORTED BAUXITE.
- ONE SMALL SPECIAL ALUMINA REFINERY (CREDO MINERALS) IS WORKING IN GUJARAT AND ANOTHER ONE OF 200,000 TPA IS COMING UP IN CENTRAL INDIA.

Indian Alumina Refineries & Future Projections



S.No.	Alumina Refinery	Installed Capacity 2021	Projected 2025	Projected 2030	Comments
1	Hindalco-Muri	0.45	0.45	0	Requires upgradation and/or change product profile
2	Hindalco-Renukoot	0.7	0.7	0	Require upgradation to sustain
3	Hindalco-Belgaum	0.38	0.5	0.5	Produces special alumina
4	Hindalco- Utkal Alumina	1.50	3.0	4.5	Mderan plant, likely to expand in phases
5	Nalco -Damanjodi	2.28	3.3	3.3	Some old lines may be obsolete by 2030
6	Vedanta	2.00	3.0	4.0	Odisha mines may supply, augmented by import
7	Gujarat Credo	0.06	0.1	0.2	Special Alumina Hydrates
8	Anrak, Andhra Pradesh	1.5	1.5	3.0	Likely to start in 2021 mainly based on imported bauxite
9	New small Plant Central India	0	0.25	0.5	Feasibility stage
10	Greenfield Kutrumali /Sijimali, Odisha	0	1.5	3.0	Likely as deposits recommnded by Government
	Total	8.87	14.3	19.0	

Alumina Refineries



**Utkal Alumina Refinery of
India**

(1.6 Mt/Annum) –

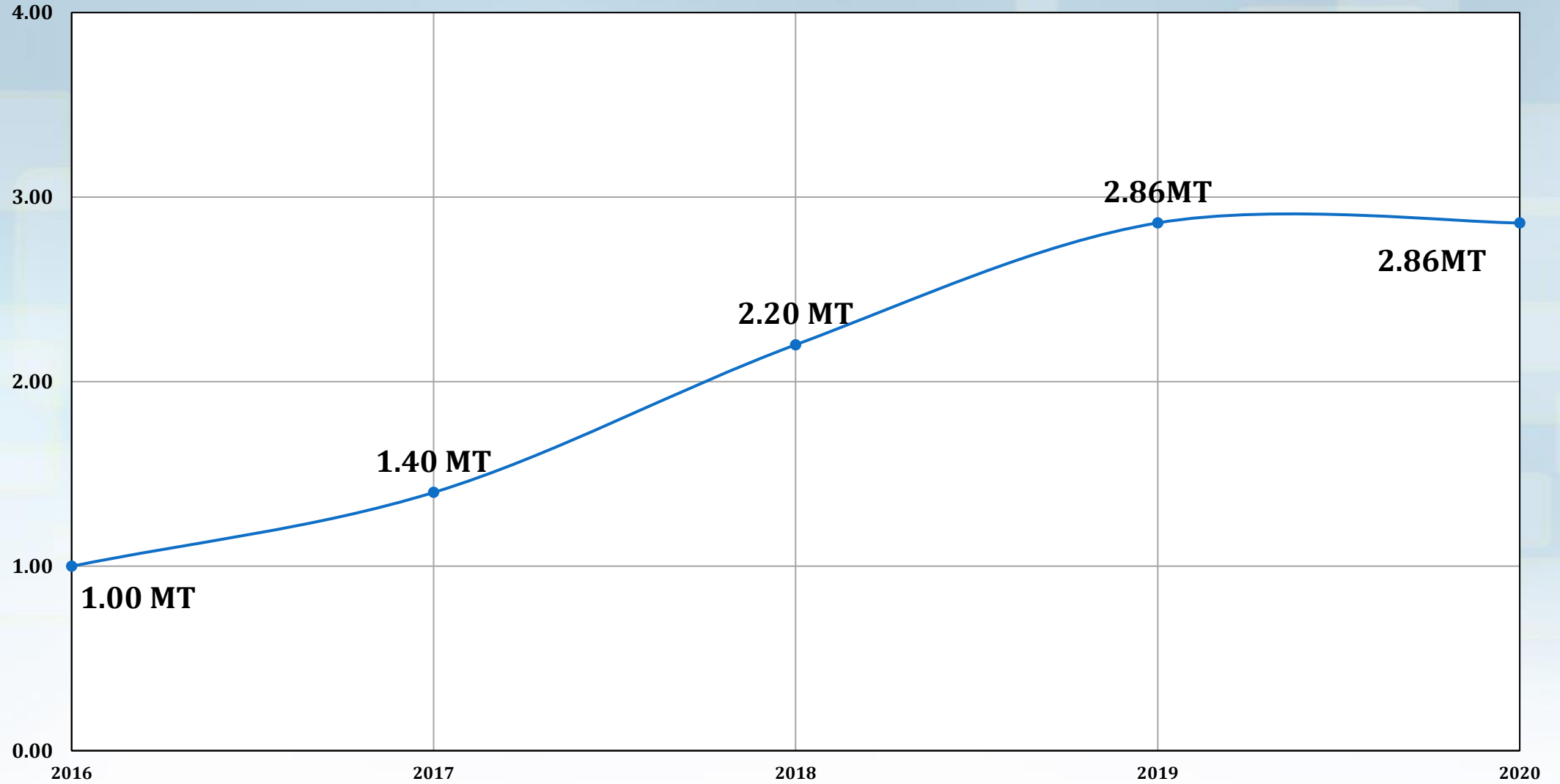
**One of the Cheapest
Alumina**

Producers of the World

**Hindalco- Muri
India's old
Alumina refinery**

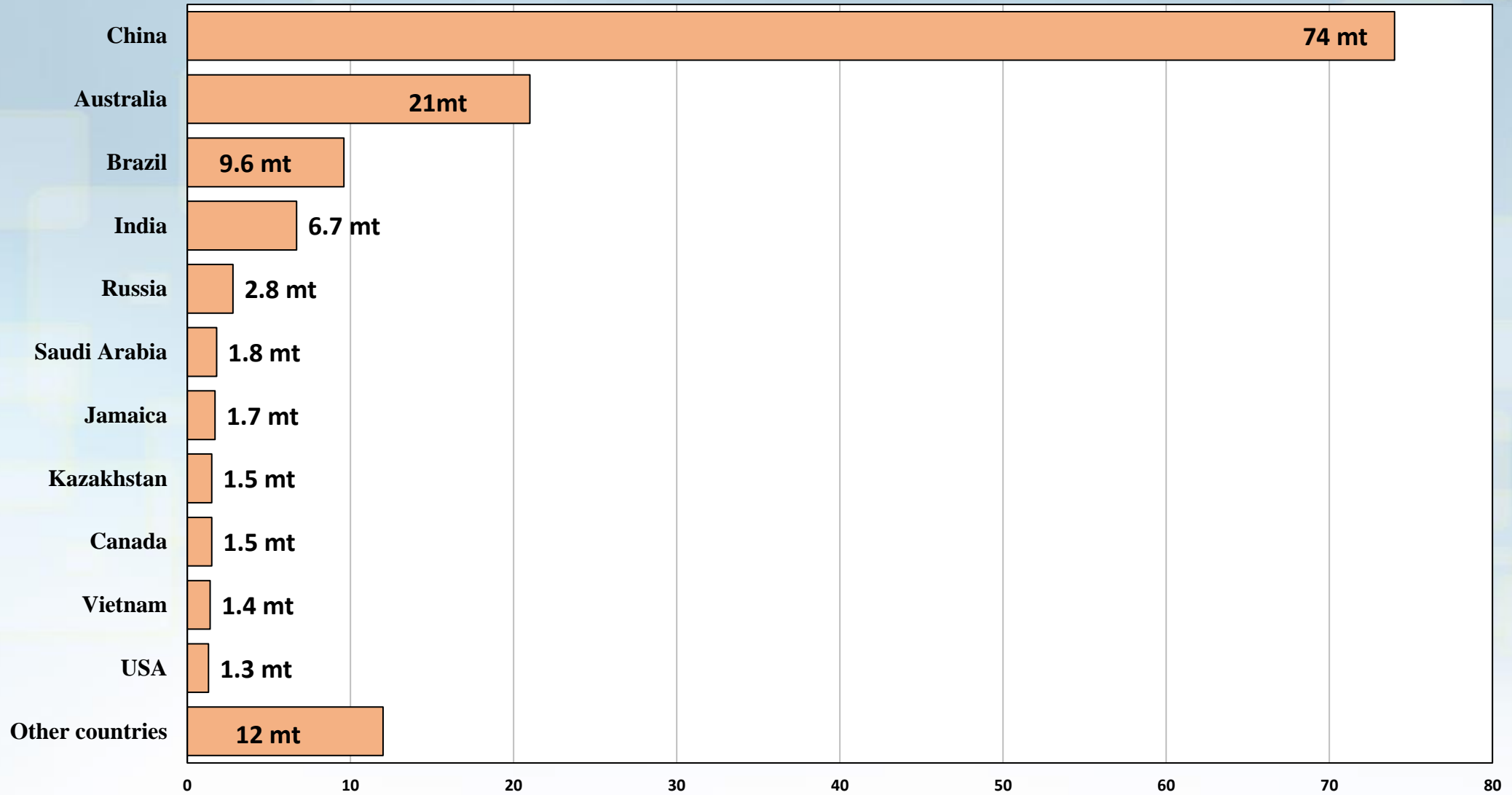


Alumina imports to India (MTPA)



SOURCE: CMIE Database, Trade Map, Ministry of Commerce & industry, Deloitte Analysis

Alumina Production By Major Counties 2020 (MT)



Source: statista.com

Aluminium Metal Scenario in India



- **DESPITE LIMITED BAUXITE AND ALUMINA, ALUMINIUM METAL CAPACITY IS INCREASING IN INDIA THANKS TO INCREASING DEMAND.**
- **VEDANTA IS THE LARGEST ALUMINIUM PRODUCER IN INDIA AND THE INSTALLED CAPACITY OF JHARSUGUDA PLANT IS NOW 1.75 MTPA AND SLOWLY COMPANY MAY ACHIEVE THIS TARGET.**
- **THE OLD BALCO SMELTER OF VEDANTA IS NOW PRODUCING 0.56 MTPA, WHICH CAN BE CONSIDERED AS SECOND LARGEST SMELTER.**
- **THE DOMESTIC ALUMINA IS NOT ENOUGH TO SUSTAIN THIS METAL PRODUCTION; THEREFORE, VEDANTA MAINLY IMPORTS ALUMINA FOR JHARSUGUDA SMELTER.**
- **ADITYA ALUMINIUM IS A NEW SMELTER-POWER PLANT COMPLEX AT LAPANGA, NEAR JHARSUGUDA WITH 0.36 MTPA SUPPORTED BY A 6 X 150 MW COAL BASED CAPTIVE POWER. BOTH LAPANGA AND MAHAN EMPLOY AP 36 TECHNOLOGY. ALUMINA IS PRIMARILY SOURCED FROM UTKAL ALUMINA, A 100% SUBSIDIARY OF HINDALCO**

Aluminium Smelters In INDIA



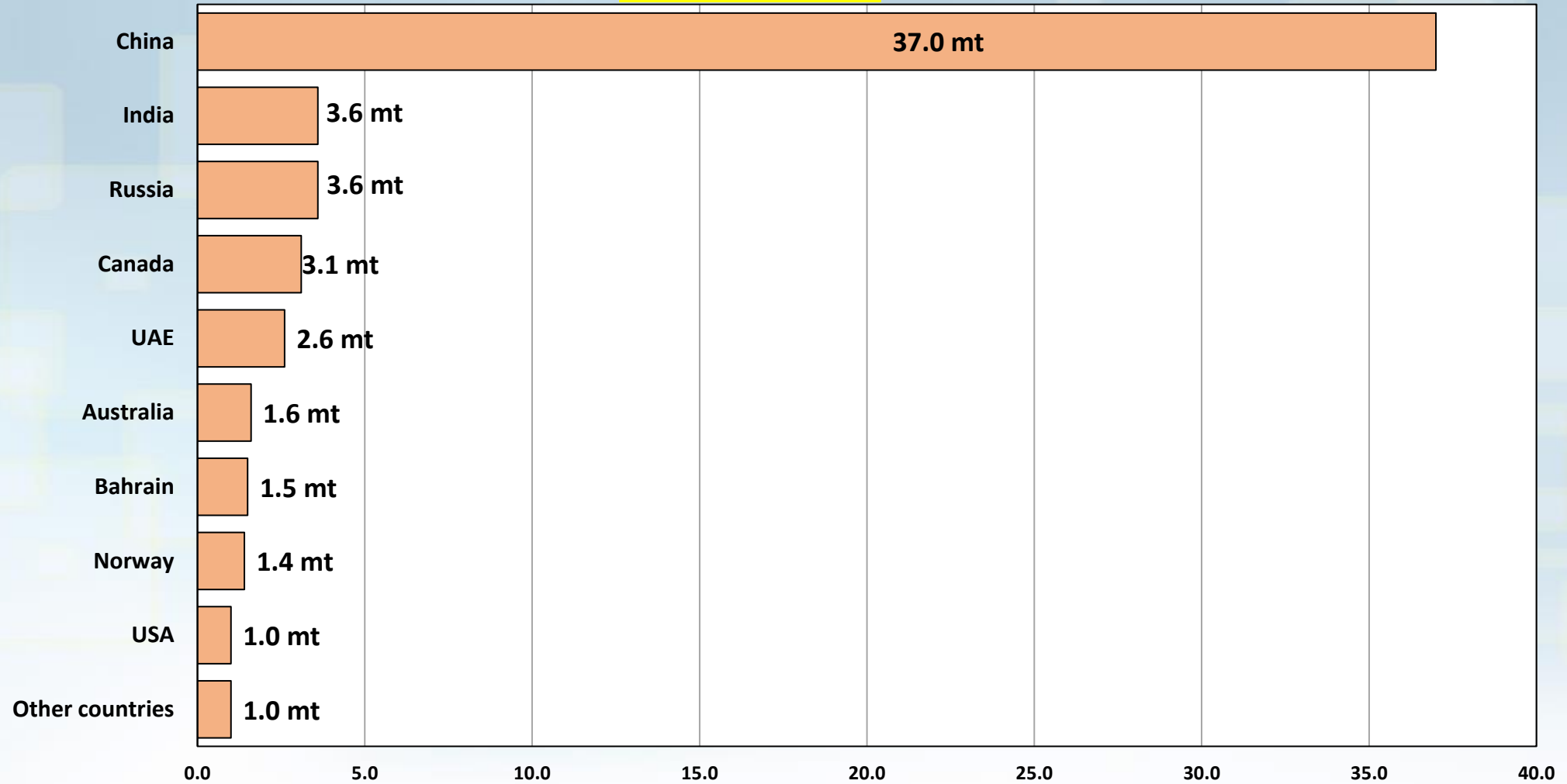
S.No.	Aluminium Smelters	Installed Capacity mtpa	Production in 2020 mtpa
1	VEDANTA, Korba	0.57	0.56
2	VEDANTA, Jharsuguda	1.75	1.36
3	NALCO, Angul	0.46	0.41
4	HINDALCO, Aditya/Lapanga	0.36	1.31
5	HINDALCO, Mahan	0.36	
6	HINDALCO, Renukoot	0.41	
7	HINDALCO, Hirakud	0.22	
	Total	4.13	3.64

SOURCE: CMIE Database, Trade Map, Ministry of Commerce & industry, Deloitte Analysis

Indian Aluminium Smelters

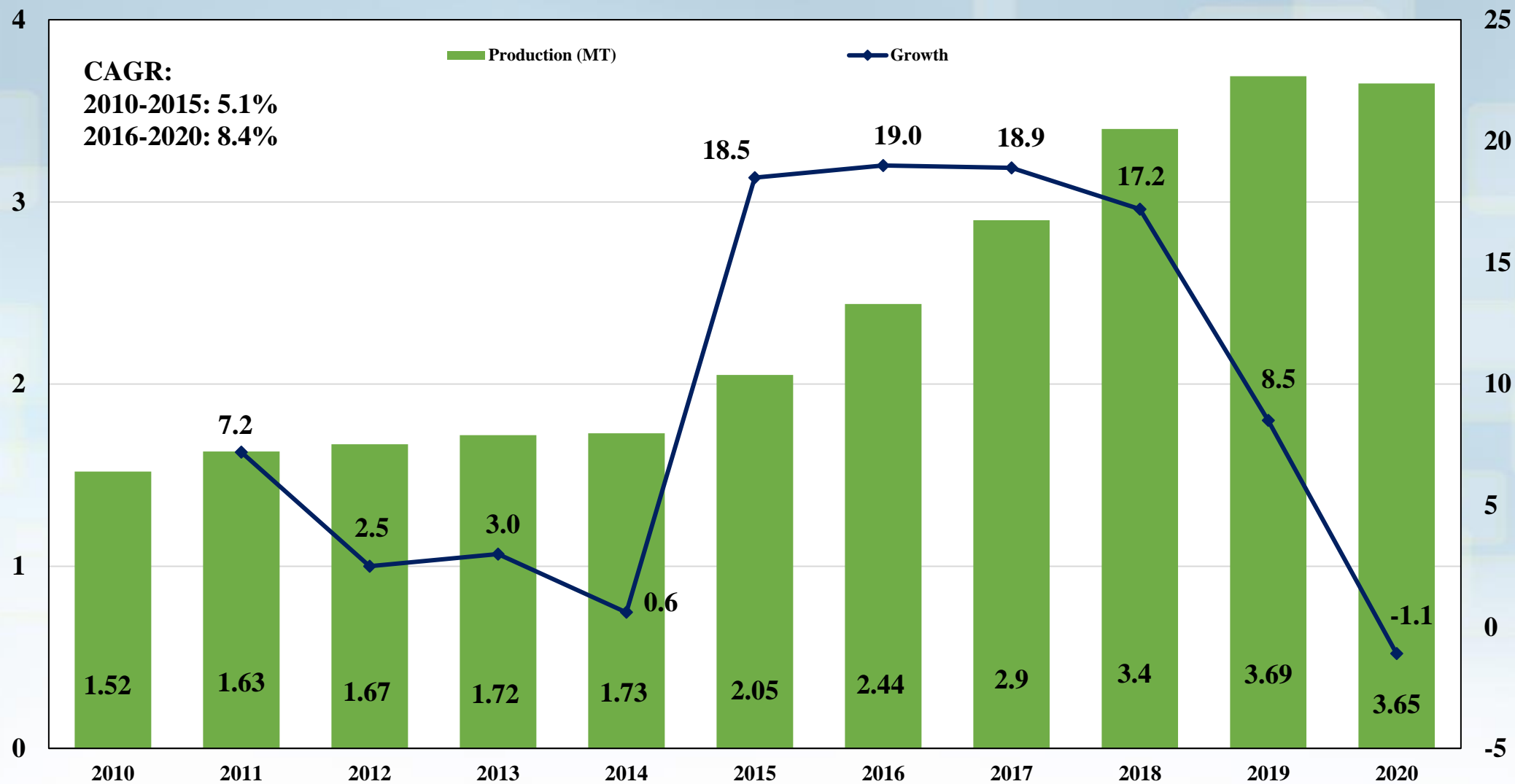
S.No.	Aluminium Smelters	Installed Capacity mtpa	Production 2020 mtpa	Comments
1	VEDANTA, Korba	0.57	0.56	Old Balco Smelter-Upgraded by Vedanta
2	VEDANTA, Jharsuguda	1.75	1.36	Modern Smelter-Largest capacity
3	NALCO, Angul	0.46	0.42	Public Sector, requires upgradation
4	HINDALCO, Aditya/ Lapanga	0.36	1.31	New Smelter Aditya Aluminium
5	HINDALCO, Mahan	0.36		New Smelter
6	HINDALCO, Renukoot	0.41		Old Smelter
7	HINDALCO, Hirakud	0.22		Old smelter Based on Hydel Power
	Total	4.13	3.65	

Aluminium Metal Production By Major Counties 2020 (MT)



Source: statista.com

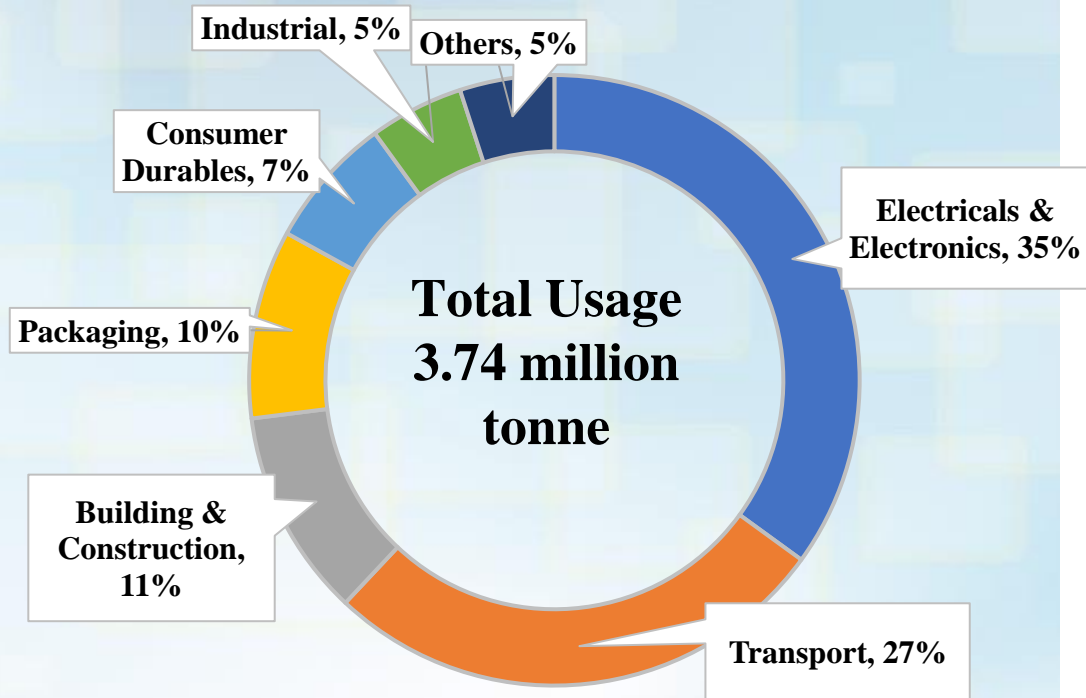
Indian Aluminum Production (MT)



Aluminium Uses in India



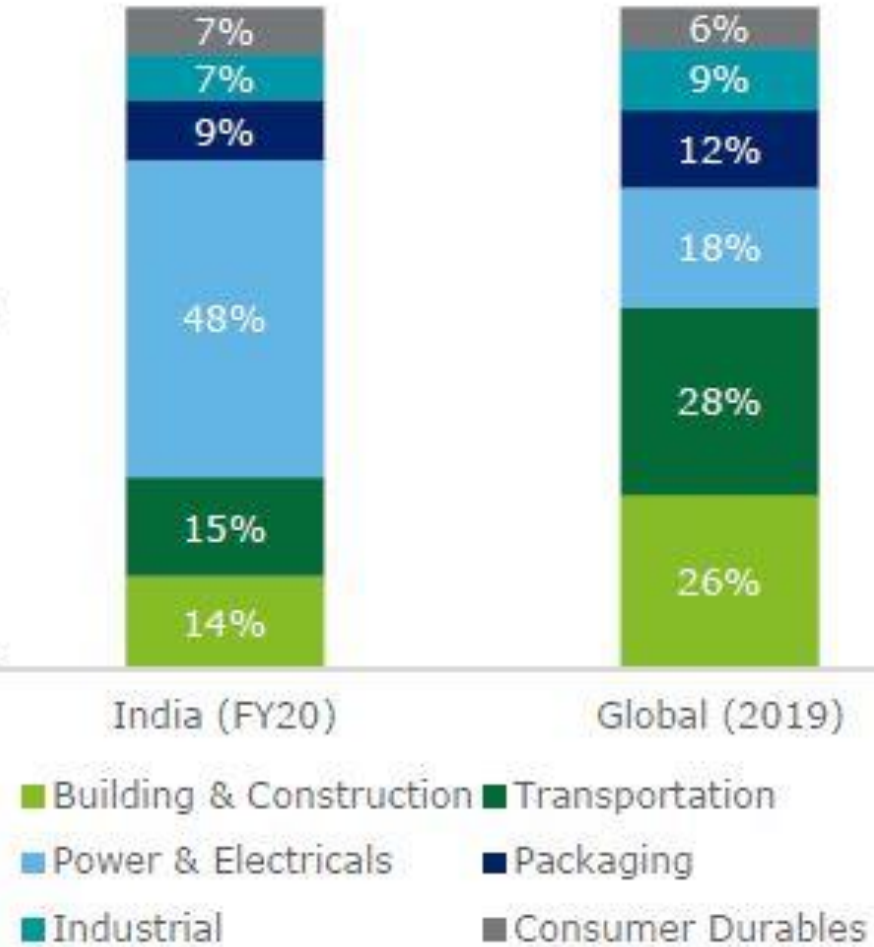
Aluminium usage by end use FY 2019-2020 (000 tonne)



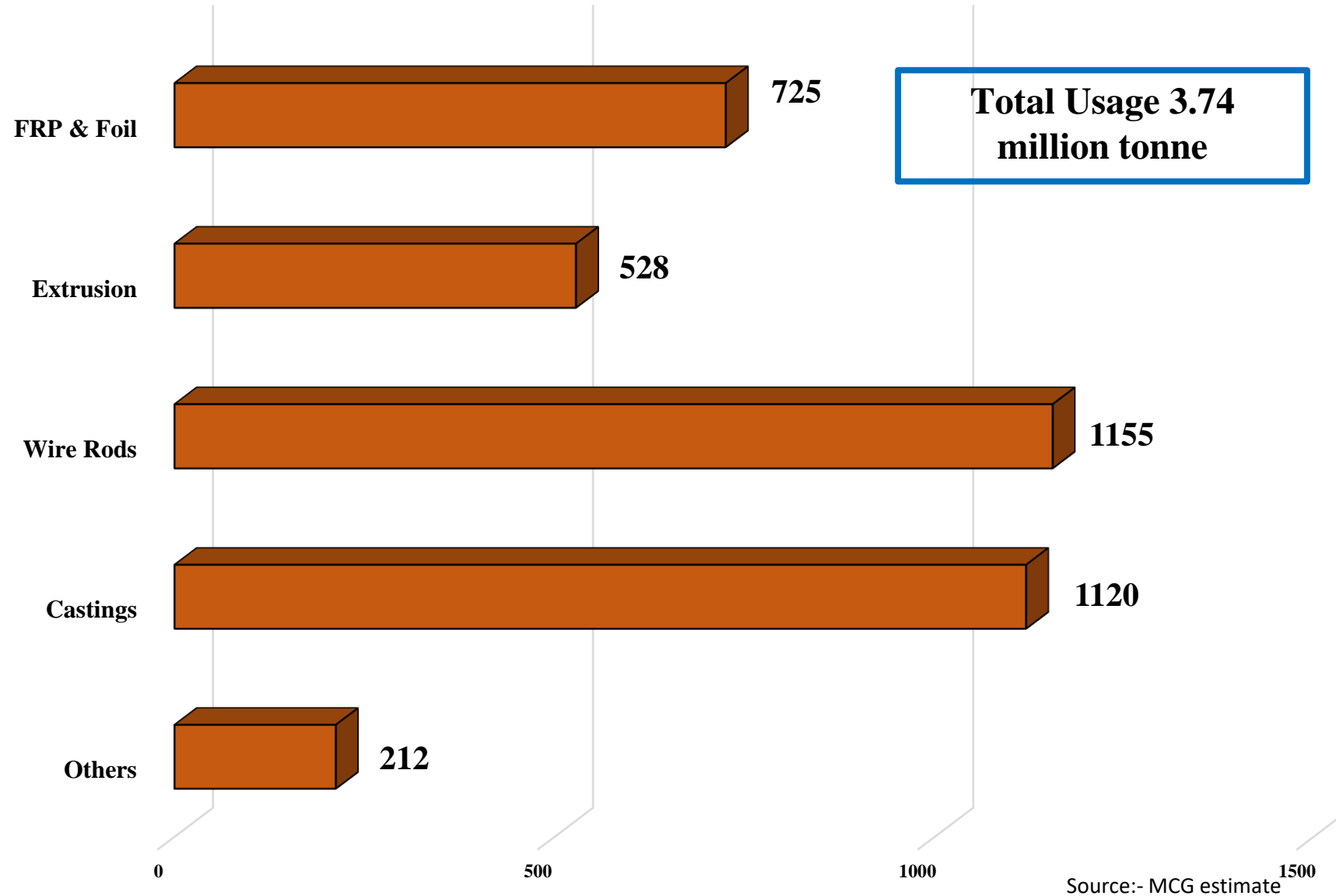
Source:- MCG estimate

Demand Drivers

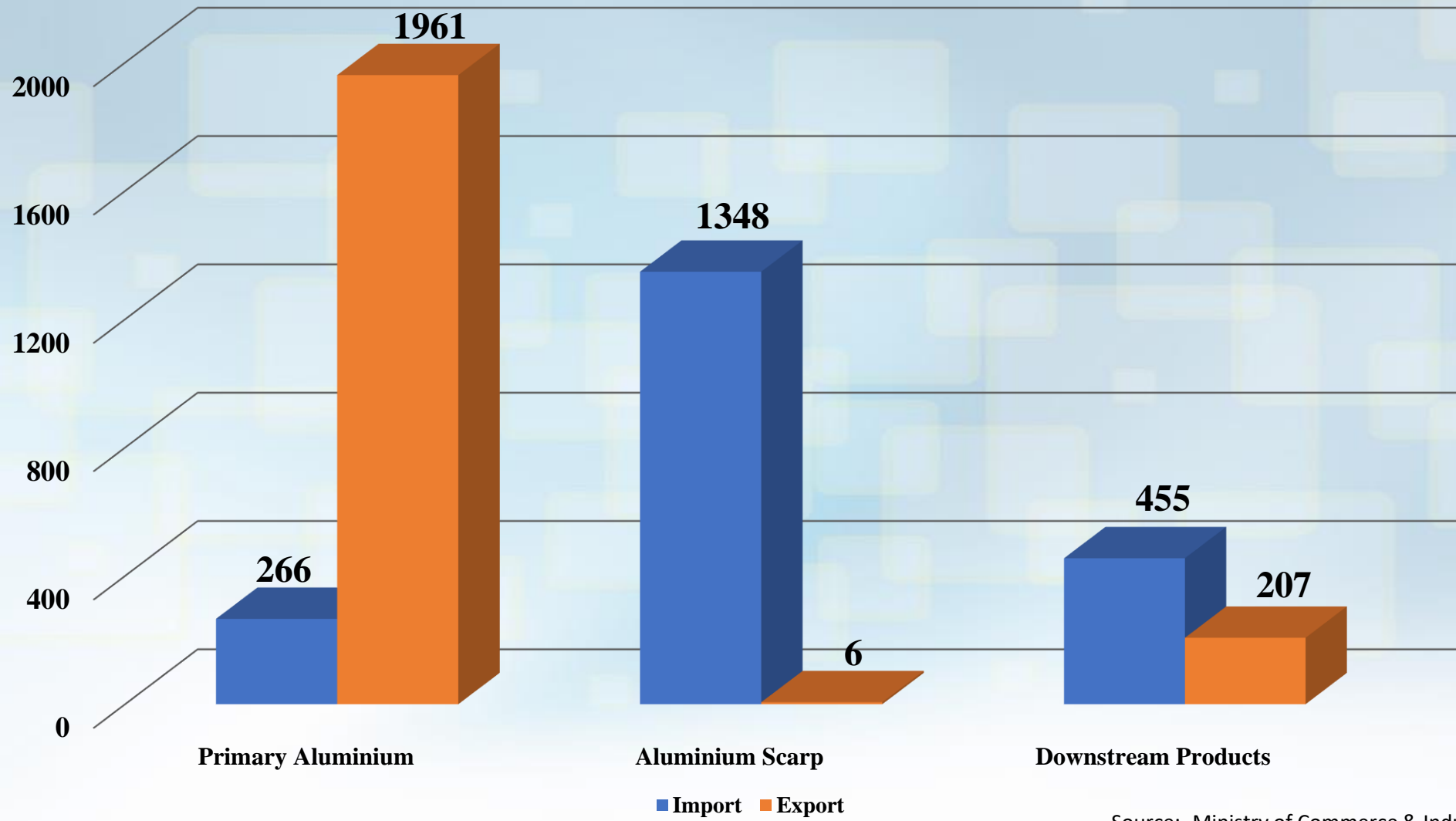
Aluminium Consumption by Sector (in million tonnes)



Aluminium usage by products FY 2019-2020 (000 tonne)



Key import/export data FY 2019-2020 (000 tonne)



Source:- Ministry of Commerce & Industry

Opportunities for Aluminium Consumption Growth in India

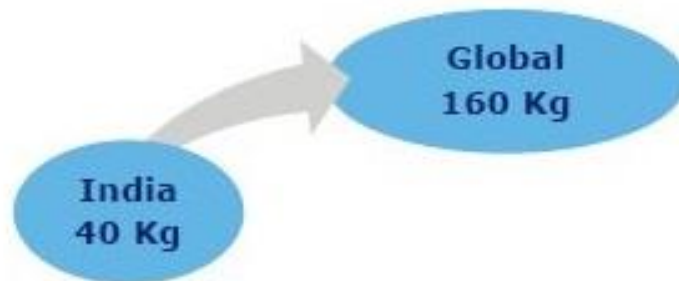


Aluminium Usage Intensity

Aluminium applications



Average Aluminium share in passenger vehicles



Electric Vehicles expected to further drive consumption by 2030

Opportunities for Aluminium Consumption Growth

National Infrastructure pipeline (NIP) - INR 111 lakh crore investment by 2025



PMAY (Urban + Gramin)

- Rural per capita aluminium consumption is around 1 kg, while national average is 2.5 kgs



Sagarmala project

- Port-led development program with an investment outlay of INR 6 lakh Cr by 2025



Bharatmala project

- Road and highway development program with total infra outlay of INR 6 - 8 lakh Cr by 2022



Gas Pipeline network expansion

- City Gas Distribution (CGD) in 300 districts with an outlay of INR 1.2 lakh Cr



National Solar Mission

- Target to achieve 226 GW installed renewable capacity by 2022, and ~300 GW by 2025



Dedicated freight corridors

- 6 dedicated railway freight corridor project (9000 km) with ~ INR 4 -5 Lakh Cr investment

...and others such as Jal Jeevan Mission, UDAN, Metro, Smart cities

Source:- Deloitte analysis

Conclusions

- **INDIA IS WELL PLACED TO INCREASE THE PRODUCTION OF ALUMINA AND ALUMINIUM IN THE COUNTRY, HOWEVER, THE LIMITED AVAILABILITY OF DOMESTIC BAUXITE CAUSING ISSUES.**
- **LIKE CHINA, INDIA MAY ALSO PARTLY DEPEND ON IMPORTED BAUXITE TO SUSTAIN INCREASING ALUMINA PRODUCTION, ALTHOUGH SOME OF THE DEPOSITS MAY OPEN UP IN THE FUTURE.**
- **DESPITE THE SHORTAGE OF BAUXITE & ALUMINA, SMELTERS ARE EXPANDING TO FULL FILL THE INCREASING DEMAND OF METAL IN THE COUNTRY.**
- **IT IS EXPECTED THAT ALUMINIUM METAL DEMAND IN THE COUNTRY WILL REACH 10MTPA BY 2030 AND PART OF THIS REQUIREMENT WILL BE MET BY IMPORTING SCRAPS.**
- **INDIA'S 48% CONSUMPTION OF ALUMINIUM IS IN POWER AND ELECTRICAL INDUSTRY, FOLLOWED BY TRANSPORT AND BUILDING & CONSTRUCTION INDUSTRY.**



**INTERNATIONAL BAUXITE,
ALUMINA & ALUMINIUM SOCIETY (IBAAS)**

Jointly with

**JAWAHARLAL NEHRU ALUMINIUM
RESEARCH DEVELOPMENT AND DESIGN CENTRE (JNARDDC)**

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(IBAAS-JNARDDC 2021)**

**SUSTAINABILITY CHALLENGES OF BAUXITE,
ALUMINA & ALUMINIUM INDUSTRY**

With

**A ONE-DAY ALUMINIUM STEWARDSHIP INITIATIVE (ASI)
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THANKS!

Dr. ASHOK KUMAR NANDI
PRESIDENT

INTERNATIONAL BAUXITE, ALUMINA AND ALUMINIUM SOCIETY (IBAAS)

info@ibaas.info; ashok.nandi@ibaas.info

Web site: <http://www.ibaas.info/>

Cell Number +91 9823015772; Office Contact Number +91 9373818839

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