International Journal of Humanities and Social Science Invention (IJHSSI)
ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714
www.ijhssi.org ||Volume 9 Issue1 Ser. II || Jan, 2020 || PP 65-79

International and Domestic Aluminium Market Scenario

Dr. Madhubrata Satpathy
(Assistant Professor, department of economics, BJB Autonomous College, Bhubaneswar)

Date of Submission: 05-02-2020 Date of Acceptance: 20-02-2020

I. INTRODUCTION

Aluminium, a silvery white metal, is one of the most widespread metals on earth making up more than 8% of the earth's core mass. Aluminium is one of the world's most abundant metals, typically extracted from bauxite ore. Guinea, Australia and Brazil are cited as hosting the largest bauxite reserves, while China, Russia and Canada are leading the way in terms of aluminium smelter production levels. Chalco, Rusal, Alcoa and Rio Tinto are ranked among the largest aluminium producers worldwide.

The most commercially mined aluminium ore is bauxite, as it has the highest content of the base metal. The primary aluminium production process consists of three stages. First is mining of bauxite, followed by refining of bauxite to alumina and finally smelting of alumina to aluminium. India has the fifth largest bauxite reserves with deposits of about 3 bn tonnes i.e. 5% of world deposits. India's share in world aluminium capacity rests at about 3%.

The aluminium production process can be categorized into upstream and downstream activities. The upstream process involves mining and refining while the downstream process involves smelting and casting & fabricating. Downstream-fabricated products consist of rods, sheets, extrusions and foils.

Power is amongst the largest cost component in manufacturing of aluminium, as the production involves electrolysis. Consequently, manufacturers are located near cheap and abundant sources of electricity such as hydroelectric power plants. Alternatively, they could set up captive power plants, which is the pattern in India. Indian manufacturers are medium cost producers of the base metal due to access to captive power, cheap labour and proximity to abundant supply of raw material, i.e., bauxite.

The Indian aluminium sector is characterised by large integrated players like Hindalco and National Aluminium Company (Nalco). The other producers of primary aluminium include Bharat Aluminium (Balco), a subsidiary of Vedanta Resources.

Aluminium offers a rare combination of valuable properties. Aluminium has been continuously finding new applications due to rising price competence, superior weight to strength ratio, corrosion resistance, formability, dampness etc.

On the industrial side, aluminium is heavily used in electrical power transmission, machinery and equipment, and construction. Housing, in particular, makes 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 conditioners, furniture and vehicles.

BAUXITE MARKET

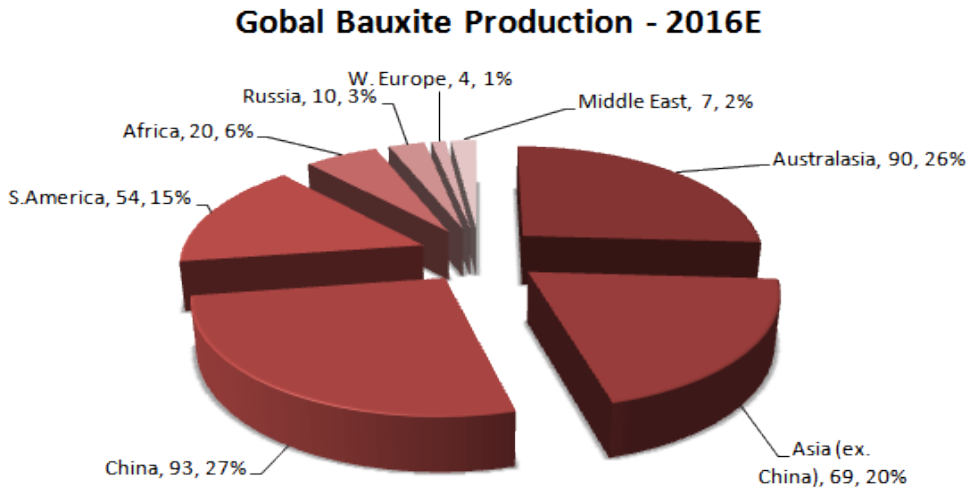
India has abundance of bauxite and occupies 6th place in the world in bauxite reserves. According to the data collected by the Indian Bureau of Mines, bauxite resources in India stand at 3480 million tonnes out of which 593 million tonnes are of the reserved category(probable and proven) and 2887 million tonnes are yet to be completely explored.

State bauxite reserves in India are as follows

State	Reserves(proven & probable)	Remaining resources
Odisha	300	1511
Gujarat	114	123
Chhattisgarh	74	96
Others	105	1056
Total	593	2887

Source: NALCO

East coast bauxite has numerous advantages such as low mining cost, low capital cost, high recoveries, low soda consumption, low operating cost, Low energy consumption (less than 12 kwh/tonne) and better productivity.



Most of the producers of primary aluminium in the country don't have adequate bauxite reserves left in their mining leases to fulfil the requirement of existing capacity of their alumina refineries. Out of more than 3.5 billion tonnes of bauxite resources in the country, only 400 million tonne have been under operating leases. Grant of mining lease, environmental clearance, land acquisition and forest clearance have been the prominent constraints in development of new mines. The balance resources need to be developed and utilized properly and this needs meticulous planning and support by the Government.

International production of bauxite:

The major regions in the world which produce bauxite are:

Regions	2013	2014	2015
Latin America	54529	55213	54529
Western Europe	2980	2980	2980
Eastern Europe	9130	9130	9130
Africa	19020	18599	19022
Asia	70796	76886	83686
Oceania	71070	69494	71600
Total	227525	232802	240947

Figures in '000MT source Reuters

The top 5 countries, Guinea, Australia, Brazil, Vietnam and Jamaica, hold over 70% of the world's documented bauxite reserves. Of these counties only Australia, Brazil and Jamaica have realised their potential as bauxite mining or alumina producing nations. While still a major bauxite producer sovereign risk has stunted development of the industry in Guinea to a fraction of its full potential. By the end of 2015, the reserves of bauxite in Vietnam were estimated to approximately 2.1 billion metric tons. Thus, Vietnam is among the global top countries based on bauxite reserves.

ALUMINA

Alumina is a white granular material and is properly called aluminium oxide. The Bayer's refining process is used by alumina refineries to extract Alumina from Bauxite, which is further transformed into aluminium metal in the smelting process Hall-Heroult process.

The world production and consumption statistics for the metallurgical grade alumina are:

Region	2013	2014	2015
North America	5525	5167	5465
Asia (ex China)	5568	7039	8874
Europe	8883	8783	8703
Australasia	21214	20216	19902
South America	13080	13475	12758
China	47122	51604	56826
Total production	101394	106283	112527
Total consumption	98697	105722	112026

Figures in '000MT source: CRU monitor Alumina, Dec'15

Domestic alumina production:

Company	2013	2014	2015
NALCO	1762700	1912600	1826500
HINDALCO	1317000	1619000	2259000
VEDANTA LTD.	527000	524000	977000
TOTAL	3606700	4055600	5062500

Here is a look at the major players in the global alumina production industry

Major alumina producers in the world:

Sl. no	Name of the company	Country	Capacity	Production 2015
1	Chalco	China	15.90	14.31
2	Xinfa Aluminium Electrical	China	12.40	10.25
3	Alcoa	USA	11.18	9.69
4	Weiqiao textile Group	China	9.01	9.01
5	Rio Tinto	Canada	8.64	7.79
6	UC Rusal	Russia	8.07	7.36
7	Alumina Limited	Australia	6.83	6.03
8	Hydro Aluminium	Norway	5.55	5.35
9	Hangzhou Jingjiang Group	China	4.80	3.93
10	South32	Australia	3.05	3.05
	NALCO	India	2.28	1.91

Alumina in Metric Tonnes

ALUMINIUMINDUSTRY STATISTICS

MAJOR INTERNATIONAL PRODUCERS

Aluminium represents the second largest metals market in the world in volume terms, after steel. Global aluminium production grew from 50.59 million tonnes in 2013 to 5415 million tonnes in 2014 registering growth rate of 6.9% while global consumption grew by 7.4% from 50.26 million tonnes in 2013 to 53.97 million tonnes in 2014. The market recorded a marginal surplus of 0.14 million tonnes in 2014. Global production reached 57.5 Million tonnes during 2015 and marginal surplus is around 1 million tonne in 2015.

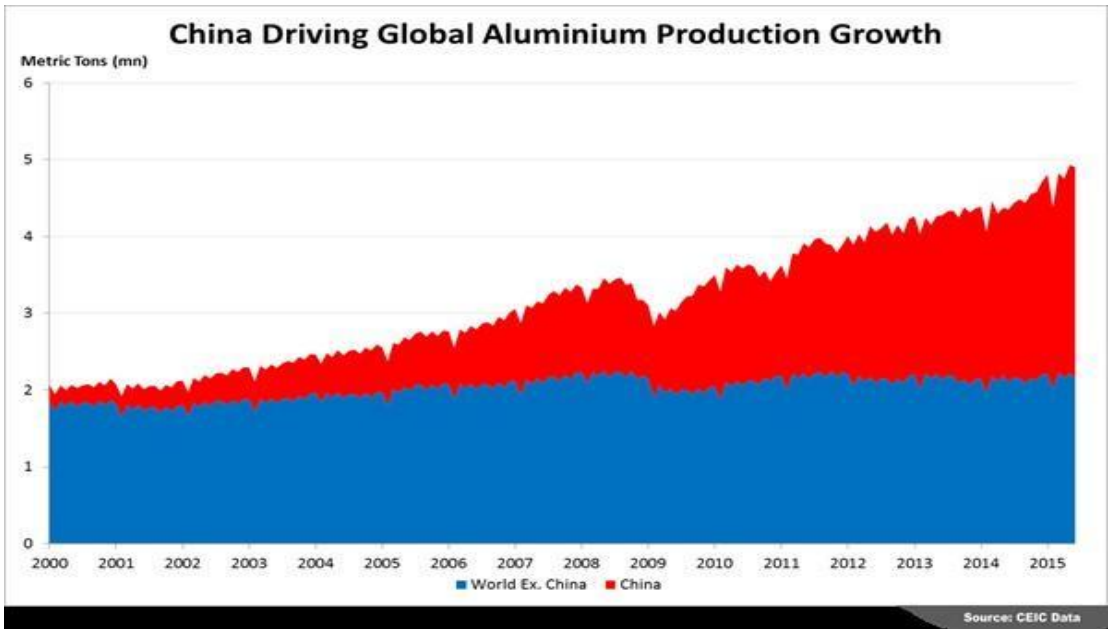
Production of aluminium by major producers around the world:

Sl. No	Name of Company	Country	Capacity	Production (2015)
1	Weiqiao Textile Group	China	4.60	4.20
2	UC Rusal	Russia	3.90	3.65
3	Rio Tinto	Canada	3.46	3.34
4	Chalco	China	3.40	3.02
5	Alcoa	USA	3.40	2.94
6	Emirates Global Aluminium	UAE	2.39	2.39
7	East hope	China	2.70	2.29
8	Xinfa aluminium Electrical	China	2.67	2.18
9	Hydro aluminium	Norway	2.07	1.84
10	China power investment	China	1.89	1.77
	NALCO	India	0.46	0.37

Aluminium in Metric Tonnes

China continues to be the world's largest producer and consumer of aluminium with a production level of 28.3 million tonnes in 2014 constituting roughly 52% of the total production and consumption level has reached 27.2 million tonnes constituting around 50% of world consumption during the same period.

Although a series of capacity closures was announced in China in the last year, the Chinese production will actually increase in 2016 as smelting projects expand output. It is predicted that Chines primary aluminium output will rise by about 4.1% y-o-y to 32.5 million tonnes in 2016. Production in the rest of the world is likely to remain unchanged. As a result, world aluminium output is likely to rise from 57.5 million tonnes in 2015 to 58.8 million tonnes in 2016.



II. ENERGY SOURCES

Aluminium production in the United States generally takes two forms, with very different energy requirements. Primary production involves making aluminium products from raw material or ingots, which is highly energy intensive, especially electricity intensive. Secondary production involves recycling aluminium scrap to form new products, a significantly less energy-intensive process. Aircraft use primary aluminium because of quality and consistency restrictions, while beverage cans and automotive castings often use secondary aluminium.

Primary processing includes processing raw materials and manufacturing aluminium. The subsector secondary processing includes melting scrap. The other two subsectors are downstream products that can be made either from primary or secondary aluminium.

Primary production starts with bauxite ore, which, in the United States, is usually imported from Jamaica and South America. Bauxite is then converted into aluminium oxide, or alumina, using natural gas at plants located in the southern United States. After alumina is extracted from bauxite ore, further processing called 'smelting' is necessary to convert it into aluminium. In this process, alumina is dissolved in a solution and a strong electric current is applied. This process has generally remained unchanged since its invention in 1886.

Because smelting requires significant amounts of electricity, some primary aluminium smelters can be found in areas with lower-cost electricity, often in areas with rich hydroelectric resources, such as the Pacific Northwest and Upstate New York. However, other smelting plants can be found in the Midwest, Appalachia, and Texas. New primary aluminium smelters are not expected to be built in the United States, although existing ones are expected to increase capacity utilization or expand production capability.

Secondary production is aluminium produced from aluminium scrap. Beverage cans and aluminium automotive parts, such as engine blocks, are two of the most common types of items made from secondary aluminium. Aluminium building materials are also recycled. Producing secondary aluminium involves cleaning and separating aluminium scrap from other materials and melting it down in a furnace, usually fired by natural gas. Compared to the energy requirements of primary production, secondary production is much less energy intensive.

Production fluctuates considerably to meet U.S. aluminium demand, which changes with economic conditions. The United States has been a net importer of aluminium since 1992. For domestic production, the

share of primary production has steadily declined while secondary production has generally remained steady. The decline in production and net imports reflect the recession and slow recovery of the economy.

III. MAJOR DOMESTIC PRODUCERS

Indian aluminium industry

Indian aluminium industry was first established in the year 1808 and it took 46 years to make its production commercially viable. In 1938, the Aluminium Corporation of India's plant was commissioned in collaboration with ALCAN, Canada, which had a capacity of producing 2500 TPY. This marked the onset of aluminium production in India. However, significant developments in aluminium production were witnessed only after 1960 when HINDALCO started operating which had a capacity of 20,000 TPY.

BALCO in the public sector was commissioned in 1975(privatized in 2001). Deficit with regular import of aluminium continued till **National Aluminium Company Limited** (**NALCO**) came into operation in 1987. Presently NALCO is the only public sector enterprise involved in production of alumina and aluminium in India. NALCO initiated export of alumina and aluminium from India for the first time in 1988. NALCO is mainly associated with upstream segment production whereas Hindalco and Vedanta are more into downstream expansion.

The total domestic production of aluminium metal in 2015 grew by 18.3% y-o-y from 1.73 million tons in 2014 to 2.05 million tons in 2015. Total domestic consumption of primary metal during FY 2014-15 remained unchanged with respect to previous year levels at 1.58 MT. Primary aluminium exports by Indian producers showed 58% growth from 0.49 MT in 2014 to 0.77 MT in 2015. The production has been increasing ever since with the domestic producers ramping up output at new smelting assets. Production level is expected to reach 2.5 million Tons in this year.

Indian domestic aluminium production (in MT)

Company	2012-13	2013-14	2014-15
NALCO	403384	316492	327070
HINDALCO	547416	618286	835896
VEDANTA LTD	773946	795355	883590
TOTAL	1724746	1730133	2046556

Domestic primary aluminium consumption (in MT)

Company wise domestic sale/import	2012-13	2013-14	2014-15
NALCO	258941	218420	265327
HINDALCO	457844	473651	484702
VEDANTA LTD	661933	547251	5506758
IMPORTS(primary Al)	304703	339392	319415
Total(primary consumption)	1683421	1578714	1576202

Indian primary producers export sale (in MT)

Company	2012-13	2013-14	2014-15
NALCO	144161	101243	60752
HINDALCO	89586	138366	334167
VEDANTA LTD	111012	247472	374156
TOTAL	344759	487081	769075

By the end of 12th plan period, the aluminium capacity in India is expected to reach about 4.1 million tonnes.

The domestic aluminium producers are also pursuing brownfield and Greenfield expansion programmes with commensurate captive power generation. The proposed plans for these ventures of domestic aluminium smelters are as given.

Company	Location	Aluminium('000t)
NALCO	ODISHA	1000(Greenfield including overseas)
HINDALCO	JHARKHAND	359(Greenfield)
total		1359

Indian aluminium capacity and production (KT)

Company	Installed capacity	Production FY15	%utilization
BALCO	575	324	56%
VEDANTA LTD	550	520	95%
VEDANTA LTD SEZ	1190	20	2%
NALCO	460	327	71%

HINDALCO	1354	836	62%
TOTAL PRIMARY PRODUCTION	4129	2026	49%

INVESTMENT BY PRIMARY PRODUCERS

The total production of primary aluminium has increased from 2.1 million to 4.1 million tons per annum after investment of 1.2 lakh crore. GDP contribution in mining sector is 10% currently and at 4.1 MT will exceed 20%.

IV. SMELTER CAPACITY

With the whole of 2015 witnessing excessive production of primary aluminium in China, cheap Chinese imports and low prices for the silver white metal the aluminium producers of India are banking on the US companies for sustaining the export market. The overall global commodity free fall was the main cause of the mayhem for Indian producers. Aluminium prices dropped from a monthly average of $2,455 a metric ton in 2011 to the recent $1,468 per MT. A large number of Indian aluminium majors are now staring down capacity shutdowns and operational losses. Companies such as Vedanta have been negatively affected.

There are three factors aluminium producers are banking on: more and newer innovative uses of aluminium, especially by the US, India's economy improving and production at its height and, finally, support from the Indian government via additional taxes and tariffs to stop the influx of cheap imports.

Five aluminium smelters having total installed capacity of 19.07 lakh TPY generated by four companies were operational in the country in 2013-14. 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 three 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.

NALCO has been operating a smelter plant and a power plant at Angul and another smelter unit of 0.5 MTPA with a power plant of 1050 MW capacity at a cost of Rs.22,000 crore is being planned at Sundargarh district of Odisha. The company has already started pre-project activities for setting up of fifth stream of 1 MTPA capacity in existing Alumina Refinery at Damanjodi at an estimated investment of Rs.5,540 crore.National Aluminium Co Ltd is planning to invest over ₹37,000 crore over the next 5-7 years for expansion of existing facilities, setting up of new smelter unit overseas, development of mines and diversification in power. Brownfield expansion and tie-ups with low power producers overseas is its two-prong strategy to wriggle out of "subdued market conditions." The company expects 6-7 per cent overall cost benefit through this exercise. Because of lower costs, currently around 56 per cent of the country's aluminium requirement is met through imports.

NALCO and Iranian Mines and Mining Industries Development Renovation Organization have signed a Memorandum of Understanding(MoU) to jointly explore the possibility of setting up an aluminium smelter of 0.5 million tonne a year (mtpa) capacity in Iran. The proposed smelter will come up at an estimated cost of ₹12,000-13,000 crore. In case a captive power plant is added to the project, then the cost will go up by another ₹6,000 crore. On the domestic turf, Nalco will look to set-up a new unit at Angul in Odisha. The 0.5 mtpa smelter unit will come up at an estimated ₹12,000 crore.

Hindalco operates two smelters – one at Renukoot (Uttar Pradesh) and the other at Hirakud (Odisha). The 345,000 TPY aluminium smelter at Renukoot produces semi-fabricated products namely conductor redraw rods, sheet, extrusions etc. BALCO's smelter capacity is 345,000 TPY with capabilities to produce ingots, wire-

rods billets, bushbars and rolled products. The Hirakud smelter capacity augmented to 217,000 tpy from 161,400 TPA. The Hirakud Flat Rolled Products (FRP) project is the first of its kind in India, produce rolled products, extrusions products and wire rods. Hindalco's Flat Rolled Products facilities at Hirakud (Odisha) and Mauda (Maharashtra) are being developed to produce world class can body stock and ultra-thin gauge foils respectively. Hindalco's foil unit located at Silvasa (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 25% of total demand.

Newer and stricter fuel and emission laws and regulations in several international markets have created favourable conditions for automakers to work with downstream aluminium manufacturers, such as Hindalco-owned Novelis and Alcoa, to develop alloys of the silver-white metal.

In India coal is the only prominent energy source which is used extensively by all the major producers. With prices increasing to compensate for the coal Indian producers now have to buy from the open market after losing captive coal blocks following a legal order last year. In the face of dropping global prices, this could mean an even more uncompetitive position in the global market. Thus, the cost of production in India is expected to rise even further, driven by the fuel costs against manufacturers from Russia and China, both which enjoy a fuel-cost advantage.

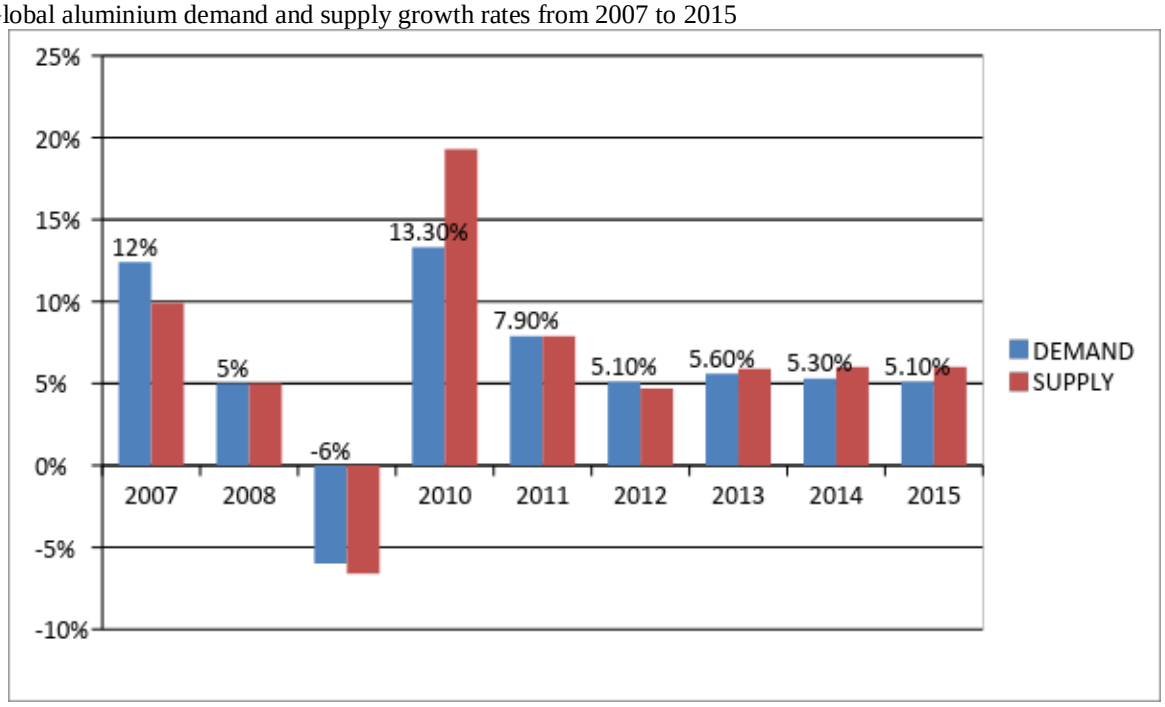
The China factor, as is evident in India in almost all major metal sectors, is also something Indian producers will have to continue to reckon with in 2016. Falling London Metal Exchange prices are largely attributed to China selling its surplus production in the world market (export) at “subsidized” rates, making India, like the US, one of its export victims.

Demand Projections:

India’s aluminium demand was expected to go up to 3.5 million metric ton by 2017-18 against 2.85 MMT in 2014-15. Several companies have set up additional smelting facilities to cater to this expected demand, but the effort could come to a naught if the cheaper imports into the country continue mainly due to China.

Market Demand and Supply

Global aluminium demand and supply growth rates from 2007 to 2015



In terms of demand, the key aluminium markets include China, the United States, Germany, India and Japan. After years of supply outstripping demand, aluminium inventories are expected to fall, particularly in markets outside China.

Demand in western sectors is distributed fairly across usage sectors such as engineering, packaging, transport, construction and consumer durables sectors but in India demand is concentrated mainly in electrical and electronics sector.

Overall the growth rate of primary metal supply in India is estimated to be higher than the market demand which may lead to widening of surplus in the country which will lead to decline in the domestic prices.

V. GLUT/OVERPRODUCTION

With the increase in supply of this lightweight metal around the world and especially in China, there has been global glut since the beginning of this decade. CRU estimates that total global aluminium inventories, including unreported stocks, have climbed 1.3 million tonnes and in the previous year to an all-time high near 15 million tonnes. Despite this increase in production that has depressed utilisation rates and weighed on prices for the lightweight metal, the world's largest aluminium producer China Hongqiao expects to increase its capacity this year to 6m tonnes by the end of 2016 from 5.19m tonnes at the end of last year, depending on market conditions.

Driven by cheap power and the need to keep producing in order to repay loans, Chinese aluminium smelters have engulfed international markets, forcing western producers to cut output and leading to dumping allegations in the US. China now accounts for more than half of the world's aluminium production and its debt-laden smelters' ability to continue producing is the main factor of the tightening of the global glut. Hongqiao is one of the several Chinese smelters that have set up a company to buy excess inventory, which has helped sustain prices but done little to solve the underlying problem of oversupply in the industry.

The increase in off radar inventories and unregistered warehouses especially in Korea and Malaysia do not figure in the official exchange stocks and this escalation in the unreported stocks is threatening to weigh on already hard hit prices.Much of the unregistered aluminium stocks are locked in lucrative financing deals, in which owners sell forward at higher prices and store the metal until the deals mature. Some of that metal is at warehouses that also store LME metal, allowing the owners to quickly register it on the exchange if futures spreads improve.

In a nutshell, even though there is a high surge in overproduction which has led to capacity curtailments in the rest of the world, China has no plans of declining its supply of aluminium partly due to lower costs for alumina and power with production climbing 22 per cent year-on-year in May to a record high of 2.67 million tonnes. China's smelter capacity is surging forward and their smelters are highly efficient and state of the art.

Per Capita Consumption

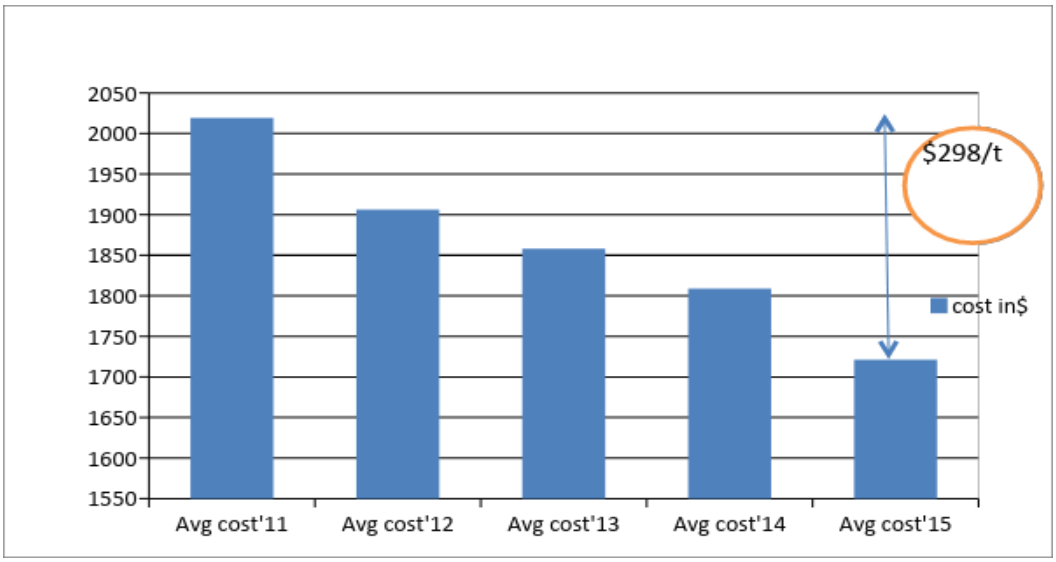
With the Indian economy anticipated to be amongst the top five in the world by 2025, the overall consumption of aluminium is anticipated to be about 5 million tonnes by 2015, and 10 million tonnes by 2020. India's consumption has grown at a CAGR of 15% in the last five years, almost double the world average of 8.1%. The per capita aluminium consumption in India is just 2.2 kgs, compared to about 16.7 kgs in China, 22.3 kgs in the US, 6.8 kgs in Brazil and 38.2 kgs in Germany. The world average is 8.0 kgs based on consumption in 2014-2015.

COSTS IN PRODUCTION

Cash costs

WORLD:

World average cash cost is decreasing mainly because of cheaper gas based power generation in the Middle East, weaker local currencies, lower coal prices and electricity tariffs in China and removal of duty inversion and freights in China.

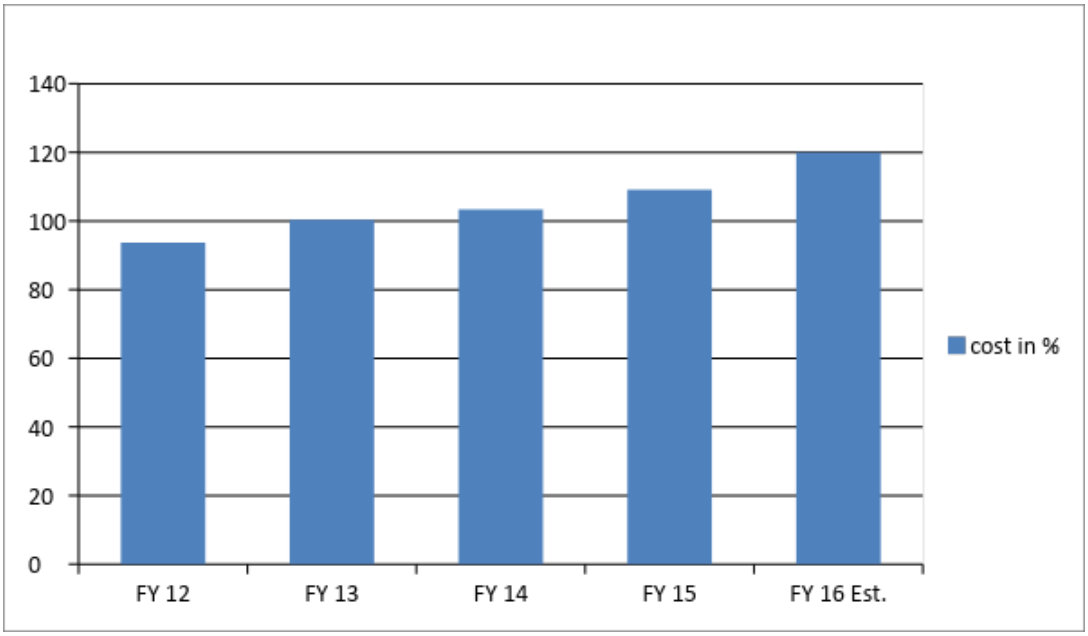


Source: Harbor Aluminium

The average cost has decreased $298/t from 2011 to 2015 which is a welcome change but the costs in domestic production of aluminium show the opposite.

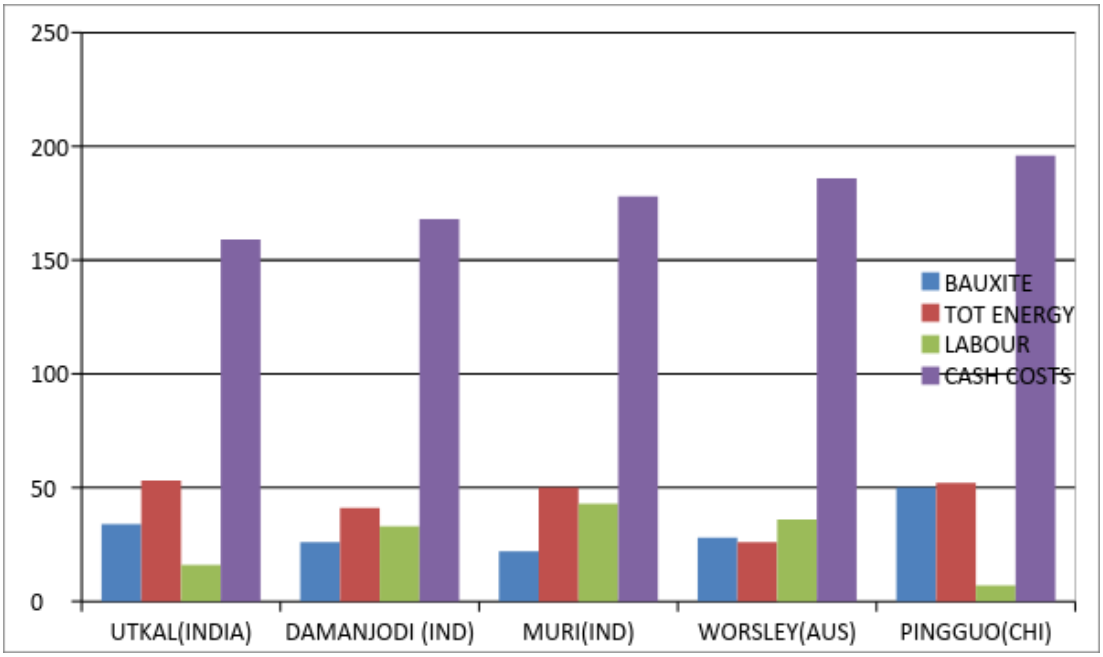
INDIA:

In India the average cash cost of aluminium is increasing due to higher coal costs, higher logistics costs, RPO and clean energy cess.



It is estimated that there will be an increase of 28% in the average cash costs of aluminium production within the country.

We can see the individual company's expenses relating to bauxite production, energy costs, labour costs and other cash costs.



FIGURES IN $/T SOURCE-NALCO

MARKET TREND

Nowadays, the high rates of aluminium consumption in terms of kilogram per capita are regarded by economists as one of the clear indicators of a robust and well-developed economy. It is little wonder that the leaders in terms of aluminium consumption are those states with a high GDP, including such beacons of technical progress as the USA, China, Japan and the developed European countries.

In the Q1 2016, world consumption of Aluminium metal was 13.58 MT against world production of 14.16 MT leaving the market at a surplus of 0.58 MT. However it is projected that in Q2 2016 world consumption will be 15.26 million tonnes against world production of around 14.58 MT leaving the market at a deficit of 0.68 million tonnes.

How the market works?

International market supply:

The aluminium market consists of the producers of primary aluminium and its alloys – the upstream segment, the producers of aluminium products – the downstream segment and the producers of aluminium out of processed raw material (aluminium recycling).

The upstream segment does not just involve the production of primary aluminium and hundreds of various alloys, but also the whole raw material supply chain preceding this process. To produce aluminium we need to mine bauxite, process it into alumina and deliver it to an aluminium smelter. The world's largest aluminium producers are, as a rule, vertically integrated holding companies comprising bauxite mines and alumina refineries. The advantage of the vertical integration model for large companies is their independence from price fluctuations and many other external factors, as they can ensure the supply of raw materials in required volumes is secured for uninterrupted aluminium production. Small producers, on the other hand, procure raw materials from outside suppliers.

The largest bauxite reserves are concentrated in the tropical and subtropical zones, and so the main production output levels are provided by the countries of Southeast Asia, Latin America and Africa, as well as Australia. As a rule, alumina production facilities are also located in these regions, which make it possible to export a more complex value-added product. Aluminium production is an energy intensive process hence aluminium smelters are mostly located in areas of low energy utilisation cost.

Market Demand:

Every year aluminium production grows in the world as a result of the ever-increasing demand for this metal.

On average, world aluminium demand grows 5-7% annually. For example, the global consumption of primary aluminium in 2014 grew 7% when compared with 2013 – amounting to 54.8 million tonnes. And based on data in 2015, world demand is expected to increase by additional 6% – amounting to 58 million tonnes.

The constant upward trend is accounted for by the fact that aluminium is the metal of progress. State-of-the-art developments in the motor industry, construction, electric engineering, aircraft industry and creation

of new gadgets all involve the application of aluminium. This metal enables both the engineers and the designers to solve their problems.

At the same time the increase in aluminium consumption takes place against the backdrop of growing global urbanisation and industrialisation. And while the developed countries have reached a high point in their economic development, the developing countries continue to grow aggressively.

The global aluminium market today can be conventionally divided into two parts: China and the rest of the world. During the last decade, China showed remarkable rates of economic growth including becoming the world's largest aluminium producer and consumer.

The People's Republic of China accounts for half of the world's volume of aluminium production and consumption - no other country is anywhere near China on this measure. Furthermore, China satisfies all of its demand for primary metal exclusively with its own production, which is why it is often regarded separately from the rest of the world's volume. At the same time China is actively increasing the export of semi-finished aluminium products competing with Western companies in the global market.

Ranked number two and three in terms of aluminium consumption volume, the European and the US markets have demonstrated an all-time level of high demand because of the advanced level of their industrial development. Another large market is Japan, which is not just a developed economy but also the birthplace of a great number of electronics and instrumentation innovations. Furthermore, the Land of the Rising Sun imports all the primary metal it needs, having no aluminium production of its own. The reason is the lack of powerful and cheap power sources in its territory. The strong growth in demand is constantly demonstrated by the fast-growing countries of Southeast Asia.

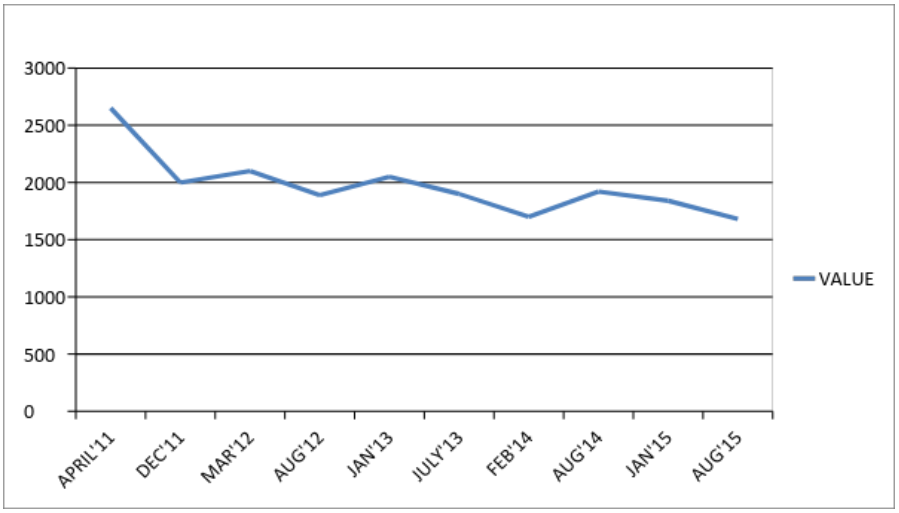
The largest volumes of aluminium are used by the transportation and construction industries – in 2014 they accounted for 27% and 25% of consumption respectively. The aluminium alloys are used to make parts of airframes, parts of car and train bodies, parts of fuel systems, conditioning systems, parts of engines, parts of chairs and interior trimming, yachts and sea craft, space shuttles and solid rocket propellants. The fashion of our age demands lightness, speed and reliability, and they can only be guaranteed by aluminium.

Aluminium has firmly established itself in the construction area as well: no skyscraper, metal frame building or regular residential house can do without it. Window and door panels, roofing, frameworks, façades and load carrying structures, elements of external decoration, sidings, staircases, conditioning and heating systems – all of these are manufactured today using aluminium and aluminium-base alloys.

Next, in terms of volumes, come the packaging and power generating sectors – constituting 16% and 13% of the market. Aluminium is indispensable in the production of power transmissions and telephone wires, radio locators, condensers, etc. As regards the packaging sector, the top positions belong to foil and aluminium beverage cans. Globally there are 200 billion beverage cans produced a year, and humankind has not invented anything more comfortable and of a better quality than the aluminium foil packaging so far.

The London Metal Exchange is the world centre for industrial metals trading. The prices discovered on their three trading platforms are used as the global reference price and both the metal and investment communities use the LME to transfer or take on risk, 24 hours a day. Hence LME governs the price of aluminium metal and we can see the price trend of the last 4 years below.

LME Aluminium price trend



Aluminium-LME prices ($/MT) Source-AAI

This figure shows that there has been 43% drop in LME prices in the last 4 years.

As of 11th July 2016 the LME Asian reference price is US$ 1638.26/t. there has been meagre changes in price of aluminium since Aug'15.But overall the trend decline in prices has resulted in stocks at warehouse declining which has resulted in a market that remains in deficit. In particular production growth remains weak and one factor for this is the slow pace of restarts and capacity curtailments in smelter plants worldwide.

TRADE

Aluminium is an exchange commodity. However, contrary to popular misconception, in most cases this metal is not physically traded on the stock exchange. Over 90% of aluminium sales with physical delivery occur under direct contracts between the metal producers and buyers.

Aluminium is an exchange commodity. Such commodities have standardised consumer attributes – the consumer does not care which specific company produced it. The products are interchangeable, easy to transport and store and can be divided into batches. For this very reason upstream products rather than semi-manufactured or finished goods are traded on the raw exchange markets.

When multi-commodity exchanges were first formed they served as a place for making physical contracts of delivery of such exchange commodities, but as the traded volumes increased and the financial instruments developed, the role of the exchanges changed.

Nowadays futures contracts for raw materials are traded there – financial instruments that almost never result in actual physical delivery (not ruling out this possibility, nevertheless). As a result of this trading activity, a price is fixed which serves as a guide for all producers and consumers throughout the world. The exchange itself does not buy or sell anything; it only provides a trading platform for professional market players - brokers.

There are a few multi-commodity exchanges in the world trading in metals which are located in the area of the greatest demand. In China – it is the Shanghai Futures Exchange (SHFE), in North America – the Chicago Mercantile Exchange (CME). However the world's largest exchange trading in all metals and aluminium in particular is the London Metal Exchange (LME), established as early as 1877.

The LME started trading in aluminium in 1978. More than a century ago when the exchange was starting up, traders would meet in a small coffee shop near the Royal Exchange and make deals orally while gathered in a circle. Nowadays on the LME about 3.7 billion tonnes of various metals are traded annually to the approximate amount of USD 14.5 trillion. This is three times the GDP of Japan. In June 2012, the Hong Kong Stock Exchange (HKEX) became the new owner of the LME after purchasing it for 1.4 billion pounds.

In basic industry, it is customary to manage the price risk by trading the future market for aluminium in the London Metal Exchange (LME). The world prices of aluminium are listed on the London Metal Exchange (LME) and form the basis for price calculations of many aluminium processing enterprises. The LME aluminium gives the price in U.S. dollars per 1000 kg. The 'settlement price' is the official cash sale and generally serves as a basis for contracts.

Aluminium is the world's largest exchange commodity for metals in terms of trading volumes. It accounts for nearly a third of all contracts made on the LME. Over 100 brands of aluminium from the leading producers are traded on the exchange and it serves as a platform serving more than 700 different specialised metal warehouses in 14 countries. This is required so that a buyer can always purchase the metal bought because even though the lion's share of contracts are futures transactions, it is not prohibited for an actual industrial buyer to purchase aluminium for its production needs. This function of the exchange is called the last hope market. In practical terms, it means that a buyer can always purchase and the seller can always sell metal under an exchange-traded contract at an established exchange price and obtain or deliver the commodity to one of the exchange warehouses.

The principal authority in charge of managing this trading activity is the exchange committee. Every day it announces the official day's price for aluminium, which is determined based on the cumulative result of the previous trading session. Trading is conducted in accordance with standard exchange contracts. Each contract specifies the quantity of commodity (for aluminium it is at least 25 tonnes), delivery terms (this could be any warehouse belonging to the London Metal Exchange), the period of performance (immediate delivery, three months, six months, etc.) and quality requirements (metal must be certified by the exchange).

The exchange price established as a result of the trading is the price benchmark for aluminium sellers and buyers all around the world, but this is not the final cost of the metal.

From 1989 until 2015 the average aluminium price on the LME was USD 1,806 per tonne. The record was achieved in July 2008 when the price of a tonne of aluminium came up to USD 3,271. The price hit an all-time low in November 1993. A tonne of aluminium was traded then at USD 1,023.

Today the final aluminium price for consumers is made up, as a rule, of three components: the LME price, regional premium that depends on the availability of the metal in a specific market, and commodity mark-up depending on the type of commodity. If the price benchmark in global trading activity is based on aluminium quotations on the LME, then whilst negotiating the premium level for actual delivery, producers and consumers

take into consideration the information about premiums published in specialised journals such as Platts, Metal Bulletin, Nikkei.

Traders often serve as mediators between metal producers and consumers. They ensure the processing of medium and small orders, assume a part of the financial risks of the transaction, have their own network of warehouses located conveniently for consumers and also render other associated services.

How is LME aluminium pricing determined?

Each aluminium processing company in the world has to deal with the risks of fluctuating aluminium prices and as a result the prices for intermediate goods and the prices of finished known products. Through past experience we have learned that not only supply and demand is an important part for the historical aluminium prices, but the price determination of aluminium is different from the expectations and sentiments in the financial sector.

The risks of fluctuations of aluminium:

Changes in aluminium prices are very unpredictable and price fluctuations can be very strong. These fluctuations have a direct impact on the profit margins, the value of the stock, but also behaviours of customers who ordered the aluminium suddenly do want to diminish or postpone the order. Companies seek control of these risks by making good agreements with both customers and suppliers of aluminium. Aluminium trading is done with respect to LME prices which fluctuate on a daily scale.

Current LME aluminium prices:

Due to the weak economy metals are currently relatively cheap. The price of aluminium on the leading London Metals Exchange (LME aluminium) fell by 12% since January 2012. Investors are buying aluminium on a large scale and sell the aluminium slow, which enables much higher purchases for companies.

THE FINANCIAL CRISIS OF 2008

When the exchanges first appeared, the price established there was considered the fairest in terms of reflecting the actual balance between demand and supply. Yet the global financial crisis of 2008 exposed major deficiencies of the exchange-based pricing mechanism.

The ensuing decline in consumption and industrial production proved to be a serious test for the aluminium industry. The demand for aluminium decreased abruptly, while the price of a tonne of aluminium dropped from USD 3,200 to USD 1,200. The producers had to supply aluminium to LME warehouses as they could not reduce the volumes of metal production fast enough after the decline in demand. As a result, over a few years the volume of metal stored in the LME warehouses grew from 1 to 5 million tonnes.

The financial market players took advantage of the situation: aluminium became for them a financial instrument with guaranteed a return due to the availability of cheap financing and the price contango – a situation where the future price of the metal is higher than the current price. As a result, the volume of aluminium traded on the LME from 2007 until 2014 grew 34 times (+3,300%), while in fact the actual physical demand grew during the same period by no more than 40%.

Financial transactions 'froze' all the aluminium accumulated in the warehouses as each such transaction had to be secured with actual metal. Buyers who wanted to buy aluminium under an exchange contract had to wait for the delivery for a year and a half or more. Waiting lists for delivery began to form. In turn this prompted an increase of premiums for the immediate delivery of the metal – in mid-2014 the amount exceeded 20% of the exchange price of aluminium. Whilst the average amount of premium fluctuated over the past 25 years in the range of USD 60-80 per tonne, that represents about 5%.

The London Metal Exchange attempted to bring the market back into a more balanced state by effecting an internal reform which resulted in the new rules for stocking and releasing metal at the warehouses which significantly limited the possibilities for the financial market players.

At the same time due to the high volumes of aluminium stored in the warehouses the largest aluminium producers cut back a part of their production removing their out dated and unprofitable facilities from operation. In particular, they closed down the facilities operating on coal-generated power which were not complying with the latest carbon dioxide emission standards, which on the whole improved the industry's efficiency and environmental performance.

The western companies, such as RUSAL and Alcoa, were most actively pursuing this course of action, while the producers from China and the Middle East on the contrary continued increasing their production output. The Middle East companies rely on the availability of cheap power from the use of associated gas to have a very low cost of aluminium production and sell the metal at a profit even when the prices are low. As regards China, the top priority there is given to guaranteeing workplaces and maintaining high rates of economic development.

In spite of all these difficulties, aluminium consumption is expected to continue its strong growth. By 2030 the volume of consumption of the winged metal may exceed 80 million tonnes, thus enabling aluminium not only to maintain but rather reinforce its leading position as one of the key structural materials of our time.

EFFECTS OF NEW LME WAREHOUSE RULES

LME's new warehousing rules are designed to tackle lengthy metal delivery queues, which are blamed for high metal premiums payable by buyers. The new rules compel warehouses with over a 50-day delivery queue to deliver a certain amount of metal determined by a formula. These changes affect aluminium in particular, where large inventories have been built up while metal premiums, too, have been rising.

Thus, although LME metal prices have declined, rising metal premiums have benefited aluminium producers. These premiums that differ by region are paid for immediately on delivery of the metal.

More metal on the market should result in softening prices and even premiums, but there are some counter views to it like LME prices will recover while premiums will decline, with little effect on producers. Another is that inventories may move out of LME warehouses to those that are not monitored. That too could have the effect of propping up prices.

A third view is that falling realizations may see more plants shut shop and lower output will see prices rise again leading to volatility during the implementation of the new rules.

The industry scenario is thought-provoking as it is. Global aluminium producers have been cutting production with the dual objective of supporting prices and lowering costs at less profitable locations. Aluminium producers remain optimistic, however. UC Rusal expects China's production to rise due to new plants, but also expects higher demand to absorb it. Excluding China, there is presence of deficit and this deficit has widened further between 2014 and 2016 due to improving demand and slower-than-expected capacity additions.

The fact that the new warehouse rules have lowered premiums can provide a comforting picture in the long term if you believe aluminium producers, but in the short to medium term attention is likely to be focused on the effect of changes to warehouse rules on aluminium price realizations (inclusive of metal premiums). A substantial fall can put more pressure on the financial health of the industry.

ECONOMIC IMPACT

Production of aluminium is labour intensive and generates huge employment opportunities. The Aluminium Industry in India presently employs more than 7.5 Lakh people directly and indirectly and with expansion schedule of primary aluminium suppliers, employment is estimated to cross over 14 Lakh. Aluminium industry has the potential to employ 6.9 million people by 2020 which will be more than 0.5% of the entire population of India.

Cheap and unrestricted imports of primary aluminium from China (which doesn't follow market pricing) into the Indian market has impacted adversely on the growth of the downstream industry.

ENVIRONMENTAL IMPACT

The effects of bauxite mining for the production of aluminium on the environment include habitat destruction, soil erosion, loss of biodiversity, deforestation and also water pollution among other changes.

FUTURE PROSPECTS

There is huge scope for use of Aluminium by the automotive industry, the construction sector, transport and packaging. The total consumption of construction sector is expected to grow at CAGR of 18-20% to around 1.7 million tonnes by 2020. The contribution of the packaging sector is estimated to be in the range of 15-20% of the total aluminium consumption by the year 2020. Aluminium's domestic demand is expected to rise in the near future, estimated at a CAGR of 7.9% by 2020.global market predicts an increasing demand as well (estimated at 5% by 2020). Aluminium alloys like Alclad, Brimabright, Magnox, etc. find usage in many high end products used in space shuttle, aerospace, etc. due to their superior characteristics like strength, superior high temperature performance, etc.

The government also stands to benefit from this industry's growth through increased collection of excise duties and taxes. The revenue is expected to exceed Rs. 33,000 crores in 2020. Aluminium industry of India has the potential to become a dominant global player by 2020, create employment opportunities on a large scale and increase contribution to the government's revenue generation.

SWOT SCRUTINY

Indian Aluminium Industry, in all its glory, is vulnerable to certain challenges and opportunities. In order to get deeper insight of this sector, SWOT analysis is used:

- STRENGTH- Low cost and efficient labour force

-abundant resources of aluminium ore
-strong managerial capability
-strongly globalised industry
-modern new plants and modernize old ones

- WEAKNESS- high energy costs
-high capital charge
-higher duties and taxes
-labour laws
- Dependence on imports especially from China for aluminium manufacturing equipment and technology
-low R&D and low technology
- OPPORTUNITY-rapid urbanization
-increasing demand for consumer durables
-untapped rural demand
-green issues driving consumption
-increasing interest of foreign producers in India
-globalization
-green smart cities
- THREATS -market fluctuations and China's export possibilities
-global economic slowdown
-governance issues
- Environmental concerns
- Aluminium substitutes like steel, ceramic growing rapidly.

VI. CONCLUSION

The light weight metal has found its use in a myriad of applicationsand providing conducive atmosphere and faster approvals for the aluminium projects launched and to be launched, taking care of all norms & stakeholders' interests will facilitate growth for the this metal industry. The Indian Aluminium Industry needs to finance huge amounts in research and development to overcome technical barriers to achieve improved primary production with effective cost reduction, lower energy consumption, improved output yield, etc. There should be focus on development of new alloys of aluminium and newer avenues for worth construction need to be discovered. Nurturing a culture of R&D will catapult this miracle metal to a new elevation.

BIBLIOGRAPHY

Some of the books/articles/websites I have referred to are:

[1]. Aluminium The Strategic Metal by DR. T.K.Chand
[2]. Presentation to Ministry of Finance GOI by Aluminium Association of India,2015
[3]. The Aluminium Industry CEO Agenda 2013-2015
[4]. Background Material on Development of Aluminium Industry in the Country, NALCO, January 2016
[5]. CRU Monitor –Aluminium 2015, 2016
[6]. www.aluminiumleader.com
[7]. www.indianmirror.com
[8]. www.statista.com
[9]. www.world-aluminium.org

Dr. Madhubrata Satpathy. "International and Domestic Aluminium Market Scenario". *International Journal of Humanities and Social Science Invention (IJHSSI)*, vol. 09(1), 2020, pp 65-79.