



# **Need for an Aluminum Policy in India**

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*Aluminum is the second most used metal in the world after steel with an annual consumption of 88 Million Tonnes (including scrap). Aluminum Consumption in India at 2.5 kg per capita is much below the global average of 11kg per capita. To reach the global average of 11 kg per capita, India will require an additional annual consumption of 16mn tonnes, thus, making it the second largest consumer in the world (absolute terms).*

*The role of Aluminum sector will be critical as India advances to meet its economic growth targets. With India's growing economic might, it should be able to produce enough high quality metal to ensure self-reliance in its defense and critical infrastructure needs in order to avoid global volatility in supply and prices.*

*Keeping this in mind, this report identifies issues that have plagued the aluminum sector with respect to demand augmentation and capacity addition. It stresses for a New Aluminum Policy that must focus on a holistic short-term, medium and long-term vision identifying growth targets for demand augmentation and capacity addition. This requires a strategy for achieving the targets in terms of raw material, infrastructure, value-addition, power, energy requirements and scrap recycling.*

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All Data cited are of 2017, except stated otherwise. These have been obtained from ministry websites, industry sources and independent calculations.

### **About the authors**

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## Chapter 1: Overview of Aluminum Industry

Aluminum is the second most used metal in the world after steel with an annual consumption of 88 Million Tonnes (including scrap). It is also the fastest growing metal which has grown by nearly 20 times in the last sixty years (compared to 6 to 7 times for other metals). Some of its unique properties like lightweight, recyclability, conductivity, non-corrosiveness and durability have helped establish it as a metal of choice for various applications across various segments of the manufacturing sector. Aluminum is also called 'the Metal of Future' due to the above properties.

Being lighter (3 times lighter than steel), it aids in fuel efficiency making it an efficient choice for automotive, defense and aviation. The construction industry relies on a variety of aluminum alloys in the manufacture of products ranging from exterior siding to structural components due to its durability and non-corrosive properties. Its ability to conduct heat and electricity also makes aluminum a popular choice in the electrical and electronics industries. Coupled with infinitely recyclable properties, aluminum is a convenient option for packaging industry such as beverage cans and foils.

In nature, aluminum does not exist in a pure state. The production of primary aluminum metal commences with bauxite ore, which is composed of hydrated aluminum oxide (40%-60%) mixed with silica and iron oxide. Roughly 4 to 5 tons of bauxite ore are refined to produce approximately 2 tons of alumina. This 2 tons of alumina is smelted to produce approximately 1 ton of aluminum. Production of aluminum is a very capital and energy intensive process. Alumina, power and labor account for 75-80% of total cost depending on the region where it operates.

Globally, auto & transport account for 23% of aluminum consumption, followed by construction (22%), packaging (13%), electrical (12%), machinery and equipment (8.5%), consumer durables (4.5%), and other segments (4%).

Since 2000, there has been a gradual shift of primary aluminum production centers from west to east largely from North America to China, India and Middle East. China dominates production as well as consumption of aluminum accounting for nearly half of the global production and consumption. China's per capita consumption of 24 kg compared to world average of 11 kg is largely driven by huge investments in infrastructure and construction and government support through specific initiatives undertaken by the Chinese government. China, Russia, Canada, India, UAE,

Australia and Norway together account for 80% of the global primary aluminum production.

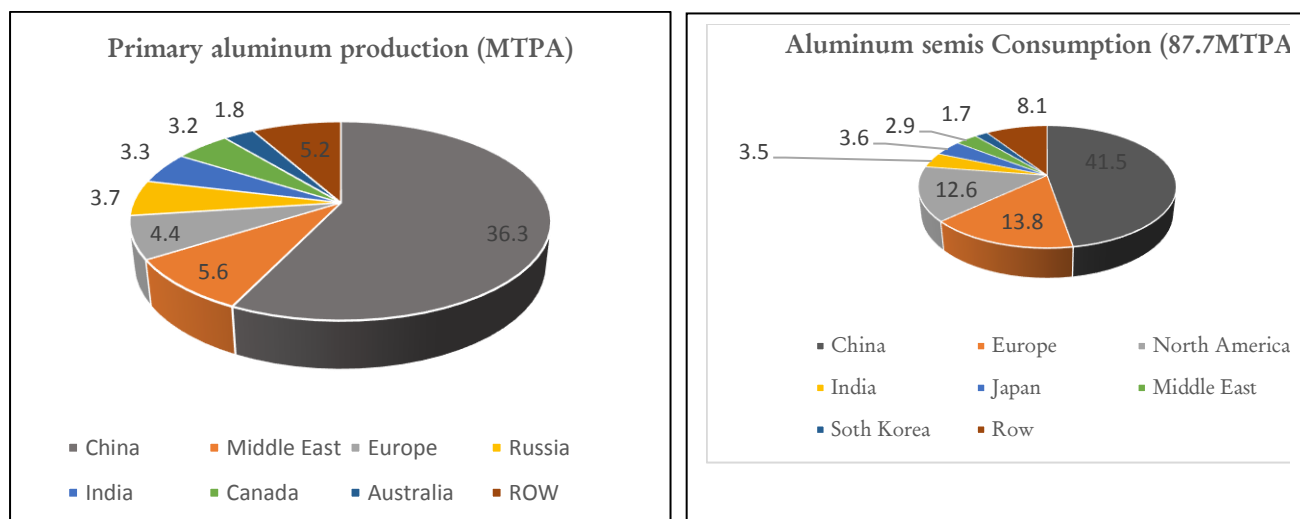


Figure 1: Global production of primary metal and consumption of aluminum semis by region

### Global aluminum industry structure

The aluminum industry comprises two basic segments: upstream, and downstream. The upstream sector produces primary or “unwrought” aluminum from raw materials and involves bauxite mining. After extraction, bauxite is processed into alumina. The alumina is transformed into primary aluminum through a process called smelting. Primary aluminum is the starting block for aluminum products and is mainly in the form of ingots and billets.

Production of primary aluminum is a capital and energy intensive process and thus major players in this segment are large players. Major global players in the primary aluminum industry are Hongqiao, Rusal, Rio Tinto, Shandong, Chalco and Alcoa. The dominant trend in the last fifteen years has been the rapid expansion of China’s primary aluminum production. (18% y-o-y).

The processing of aluminum into semi-finished aluminum goods such as rods, bars, rolled products, castings, forgings and extrusions comprises the downstream segment of the industry. These aluminum products can be manufactured using primary or secondary aluminum, or a combination of both depending on the specification of the final product. Aluminum production from recycled scrap is secondary production.

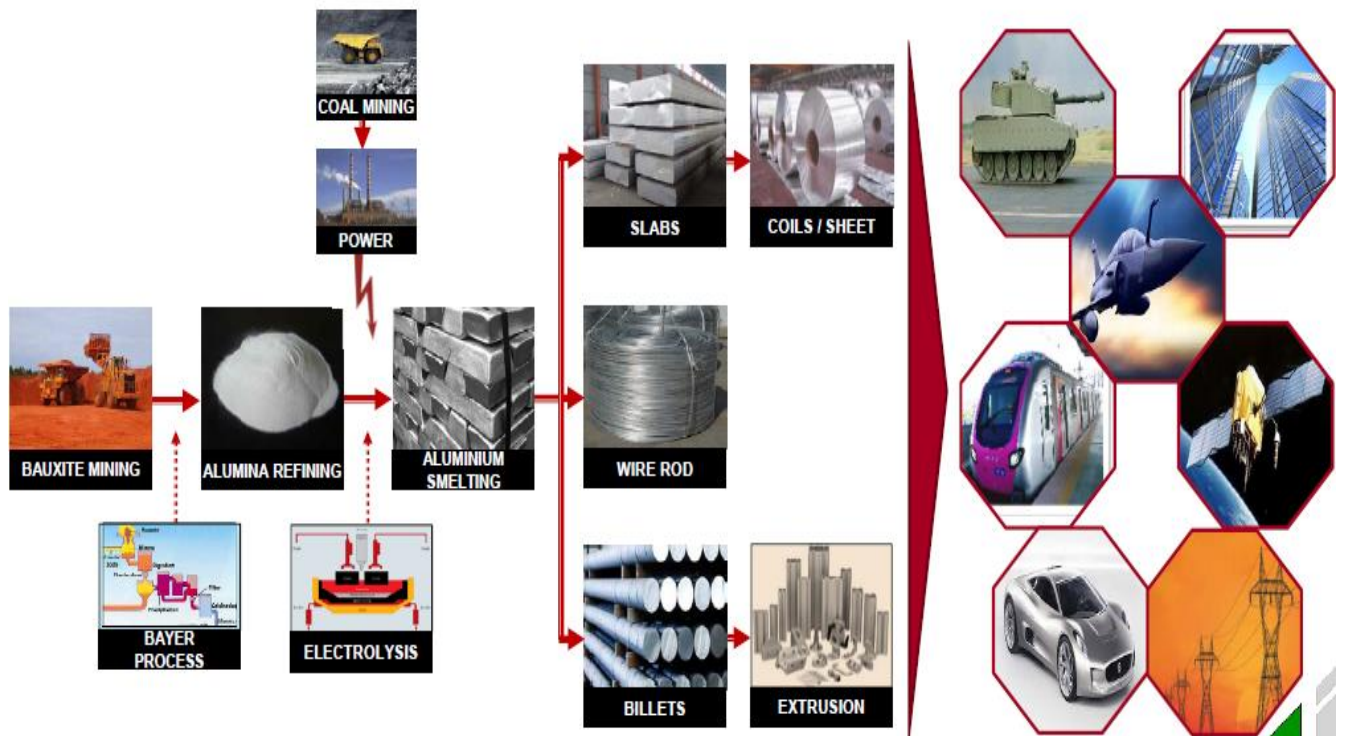
Extrusion products are mainly used in building and construction sector (B&C) in the form of windows, doors, curtain walls and formwork, bathroom

and kitchen applications etc. B&C accounts for almost 62% of extrusion consumption. Automotive sector also uses extrusion products for light weighting of vehicles in the form of extruded tubes, multi-hole profiles, door beam, bumper system etc. Both developing and developed countries are increasingly using them for the purpose of urbanization and the need for sustainable buildings respectively. The transport sector accounts for almost 14% of demand, primarily driven by light weighting of vehicles (aids in fuel efficiency).

China is the biggest consumer of extrusion products accounting for almost 63% of global consumption. Chinese demand for extrusions was driven principally by its B&C and infrastructure projects, but also by its emergence as the world's leading supplier of transportation equipment. Due to low technological and capital intensity, the market is mostly fragmented with a large number of small to medium size players and a few larger players. China Zhongwang Holdings Limited is a leader in extrusions. As per estimates, there are around 400 Chinese extruders in operation. Sapa (Hydro extruded solutions) is one of the largest extruders outside of China accounting for over 15% of production. Bigger players like Hydro, Aleris and Alcoa are present across segments like industrial, construction, auto and aviation. There are also few niche players like Alu Menziken and Universal Alloy which operate in only high margin segments of aero and automotive.

The aluminum flat rolled products (FRP) include products like sheets/plates for aerospace and civil aviation, auto body sheets, can body stick, building sheet, litho sheets etc. FRPs have a wide range of applications in transportation/automotive, building and construction, beverage cans and packaging. FRP's are the second-largest wrought aluminum product category in the world after extrusions. Novelis (a subsidiary of Hindalco Industries ltd) is an industry leader in rolled aluminum production and aluminum recycling. Aleris - a global leader in the manufacture and sale of aluminum rolled products - serves a variety of end-use industries, including aerospace, automotive, defence, building and construction, transportation, packaging, and consumer goods. Constellium is a key European rolling and recycling player which produces a wide variety of products for Packaging, Automotive and customized industrial coil and sheet solutions. Hydro is Norway based leader in rolled aluminum products. The products are produced using high tech continuous casting machines and are highly recyclable.

Figure 2: Aluminum: Mines to Finished Goods



## Chapter 2: Aluminum as a Strategic Sector

*A country's over-reliance on foreign import for essential strategic metals may be detrimental towards the objective of national security. A strong economic power should be able to produce enough high quality metal to ensure self-reliance in its defense and critical infrastructure needs in order to avoid global volatility in supply and prices.*

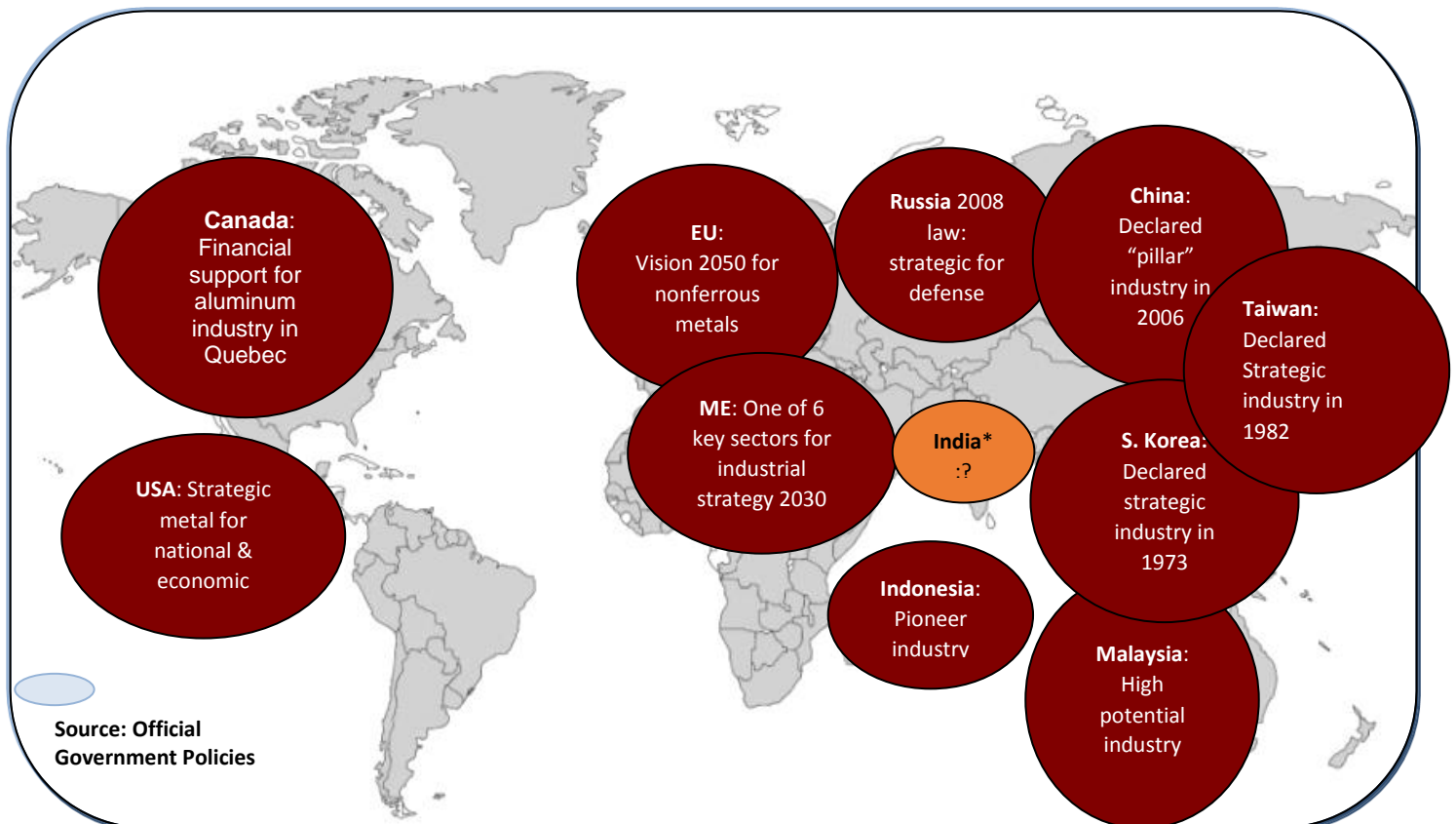


Figure 3: World View on Aluminum as a strategic sector (Source: Official Government Policies)

Many industrialized nations have included non-ferrous metals/ aluminum industry as a strategic sector in their industrial strategy/plan.

- **China** in 2006 identified the sector amongst the nine 'pillar' industries where the government was supposed to play a predominant role. The Chinese 12<sup>th</sup> five-year plan also included non-ferrous metals as a part of key industries that will be encouraged to consolidate and form large enterprises.
- **USA** has recognized aluminum as a strategic metal for Defense, National Security and Critical Infrastructure.

- [Russia](#) identifies Aluminum as a strategic metal for defense. The Ministry of Industry and Trade (MIT) has approved a development strategy for non-ferrous industry up to 2030. This will provide a list of actions and measures to be taken by the government for developing the industry.
- [South Korea's](#) heavy industry drive in 1973 identified six strategic sectors including non-ferrous metals where the government provided benefits like low interest rates, reduced tax liability etc. to drive the growth of specific sectors.
- [European Union](#) has drafted a strategic vision for non-ferrous metals titled, "[Non-ferrous Metals Manufacturing: Vision for 2050 and Actions Needed](#)" (2017). It defines, "(1) a long-term vision for the non-ferrous metals manufacturing industry and (2) proposes concrete actions for the industry, policymakers, and other stakeholders, to address the challenges faced by the sector (trade and competition, innovation, resources, business integrity and skills) on its path towards the vision."
- [Canada](#) provides support to aluminum plants in Quebec province. Quebec Aluminum Development Plan (2015 – 2025) focuses on financial support for R&D, new projects, carbon footprint, and export incentives.
- [Taiwan](#) in 1982 also categorized Non-ferrous as a strategic sector where government provided preferential measures like low interest rate loans and technology and management assistance.
- [Malaysia's](#) 2017 draft industry plan recognized metal as a focus sector with high potential for growth and identified policy interventions to support the industry.
- In [Indonesia](#) too, pioneer sectors were expanded to include upstream metal in 2015. Benefits like tax holiday scheme, accelerated depreciation and amortization, compensation losses extended from 5 to 10 years have been provided.
- Aluminum is a key sector for [Dubai's](#) industrial growth and a part of Dubai and [UAE's](#) Industrial strategy for 2030. As a part of the strategy, hosts of benefits are provided including low corporate tax, cheaper electricity costs and easy access to financing and capital.



- Here, we trace out some selected policy support initiatives that various national governments provide to their Aluminum Industry, as documented in [USITC Report, 2017](#).

### POLICY AND THEIR QUALITATIVE EFFECTS

<b>Policy</b>	<b>Qualitative effect of the policy</b>
<b><u>RUSSIA</u></b>	
State aluminum reserve	Increases demand for aluminum
“Aluminum Valley” (Siberia) special economic zones	Increases aluminum production and consumption
Development plans	Increases demand for aluminum
Direct government investment	Lowers production costs
<b><u>Western Europe</u></b>	
“Energy transition” in Germany	Increases production costs, especially for primary unwrought
Environmental policies	Increases production costs

<b><u>Canada</u></b>	
Low-cost electricity	Lowers production costs, especially for primary unwrought
Low-cost financing	Lowers production costs
Accelerated depreciation schedules for machinery and equipment	Lowers production costs
Government procurement	Increases demand for aluminum
<b><u>China</u></b>	
Reduced electricity prices	Lowers production costs, especially for primary unwrought
Higher electricity prices for inefficient smelters	Increases production costs for inefficient primary smelters
Environmental policies	Increase production costs
Overcapacity policies	Lowers production capacity
Low-cost financing	Lowers production costs
Tax benefits for facilities that are new or in Western China	Lowers production costs
VAT rebates for secondary and wrought	Lowers production costs
Grants	Lowers productions costs
Discounted land use fees	Lowers productions costs
Wrought policies names in	Lowers productions costs

antidumping cases	
<b>Gulf Cooperation Council (GCC) Countries</b>	
Low-cost electricity	Lowers productions costs
Low-cost natural gas	Lowers productions costs
Corporate ownership policies	Increases production costs
Low-cost financing	Lowers productions costs
Tax benefits	Lowers productions costs
Low rents, land grants, and Investment programs	Lowers productions costs
Investment promotion	Lowers productions costs
Labor policies and hiring preferences	Increases production costs

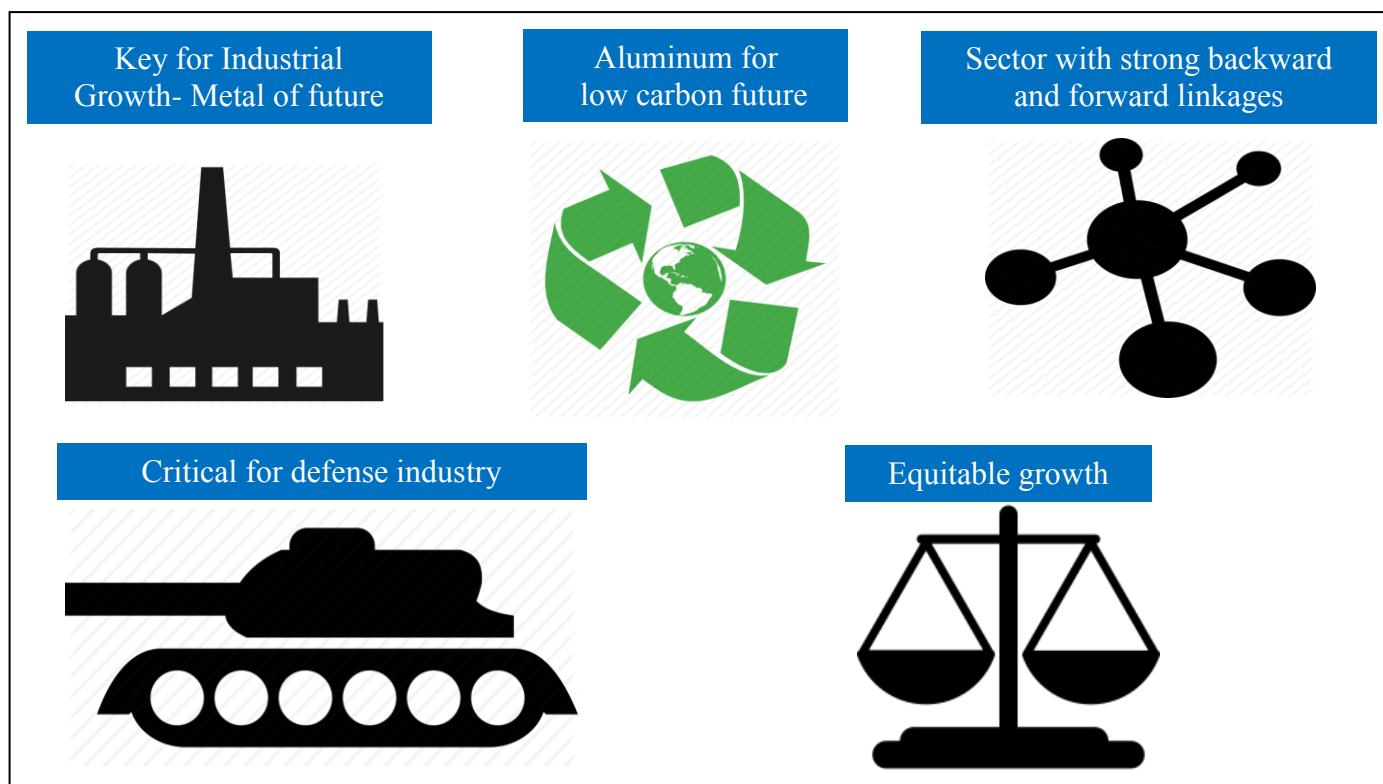


Figure 4: Aluminum and its Strategic Uses

Aluminum is a key metal for industrial growth. Its unique properties like strength, durability, conductivity, flexibility, impermeability, light-weight, non-corrosiveness, recyclability make it a metal of choice for various industrial activities.

Aluminum is considered a strategic sector by various industrialized economies due to-

- high linkage effect
- high market potential
- high technological intensity
- high value addition

Non-ferrous metals have a strong output and employment multiplier effect (backward and forward) on other key sectors. Aluminum has forward linkages with key sectors like aviation, defense, auto, electricity, construction, packaging, machinery, marine etc. and backward linkages with mining, chemical industry, power, machinery. *By speeding up investment in sectors with high backward and forward multipliers, the industrialization process can be speeded up. As per various research studies, non-ferrous metals have a forward and backward multiplier more than 1\*.*

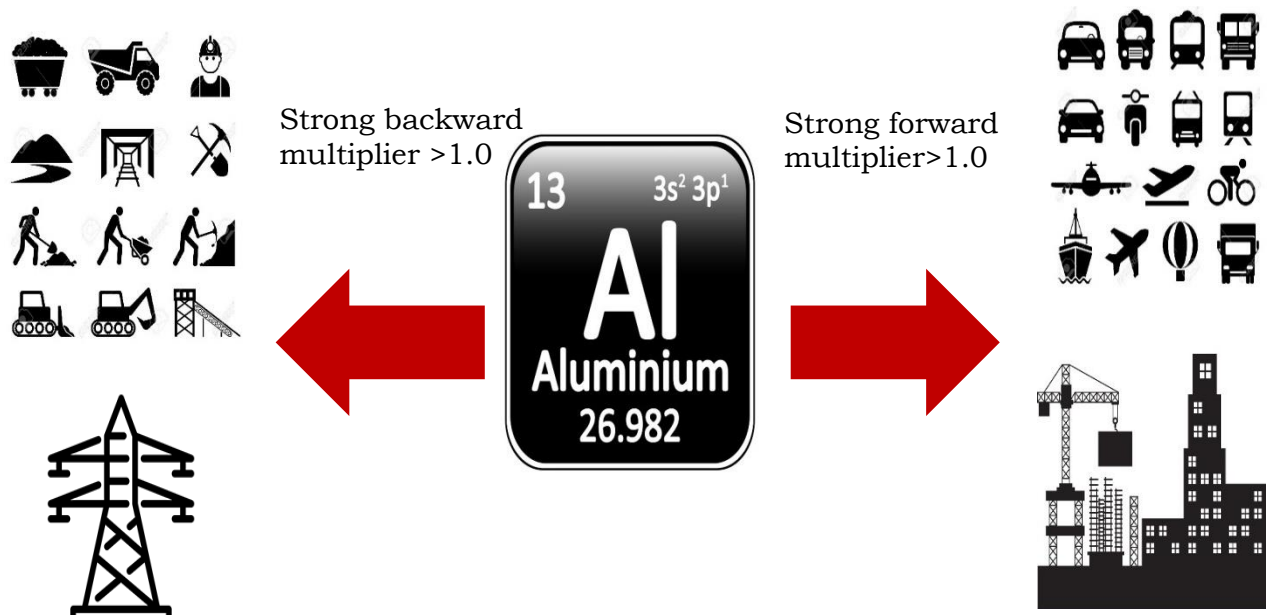


Figure 5: Aluminum: Linkages and multiplier effect

Industries with strong linkages based in the hinterlands of the country are also generating peripheral employment and are aiding in the development of the region.

The growth of the aluminum industry can be attributed to its widespread application in major spheres of economic activities including infrastructure, construction, power, packaging, consumer durables and automotive. In developed countries, aluminum has over 3,000 applications whereas in developing economies, the usage is limited.

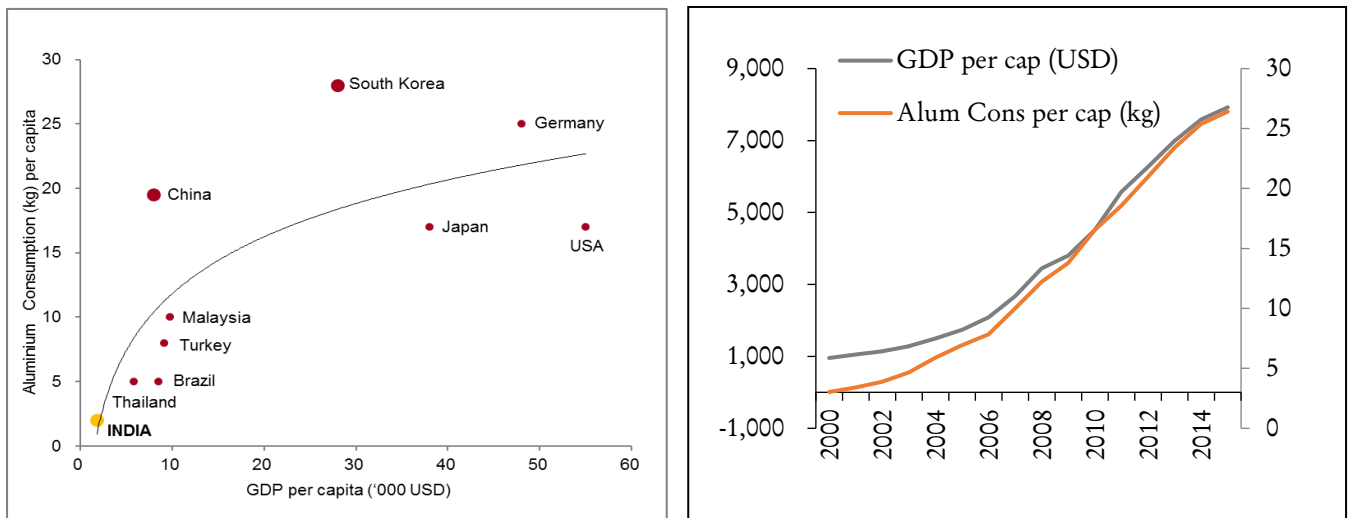


Figure 6: a) Aluminum Consumption per capita versus GDP per capita, b) China's Aluminum consumption per capita versus GDP per capita from year 2000 to 2015

Per capita consumption of aluminum is closely related to Gross Domestic Product (GDP) of a country. It has generally been observed that aluminum consumption has risen with increase in per capita GDP and industrialization. For e.g. highly industrialized and high per capita income countries like South Korea has highest per capita consumption of 46.7 kg, followed by Germany (29.9 kg), US (18 kg) and Japan (16 kg). For middle income countries like China, per capita aluminum consumption is 24 kg, Brazil at 8.6 kg and Russia at 8.4 kg. In India, the per capita aluminum consumption is very low at 2.5 kg compared to a world average of 11 kg. Thus, aluminum is a key metal which will be needed during the further industrialization phase of India.

Aluminum is also a strategic metal for national defense and security. It is widely used in making various ammunition components, parts for missiles and missile batteries, tanks, armored vehicles, aircraft structural parts and components, naval vessels, space and missile structural components and satellites. Due to its ability to withstand high and low temperatures, vibration load and radiation, Aluminum finds wide acceptance in the defense and aerospace sectors. A growing number of emerging applications in both these sectors make it a metal of choice. It is also used for critical infrastructure sectors including power transmissions, transportation systems, manufacturing industries, construction, and others.

- *The U.S. Department of Defense* considers aluminum a strategic metal for maintaining effective military capabilities.

- It is also a “critical metal” for European defense industry.
- Russian law (2008) on strategic industry identifies manufacturing of metal and alloys used for defense as strategic industry.

Aluminum is also one of the critical metals for world’s commitment towards 2015 Paris commitment of low carbon footprint.

- According to US Department of Energy, auto industry estimates that 6-8% fuel savings can happen for every 10% weight reduction by substituting aluminum with other heavy materials.
- As per the Life Cycle Inventory report for US Aluminum Industry, over the life of a car, aluminum content can save more energy than needed to produce it. To aid green mobility, North America promotes use of Aluminum in automotive. The Aluminum content in North America is 180 kg compared to 45 kg in India.
- Aluminum is also a durable metal with its life span in building and construction ranging between 40-50 years.
- Aluminum can also be endlessly recycled with only 5% of energy & emissions needed to produce a new aluminum product.
- Aluminum availability is critical to achieve low carbon footprint using wind, solar and energy storage batteries as per a World Bank study 2017.

According to a World Bank study titled, “[The Growing Role of Minerals and Metals for a Low Carbon Future](#)”, Aluminum will play a significant role in achieving low carbon footprint. Using wind, solar, and energy storage batteries as proxies, the study examines which metals will likely see a rise in demand to deliver a carbon-constrained future. Metals which could see a growing market include aluminum (including its key constituent, bauxite), cobalt, copper, iron ore, lead, lithium, nickel, manganese, the platinum group of metals, rare earth metals including cadmium, molybdenum, neodymium, and indium—silver, steel, titanium and zinc.

By 2050, under a 2DS scenario (limiting global temperature rise to 2 degrees) aluminum demand for supplying wind technologies through 2050 will rise by 250% compared to 6DS. Similarly, for solar it will rise by 310% and for energy storage technology it will rise by 1000%. The report states that a growing demand for minerals and metals to supply a low-carbon future, if not properly managed, could bely the efforts and policies of

supplying countries to meet national objectives and commitments regarding climate change and related sustainable development goals.

### Chapter 3: Aluminum and India

Aluminum Consumption in India at 2.5 kg per capita is much below the global average of 11kg per capita. To reach the global average of 11 kg per capita, India will require an additional annual consumption of 16mn tonnes, thus, making it the second largest consumer in the world (absolute terms).

Even at low consumption, aluminum contributes 2% of manufacturing GDP (steel 12%, cement 9%) and this is expected to move up with consumption growth. This growth is critical for India's industrial vision of achieving 25% of GDP from manufacturing by 2022.

Studies document Aluminum industry's forward and backward linkages are greater than 1. *By speeding up investment in sectors with high backward and forward multipliers, the industrialization process can be speeded up accelerating economic growth.*

The industry also has a high direct and an indirect employment multiplier creating close to 800,000 jobs. Plants are generally based in the hinterlands of the country and aid in generating peripheral employment and development of the region. Going forward the sector will be a key contributor to the government's key flagship programs like Make in India, National Capital Goods Policy, Development of 100 smart cities and government's commitment to reach a 100 GW solar capacity by 2022 from 20 GW today.

Some of the ways it can contribute to key sectors in India are by enhancing fuel and cost efficiency in [railways](#), commitment to CO2 emission norms and adoption of EV's in the transport sector, target to increase renewable energy share to [40% and even more](#) by 2030, indigenously designed defence equipment, increasing indigenisation of aerospace and aviation sector and increasing footprint in consumer durable and packaging sector as a result of growing urbanisation. Thus, the sector has strong forward and backward linkages to other key sectors.

Being light-weight, good conductor of electricity, non- corrosive in nature, durable, infinitely recyclable and the fact that it can aid in fuel efficiency makes it usable across various critical segments of the manufacturing sector.

We describe below some key ways in which the aluminum sector can contribute to India's growth story.

## ALUMINUM USAGE IN VARIOUS SECTORS

### Railways

Rs.8.5 Lakh Crores committed over the 5 year period with focus on:

- Enhancing safety of passenger cars
- Increasing speed of the trains
- Driving Energy and Cost Efficiency

### Transport

- Stringent CO<sub>2</sub> emission norms
- Faster Adoption & Manufacturing of Hybrid / Electric Vehicles (FAME Scheme)
- Enhanced safety features thru Crash Management System (50% of PVs by 2022), Under Body Protection (CVs)
- Switch to Automatic Transmission (AT cars share from 7% to 30%)

### Power/Solar

- Target to increase renewable energy share to 40% by 2030 (33% currently)
- Solar capacity increase from ~3 GW to 20 GW in last 4 years
- Target to increase Solar capacity to 100 GW by 2022

### Defence

- 5<sup>th</sup> largest defence spending (\$64 Billion, 13% YoY growth\*)
- Largest importer of defence equipment
- Institutionalization of Make In India, DPP (Defence Procurement Procedure), IDDM (Indigenously designed, Developed & Manufactured) and ToT (Transfer of Technology)

### Consumer Durable / Packaging

- Increasing urbanization: urban population share set to cross 50% by 2039 (33% currently)
- Rising per capita consumption
- Environment and Health centric regulations to eliminate plastic usage in packaging – Aluminum green and healthy substitute

### Aerospace & Civil Aviation

- Increasing indigenization by ISRO
- India's civil aviation market expected to be 3rd largest by 2020
- Demand boost through offset obligations – Boeing, Airbus, Dassault expected to spend \$14 billion by 2028



### Aluminum and its role in SDG goals

India's COP-21 commitments to reduce the emissions intensity of its GDP by 33-35% by 2030 from 2005 level will be aided by

- Light weighting of vehicles leading to increased fuel efficiency,
- Replacing plastic with aluminum cans to reduce GHG emission
- Promoting use of electric cars
- Reducing usage of wood in construction sector.
- Aluminum will also play a critical role in investment in renewable energy like wind, solar and energy storage batteries as mentioned earlier

Source: Industry Inputs

Government's commitment and renewed focus on Make in India [2.0](#) needs to take into account focus sectors which have:

a) High growth potential: Per capita consumption of aluminum in India is still very low at 2.5 kg. Consumption is heavily concentrated in the electrical industry segment (43% share). Transport and consumer durables account for 19% and 15% share respectively. As documented above, a strong correlation between GDP per capita and Aluminum consumption per capita presents a huge opportunity for growth in various segments.

b) Competitive Advantage: India is the 4<sup>th</sup> largest Alumina Producer, 3<sup>rd</sup> largest Aluminum Producer and 5<sup>th</sup> largest consumer of Aluminum. It is endowed with rich and good quality coal and bauxite reserves (5<sup>th</sup> largest in the world for both). India's unique advantage of abundant, good quality bauxite (compared to China which has high silica content) along with coal, which needs to be leveraged to develop a globally competitive aluminum industry which will also help achieve our economic development goals. India has a significant primary aluminum capacity (4100KT) and downstream processing capacity (3880KT) which lays a good platform for scaling up and leveraging our natural resources.

*Given our competitive advantage in terms of natural resources, capacity can be increased multifold to cater to domestic demand without any reliance on imports.*

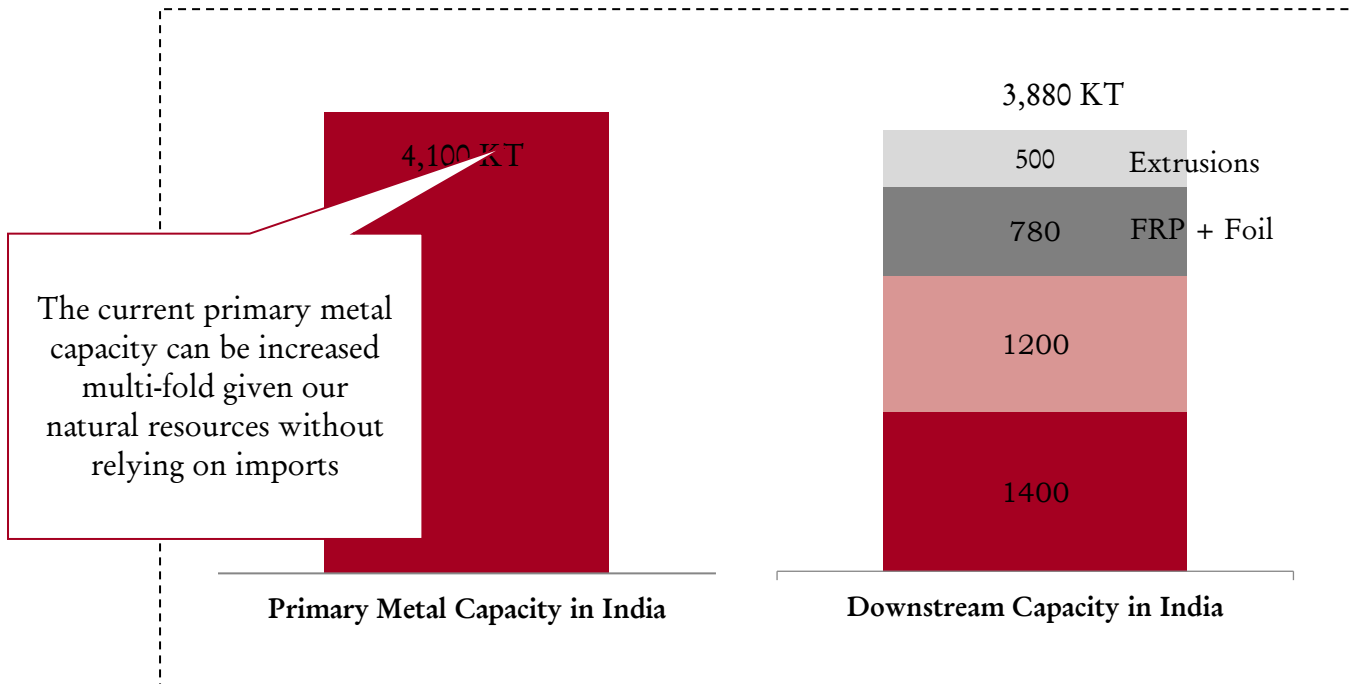


Figure 6: Aluminum primary metal capacity and downstream capacity in India, KT

The sector in India is characterized by companies ranging from fully integrated to product specialists and is horizontally and vertically extended. The upstream sector being capital intensive is dominated by three major players NALCO (PSU), Hindalco and Vedanta with a production of about 3.5 MT and capacity of 4.1MT. Production has grown three fold since 2007. The downstream segment comprises 150+ large & mid-sized companies and a much larger base of smaller & unorganized players.

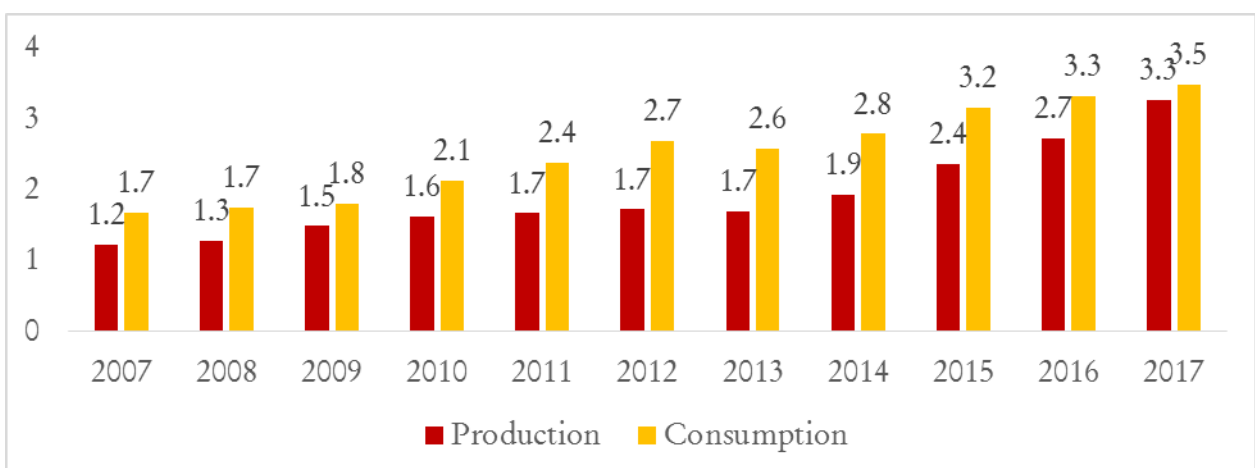


Figure 7: India production and consumption of Aluminum, MT

Recycled aluminum sector is highly fragmented with around 10 medium sized players and over 150 to 200 small players due to low entry barriers & capital costs. Castings account for about 70% of the recycled aluminum

usage in India; billets, re-rolling units and steel de-ox make up the balance 30%. Transportation (mainly automobiles), followed by building & construction, consumer durable products and other industrial applications are the major users for recycled aluminum in India. Aluminum recycling process is less capital intensive and requires only 5% of energy to produce aluminum compared to primary route.

Along with the availability of Primary Aluminum and Scrap sources, India also has a strong downstream presence across FRP, Extrusions and Casting segments.

In FRP, Hindalco is the largest player with 2/3<sup>rd</sup> of the market share. Hindalco, along with its subsidiary Novelis Inc, is the largest FRP manufacturer and recycler in the world. In India, other than Hindalco, other FRP manufacturers are small in size with the largest one having 5% market share. Extrusions, on the other hand, is a highly fragmented market with about 200 players operating in the segment. Jindal Aluminum and Hindalco are the largest players in the Extrusion segment with combined market share of 30%. Other than FRP and Extrusion, Castings is one large segment which primarily serves the Automotive market and mostly uses Aluminum in the Scrap form.

Going forward, India may witness strong growth from segments like Construction, Packaging and Transport sector and this would require strengthening of our downstream sector beyond the current capabilities. This would entail significant investments from the aluminum sector and adequate policy support to fuel aluminum adoption in emerging applications.

## Chapter 4: Self-Sufficiency in Aluminum: China versus US

Growth of China's economic prowess in aluminum sector has been unique. China's four pronged approach for growth of aluminum industry worked to its advantage. Its share in global primary aluminum production increased from 10% in 2000 to 57% in 2017.

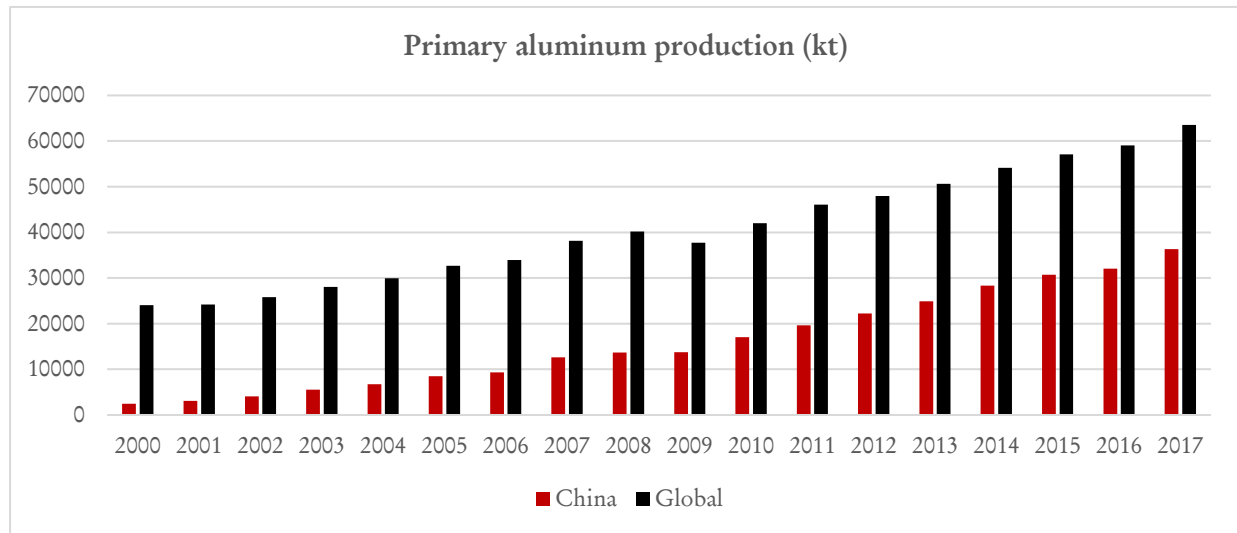


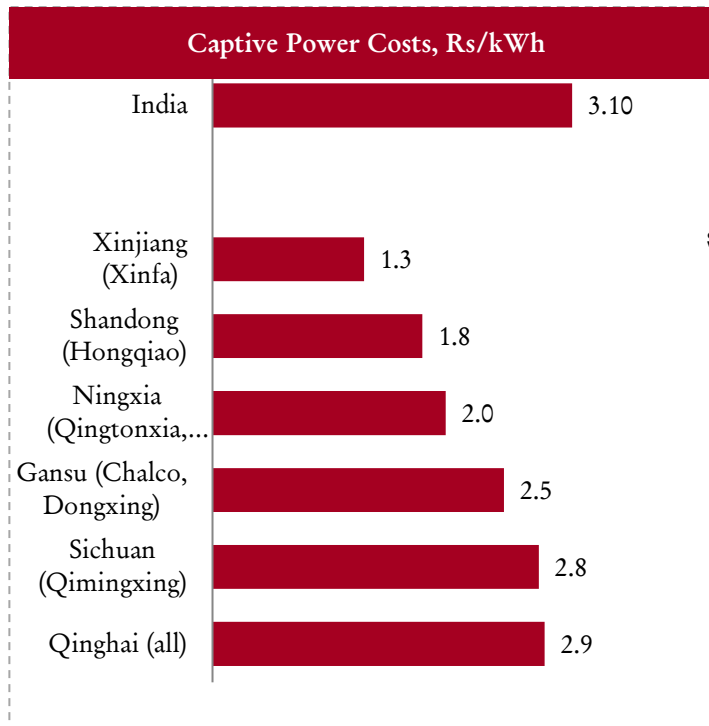
Figure 8: China versus Global primary aluminum production (KT)

**First**, it appears that China recognised its the importance of owning strategic metals, leveraging natural resource advantage and the link between a strong metal sector and its export-led strategy for economic growth. **Second**, its industrial cluster development philosophy for the sector helped it develop relatively backward regions of the country. **Third**, it focused on value addition by supporting the downstream sector in product development and capacity creation. **Fourth**, strong policy interventions/support to the 'pillar' industry promoted domestic demand for the metal. The result of this strategy was that China became self-sufficient in aluminum production and a global supplier.

Additionally, local and central governments in China made available a host of other forms of support to aid aluminum companies. These include interest free and low cost loans, subsidized land and capex subsidies to new smelter projects, income tax rebates, transport subsidy, and VAT rebates.

To encourage usage in automotive sector, China released a catalogue of industrial restructuring guidance encouraging the promotion of lightweight materials in cars. Usage was also encouraged in building and construction sector in order to improve efficiency for the building materials Industry.

Figure 9: Captive Power Costs (2016)



As part of its pillar industry, one of the biggest incentives for the Chinese aluminum sector is its lower cost of power as a result of coal subsidies and cheaper grid tariffs provided by various provincial governments.

On the other hand, *US's aluminum journey has been the exact opposite of China*. Its share in global aluminum production reduced from 11% in 2001 to 1% in 2017. The '[Section 232](#)' investigation report reveals that China's aluminum excess capacity

resulted in weakening of US aluminum industry. In 2016, the U.S. imported more than 90 percent of the primary aluminum it consumed. China's export rebates to their downstream industry have also led to flooding of imports in the downstream industry which provides supplies to their defense and critical infrastructure.

*"As a result, eight U.S. smelters have either closed or curtailed production since 2014, leaving only two fully operational at 100 percent capacity; in contrast, China has 180 operational smelters."*- [Section 232](#)

The economic and security consequences have prompted US to protect its failing Aluminum industry. These are important cross-country learnings for India's growing Aluminum Industry.

## Chapter 5: Issues Plaguing Aluminum in India

The issues plaguing India's Aluminum Industry could be broadly classified into these five categories.



Figure 10: Issues affecting the Aluminum Industry in India

### (a) Energy

The domestic aluminum industry is struggling to remain globally competitive in the wake of increasing production costs. Amongst the largest producers of aluminum like Canada, Russia, Middle East, Norway and China, India has the highest cost of production. This can be attributed to high power cost in India.

Power is a critical input for aluminum industry accounting for almost 30-40% of their cost of production. Coal subsidies in China, natural gas subsidies in Russia and subsidized power in Middle East and various aluminum producing countries gives an edge to them over Indian players.

Since 2003, rise in Indian smelter's metal cost (73% **rise** between 2003-18) has exceeded the rise in LME prices (64%) mainly driven by higher power costs.

Apart from higher power cost additional burden in the form of Renewable Purchase Obligation (RPO), coal cess (Rs 400/MT) and PAT (Purchase, Achieve and Trade), and electricity duty on power generation have increased overall cost of production.

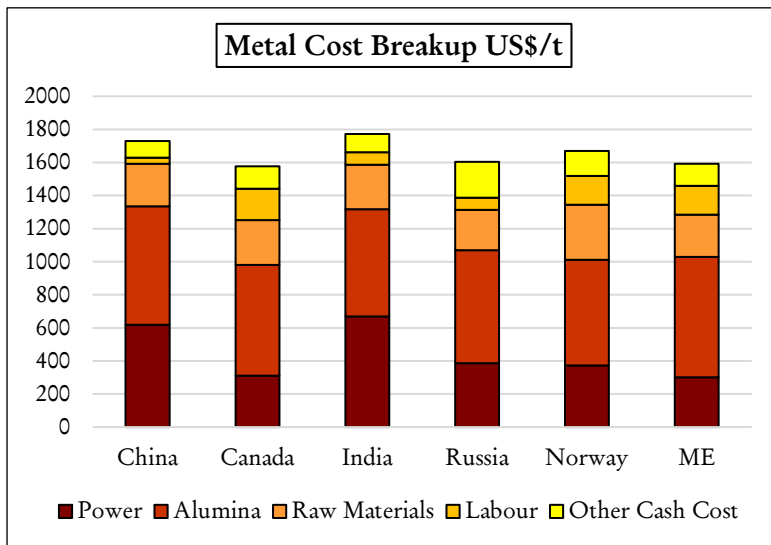


Figure 11: Breakup of Metal Cost (US\$/t)

Under RPO, it is mandatory that certain percentage of energy mix for the industry comes from renewable sources such as wind and solar. This is applicable to all electricity distribution companies and also captive producers. With [RPO burden](#) going up steadily every year, the cost of energy is expected to increase. It is unfair to expect the aluminum Industry to source their power from Renewables sources as it needs *stable, concurrent, uninterrupted and quality power*. Moreover, interstate transfer of renewable power is also expensive. However, one expects power from renewables to be a part of Aluminum industry in the near future with technological advancements and storage capabilities.

Coal cess alone amounts to almost one-fifth of the cost of mining coal. Despite having a competitive advantage in coal, India is one of the most expensive places to produce coal-based electricity.

*'PAT is a market-based mechanism to incentivize energy efficiency in eight large energy-intensive industries like thermal power, aluminum, cement, fertilizer, iron and steel, pulp and paper, textiles and chlor-alkali. Under this scheme, the industries are given targets for carbon emissions and those who under-achieve their targets can comply by purchasing Energy Saving Certificates (ESCCerts) from electricity exchange or by paying a penalty. Others who achieve reduction in baseline specific energy consumption (SEC) in excess of targets will be entitled to sell ESCerts.'*

Taking into account the [revised RPO notification](#) dated 14.06.2018, the three put together amount to a carbon tax of **US\$ 9.7<sup>1</sup>** per ton of carbon dioxide emission. From a developing country perspective with low per capita consumption of electricity, this carbon tax seems to be excessive.

<sup>1</sup>Independent calculations under certain assumptions. Authors are happy to provide them to those interested.

Another distortion in the electricity market is the differential electricity duty for captive and IPP power. Aluminum producers set up captive power plants for their energy requirement as it guarantees 24\*7 steady power since the quality and quantity of grid supply is not as reliable. After investing significantly in CPPs, they are charged higher electricity duty compared to IPP. States owing to their fiscal condition, often engage in such unfair taxation and it is recommended that it should be reviewed and rationally revised.

Specifically, for aluminum industry, the impact of [coal cess](#), [electricity duty](#), [RPO](#), [evacuation facility charges on coal](#), and [import duty on CP coke](#) raise the cost of production to almost US\$238/MT. With revised RPO obligations, these costs are expected to rise further.

Figure 12: Impact of Cess & Duties in the last 3-4 years

Particulars	Previous	Current	Sp. Consumption/ MT of Aluminum	Impact on Aluminum COP (\$/ MT)
Cess on Coal <sup>1</sup> (introduced in 2010)	Rs50/ MT	Rs 400/ MT	11.73 MT	\$64/ MT
Electricity duty <sup>2</sup>	Rs0.30/kwh	Rs0.55/kwh	14500 kwh	\$56/ MT
Renewable Power <sup>3</sup> Obligation (RPO)	Nil	4.75% for Solar 5% for non-solar	14500 kwh	\$58/ MT
Evacuation Facility Charges <sup>4</sup> on Coal by Coal India	0	Rs50/MT(w.e.f. 20.12.2017)	11.73 MT	\$9/ MT
Import Duty on CP Coke <sup>5</sup>	2.5%	10%	460 kg	\$18/ MT
Furnace Oil to LDO	Shifted from FO to LDO based on Supreme Court order			\$33/MT
Total				\$238/MT

Overall, [additional capex](#), [differential electricity duty](#) and [carbon tax](#) is a triple whammy for domestic producers of Aluminum.



(b) Mining

Coal and Bauxite account roughly for nearly 70% of Aluminum production costs (See table). Making the sector competitive will need targeting the costs side.

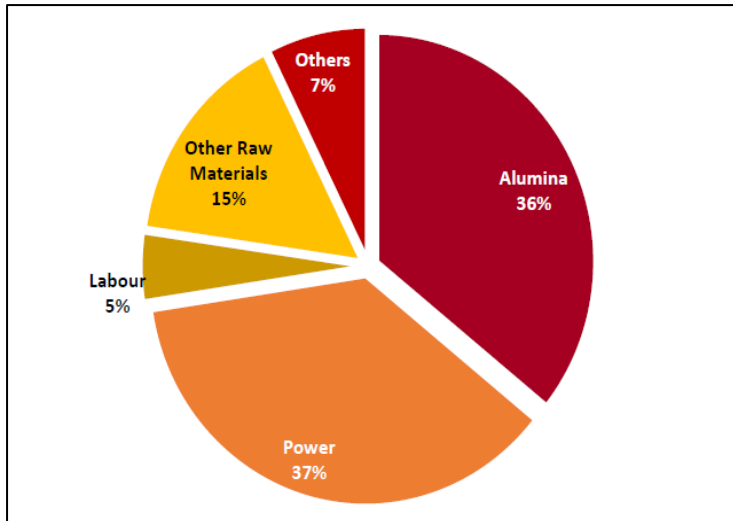


Figure 13: Break-up of Aluminum Production Costs

Some of the issues affecting mining of coal and bauxite are:

- Delays in grant of Environmental Clearances, Forest Clearances, other statutory clearances causing significant development risk.
- Land acquisition issues in mineral rich areas.
- Absence of railway connectivity and transport infrastructure in several mineral rich areas of the country which are typically remote
- Procedural issues between Centre, State and bidders in matters of bloc allocation
- Availability and allocation of rakes to non-regulated sector is well below the demand (Steel and Aluminum both face these issues)

Implementation of taxes/levies on coal such royalty, DMF, CSR putting undue burden on coal cost and industry. A schedule of cross-country comparison of royalty duties (coal and bauxite) is attached.

Schedule 1: Royalty and Taxes as percentage of ex-mine coal cost (pc)

Country	Royalty & taxes as % of ex-mine coal cost
India	25% - 31%
Indonesia	12%
South Africa	0% - 7%
Australia	7%

### Schedule 2: Bauxite: Royalty and Taxes (Rs/T)

Country	Royalty & taxes (Rs/T)
India	230
Guinea	50
Brazil	90
Australia	120

- Moreover, taxes on coal in India raise the price by about 24% and impact the competitiveness of the aluminum sector already battling coal subsidies offered in China
- India lacks a robust geological database of bauxite reserves
- States have not come up with auctions of metallurgical grade bauxite reserves, therefore, limiting domestic competitiveness

#### (c) Infrastructure

Logistical and Infrastructural issues continue to hinder movement of minerals from their mines. Some of these are outlined here:

- Increased cost of transportation of Alumina and Bauxite
- Poor rake availability affects coal and bauxite movement and results in high working capital blockage. Also, growing consumption per capita will need to be met by better railway infrastructure.
- Poor Railway connectivity is also an issue in remote areas
- Costly infrastructure for disposal of Fly-Ash and Red Mud

#### (d) Scrap Recycling

As India embarks on a growing aluminum consumption trajectory, *it must realize that both primary and scrap-recycling industries are essential to the vision of India's Aluminum Policy.* Therefore, a fine balance must be maintained for the co-existence of primary and scrap so that it can cater to the future demand, both domestic and foreign.

One of the unique properties of aluminum is recyclability. There are several reasons as to why Primary and scrap are crucial for India's Aluminum story. While, producing Aluminum from recycled scrap produces much less carbon emissions compared to primary metal, Primary aluminum production in terms of value addition is 15 times that of scrap recycling. Also, scrap usage is limited to specific applications based on their alloy composition and is often used along with Primary in manufacturing processes.

For India, the dynamics of primary and scrap production and consumption will follow two phases.

**Phase one** will see India's consumption of aluminum grow up strongly owing to investments in infrastructure and defense. Currently, the per capita aluminum consumption is very low at 2.5 kg compared to a world average of 11 kg. Both Primary and Scrap need to fuel this consumption demand. In the absence of a formalized and standardized scrap recycling policy and industry, our consumption needs would make us unduly rely on foreign imports, despite significant scrap generation and processing potential.

**Phase two** will witness India hitting some steady-state value of Aluminum consumption. In this phase, it's the scrap that can be recycled again and again to cater to steady state demand. Currently, In India we do not have any formal organized Metals Recycling industry structure. The industry is not highly regulated and there are no specially designated zones/areas for Metals Recycling.

We outline some key facts on the global scrap import scenario in the appendix of this paper.

Therefore, India cannot afford to miss the bus when it comes to domestic scrap generation and recycling facility. Laxity on these counts would only be detrimental to our strategic economic and critical infrastructure interests.

#### (e) [Trade Policy and FTA's](#)

While it is a well-known fact that bilateral trade deficits with our FTA partner countries have increased post signing of FTAs like ASEAN, Japan and Korea, the Aluminum sector too has also not benefitted from these [agreements](#). Aluminum imports into India from ASEAN region have surged from \$122mn in 2010 to \$302mn in 2016. The reason has been increase in imports especially from Malaysia. This is because the tariff elimination schedule in India- ASEAN FTA is skewed heavily in favour of Malaysia.

Schedule 3: % of tariff lines offered under staging categories for Chp-76 India- ASEAN						
	India	Malaysia	Indonesia	Vietnam	Philippines	Thailand
EL	7%	84%	0%	0%	5%	0%
ST	0%	0%	78%	22%	26%	0%
NT-2	13%	0%	0%	5%	3%	21%
NT-1	80%	16%	22%	73%	66%	79%

India's trade with respect to Aluminum products with FTA partners  
(Chp-76)

- (a) Under the FTA, India kept all items except 760110 (Unwrought aluminum, unalloyed) in Normal track. Duty on 760110 is 7.5%.
- (b) On the Malaysian side, all downstream tariff lines from 7604-16 were kept under exclusion list with tariff ranging from 25-30%. 7601-03 were given access at zero duty. This skewed duty structure has impacted our trade with ASEAN specifically Malaysia.
- (c) On the import side, import of aluminum items which were given preferential duty by India (all except unwrought aluminum) has surged from USD35 mn in FY11 to USD253 mn in FY17. The impact on alloyed aluminum is the most where imports have surged from US\$7mn in FY11 to US\$174mn over the same period.

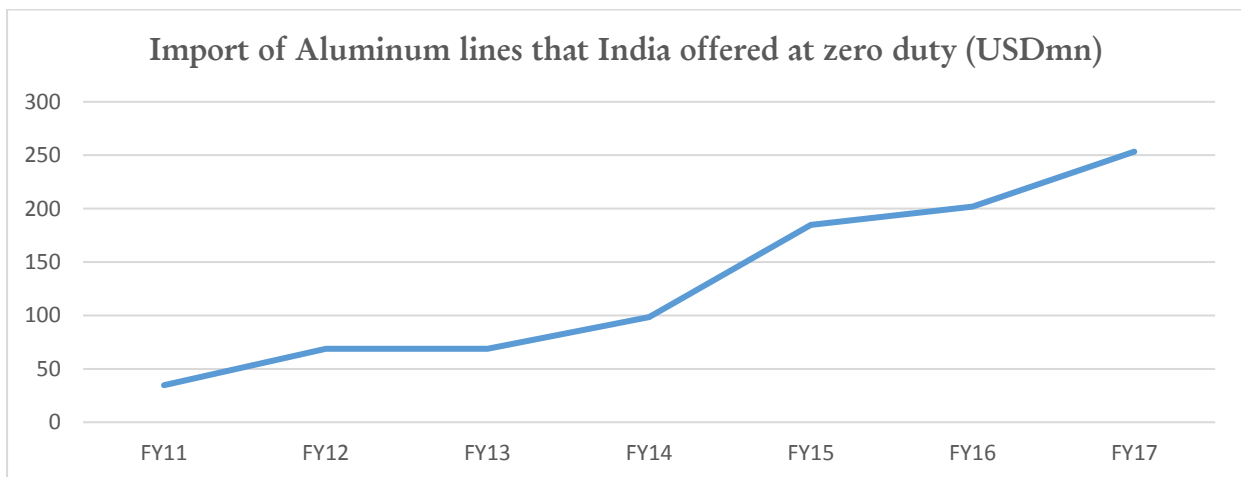
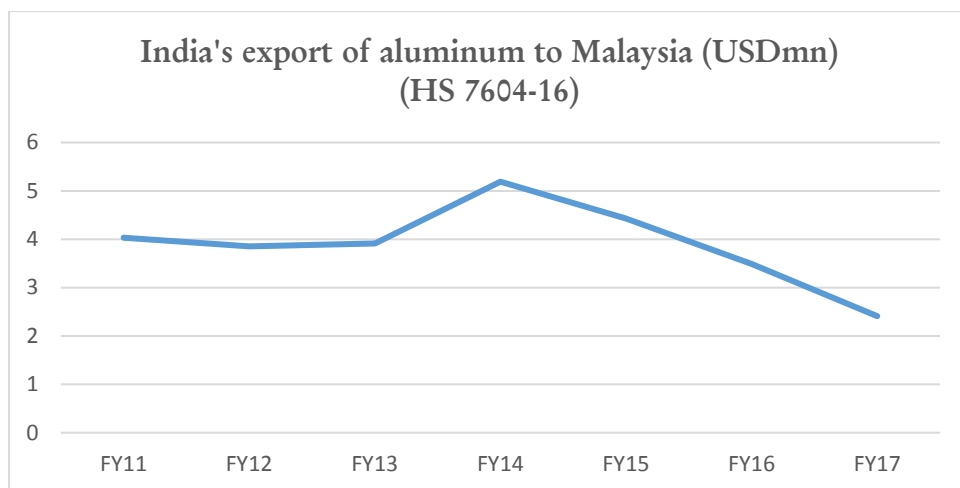


Figure 14: Import of Aluminum lines that India offered at zero duty (USD mn)

- (d) Imports of 760110 hasn't increased much since the FTA came into effect, as the same was in exclusion list with duty protection of 7.5%.
- (e) On the export side, due to a heavy duty protection of 25-30% on HS codes (7604-16) Indian downstream industry hasn't been able to export to Malaysia. This has led to an unfavorable trade imbalance for India.



**Figure 15: India's export of Aluminum to Malaysia (USD mn)**

Almost 50% of the aluminum consumption in India is imported, however, more than half of these imports comprise of scrap. A large part of the non-scrap imports into the country are from FTA partner countries like Malaysia.

**Schedule 4: Imports through FTA and Non-FTA route**

Products, kt (CY 2017)	FTA	Non-FTA	Grand Total	Addressable
Unalloyed Ingots	8	85	93	93
Alloy Ingots	111	127	238	--
Billets	27	13	40	40
Wire Rods	29	17	45	45
FRP	23	118	141	70
Extrusion	8	45	53	30
Foil	28	110	138	30
End Products	11	51	62	--
Powder	1	2	3	--
Grand Total	246	568	813	308

India also negotiated a FTA with RCEP countries which includes China. India has been under tremendous pressure to reduce tariffs on majority of their tariff lines. While India's trade balance with respect to China is heavily skewed in favor of China or the aluminum sector to the story is the same. Aluminum imports from China into India are almost 30x of India's aluminum exports to China. Trade deficit for aluminum is around USD 690mn. If duty is further cut under RCEP, domestic aluminum industry will

be severely hit. Before RCEP is signed, the government should create a level playing field for the Indian metal Industry in the face of competition from other trade partners.

## Chapter 6: Vision for a New Aluminum Policy

The National Aluminum Policy (NAP) needs to focus on a holistic short-term, medium and long-term vision identifying growth targets for demand augmentation and capacity addition. This requires a strategy for achieving the targets in terms of raw material, infrastructure, value-addition, power, energy requirements and scrap recycling.

NAP must address the issues that have constrained domestic industry productivity and capacity augmentation. Some suggested recommendations are as below:

1. Aluminum as a core industry: Currently, India identifies coal, crude oil, natural gas, refinery products, fertilizers, steel, cement and electricity as its eight core industries. Aluminum contributes to nearly 2% of manufacturing GDP and with projected consumption growth, we expect the share (% of manufacturing GDP) to go higher. The industry also has a high direct and an indirect employment multiplier creating close to 800,000 jobs. Plants are generally based in the hinterlands of the country and aid in generating peripheral employment and economic development of the region. Therefore, we recommend into looking actively into the possibility of classifying Aluminum as a core industry.
2. Reforms in coal and bauxite mining: It is imperative that once allotted, industry should not face administrative and legal hassles during the operation of coal and bauxite mines. This hampers the spirit of 'Ease of Doing Business' and induces inefficiency. On this count, we have two recommendations to make.
  - a) First, while putting the mines for auction, central government must make sure that it has all the mandatory clearances (Environment, Forests, statutory and miscellaneous) at its disposal. It should not be the private players burden to obtain these clearances. This will foster Ease of Doing Business. This will involve consultations with all the necessary stakeholders but in the interest of providing a business supporting environment, this should be actively explored.
  - b) Alternatively, the possibility of a single window clearance could also be put in place. Private bidders, after receiving their mine allotment should go to this single window clearance body and receive all the necessary clearances. Currently, they have to

report to different ministries of the government to receive clearances, which is often time consuming and in some cases, a substantial cost disability factor.

3. Metal Scrap Recycling: A National Material Recycling Policy, being drafted by NITI aims to create generate public awareness to Reduce, Reuse and Recycle to make it a habit of choice. The policy will provide guidance to enable India to establish an appropriate legislative, administrative and institutional framework for recycling of metals and materials. The Scrap policy will be a living document that will be monitored and formally reviewed to reflect new needs, issues and opportunities with an aim to achieve a target of 85% recycling rate by the year 2025 and enhance job creation opportunities. Scrap usage in India is diffused and not regulated through standards or end-use restrictions with heavy reliance on imports. As outlined above, Phase two will witness India hitting some steady-state value of Aluminum consumption. In this phase, it's the scrap that can be recycled again and again to cater to steady state consumption demand. The duty differential between scrap and primary metal tilts the usage in favour of imported low quality scrap. Domestic scrap generation has to be our priority.
4. Energy policy for energy-intensive sectors: A separate energy policy needs to be developed for the energy intensive sectors. High energy intensive sectors are being penalised by paying high carbon tax through various cesses and duties. A separate energy policy for these industries should ensure that these industries receive power at globally competitive rates so that they can compete with global players. It is recommended that RPO obligations, coal cess and electricity duty charges may be looked at and rationalised to make these sectors competitive.
5. Export policy for downstream industry: Downstream producers of aluminum need to be encouraged towards high end production and exports of value added exports of aluminum. This must be in sync with the objective of Make in India with focus on the development of the entire value chain of aluminum production in India.
6. Trade policy and mega Free Trade Agreements- India trade policy and mega FTAs should be negotiated keeping in mind India's experience w.r.t previous FTAs. With respect to Aluminum industry, before opening up our domestic market to RCEP or any other FTA members, a level playing field (on the issues highlighted above) should be



ensured for domestic manufacturers to compete with foreign players. [FTAs](#) have tilted the balance of trade in favor of our trading partners and these need to be carefully reviewed leveraging our maximum export potential and keeping trade complementarities in mind.

7. Infrastructural and Database Issues: Aluminum being a continuous process industry will require priority access to infrastructure. Rake availability in railways is an issue. N-BOX and BTAP wagons are in shortage; their poor availability affects coal movement and results in working capital blockage. Several mineral rich areas of the country are yet to be connected with durable transportation infrastructure. When it comes to bauxite reserves, India lacks a robust geological database which can be mined for exploration. It is also strongly recommended that an ecosystem for fly-ash be created around these aluminum production plants which can be used as a feedstock for brick, gravel and cement manufacturing industries. It is recommended that these issues be carefully addressed.

## Appendix-1

Table 1: Global Imported Scrap Scenario

Global Imported Scrap Scenario										
Units: KT	Finished Good Production	Scrap Volume	Scrap Ratio	Net Scrap Import	Import Ratio of total Scrap	Primary Metal Production	Excess Primary Metal for Export	Primary Export as a % of Scrap Volume		
Italy	1742	858	49%	385	45%	0	0	0%		
Japan	3815	1730	45%	0	0%	0	0	0%		
France	1098	493	45%	0	0%	416	0	0%		
US	9141	4121	45%	0	0%	744	0	0%		
UK	328	146	45%	0	0%	40	0	0%		
Germany	3726	1425	38%	0	0%	548	0	0%		
Brazil	1326	524	40%	76	15%	801	0	0%		
<b>India</b>	<b>3154</b>	<b>1083</b>	<b>34%</b>	<b>1083</b>	<b>100%</b>	<b>3234</b>	<b>1163</b>	<b>107%</b>		
Korea	2057	638	31%	780	122%	0	0	0%		
<b>China</b>	<b>43986</b>	<b>10396</b>	<b>24%</b>	<b>2172</b>	<b>21%</b>	<b>36099</b>	<b>2509</b>	<b>24%</b>		
Turkey	1480	342	23%	0	0	80	0	0%		

In this table, we outline some of the key facts that characterise the scrap scenario in India and the world over.

1. The world average of scrap consumption ratio is roughly 27% of total aluminum consumption. Advanced economies such as US, UK, Japan, and France have a scrap ratio exceeding 40%.
2. However, the net scrap import among these advanced economies is negligible owing to domestic scrap generation.
3. India and Korea are highest in scrap import ratio at 100% and 122% respectively.
4. India is the 2nd largest importer of scrap behind China. Despite significant presence of primary metal, India's consumption of scrap is 100% import dependent. Contrast this with China, where scrap import ratio is nearly 21%.
5. India's export of excess primary metal as a percentage of scrap volume is 107% whereas for China it is 24%. This reflects the poor domestic scrap recycling infrastructure India has.