

Assessment of secondary aluminium industry in India

September 2022

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1 Indian aluminium demand review

1.1 Overall aluminium sector demand review

Total demand estimated at 3.9 million tonnes in fiscal 2022

Total aluminium (primary and secondary) demand in India in fiscal 2022 is estimated at 3.9 million tonnes, logging a CAGR of 4-5% over fiscals 2015 to fiscal 2022.

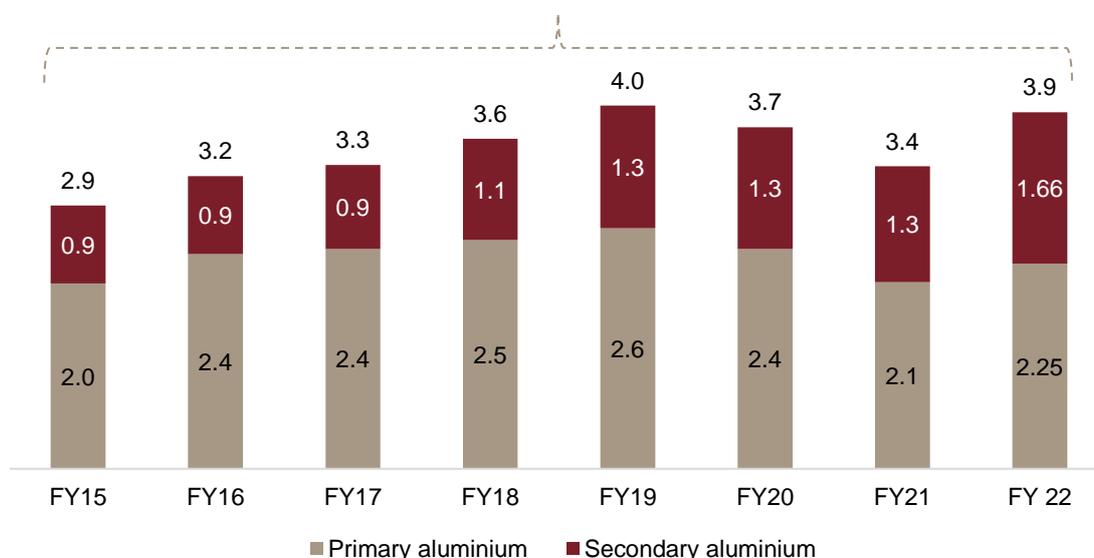
The demand for secondary aluminium in India zoomed at a CAGR of 9-11% from fiscal 2015 and 2022, while primary aluminium demand registered a CAGR of 1-2% only. Demand for primary and secondary aluminium is estimated at 2.25 and 1.66 million tonnes, respectively, in fiscal 2022. The demand for secondary aluminium is primarily led by demand from the auto sector. Rising demand from packaging, consumer durables and construction sectors also led to increased demand. Due to better cost dynamics the share of secondary aluminium in aggregate aluminium market in India rose to 42-43% as of fiscal 2022 from 29-30% in fiscal 2015.

The overall growth in aluminium demand is supported by replacement of other non-ferrous or ferrous metals with aluminium in key end-use industries in the domestic market owing to better technical properties such as an optimum strength to weight ratio, low melting point, corrosion resistance, better electrical and thermal conductivity, better recyclability, etc. amongst others.

Aluminium demand trend in India

Unit: Mn Tonnes

CAGR (FY15-22): 4-5%



Note: Figures above the bars represent total (primary + secondary) aluminium demand for the year

Source: Industry, CRISIL Research

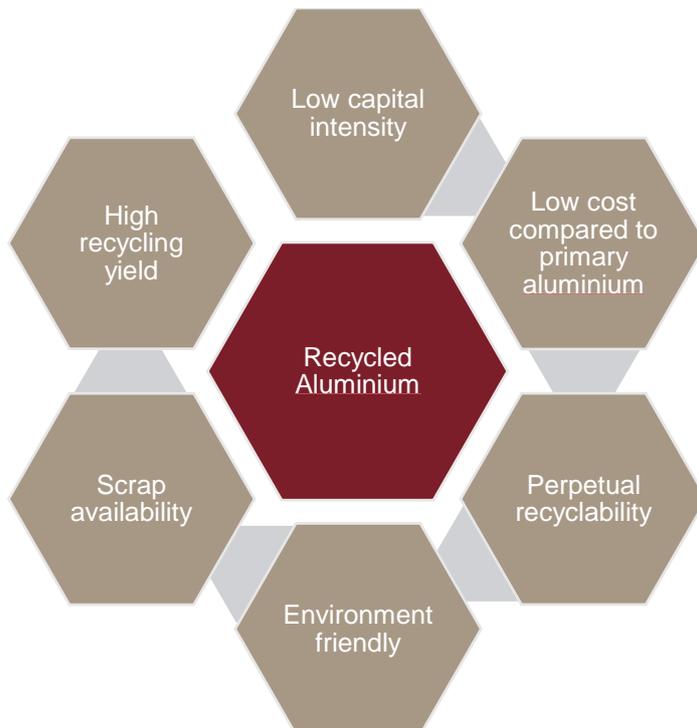
According to a Niti Aayog report, per capita aluminium consumption of aluminium in India is at 2.5 kg which is far below the global average of 11 kg. This presents a huge opportunity for Indian aluminium industry to grow across various end-use segments.

1.2 Key advantages offered by recycled (secondary) aluminium

Consumption of secondary aluminium has various economic and environmental advantages

Sharp growth in usage of secondary aluminium is primarily attributed to its better cost economics compared with primary aluminium, better technical properties compared with other metals, environmental benefits, and low capital intensity.

Key advantages of secondary aluminium



Source: Industry, CRISIL Research

- Less capital intensity:** Manufacturing of aluminium through primary route involves bauxite mining, bauxite refining, smelting of alumina, etc. These activities are capital as well as energy intensive. Setting up of a green-field refinery and smelter of a minimum economic size (typically a refinery of 1 million tonne and a smelter of ~0.5 million tonne) with a captive power plant requires an investment of around Rs 220-240 billion. As against this, the recycled route involves sorting and segregating scrap, melting of scrap, re-alloying, and casting into ingots. This process is carried out at a cost considerably lower than that of primary aluminium owing to lower energy requirements. Moreover, setting up of a fully mechanised recycling unit of 1 million tonne capacity would typically involve an investment of Rs 15-20 billion.

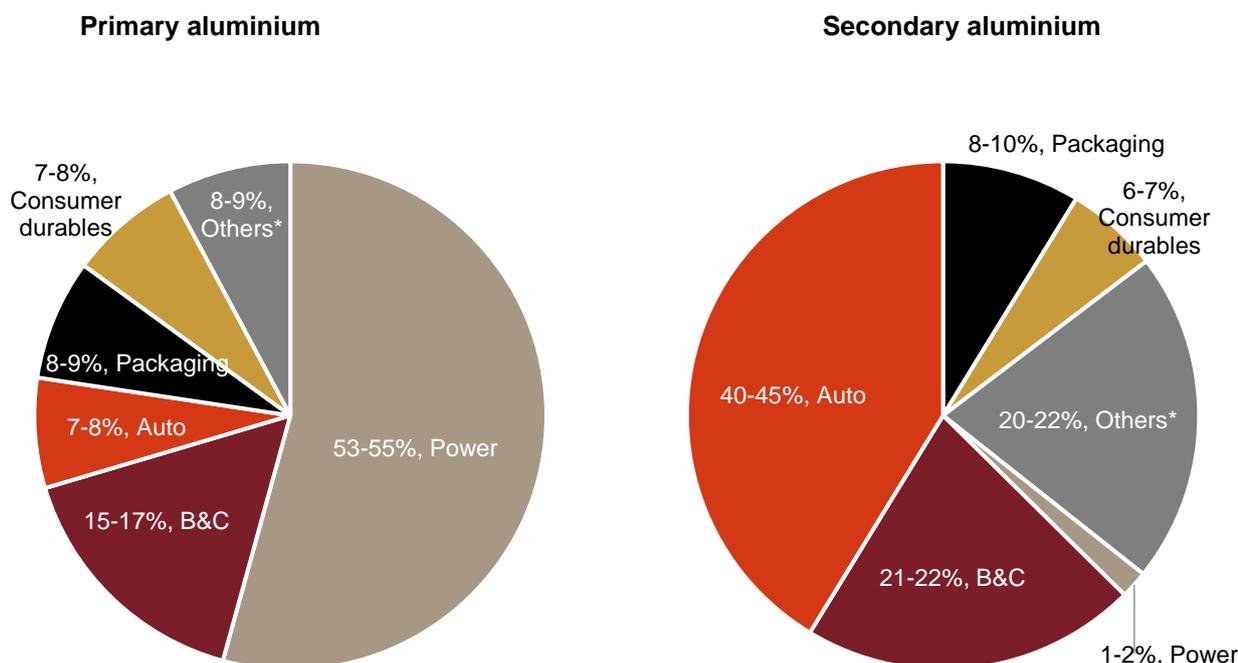
- **Low cost of production compared to primary aluminium:** One of the major advantages of recycling is low production costs as against manufacturing through the primary route. This low cost is attributed to significantly lower energy requirements (~90-95% of energy savings in case of secondary aluminium production as per International Aluminium Institute) for recycling than the primary route. Also, pre-existence of required alloyed elements in aluminium scrap further reduces alloying costs.
- **Perpetual recyclability:** The inherent quality of aluminium is not affected irrespective of the number of times it is recycled. The other key characteristics that drive the demand for secondary aluminium are its perpetual recyclability, with an advantage of pre-existence of desired properties (as it is pre-alloyed specific to end-use requirement when in scrap form).
- **Scrap availability:** Aluminium scrap is estimated to be available in abundance globally, which further results in increased recycling of aluminium for key end-use products.
- **Environment-friendly option:** Manufacturing of primary aluminium consumes significant natural resources. As per industry estimates, every 1 tonne of aluminium manufactured through primary route consumes 4-6 tonnes of bauxite, 1-1.5 tonne of limestone, 20-22 cubic metre of water, and ~14,000 Kwh of power. As against this, manufacturing of 1 tonne aluminium through the recycled route consumes aluminium scrap as a key raw material (saving natural resources) and consumes only 5-7% of the total energy required for primary aluminium, thereby saving natural resources and being energy efficient. Furthermore, as per the Bureau of International Recycling (BIR), each tonne of aluminium ingot manufactured through primary route emits ~3,830 kg of CO₂ compared with ~290 kg of CO₂ for aluminium manufactured through scrap recycling. The process of primary aluminium production through refineries results in the generation of large quantities of solid waste amounting to ~ 2-2.5 tonnes for 1 tonne aluminium produced hence effecting the environment, unlike secondary aluminium where solid and liquid discharge is close to negligible.

1.3 Demand segregation across primary and secondary aluminium

Light weight, high strength, moderate melting point, ductility, conductivity, resistance to corrosion and the ability to be recycled (without any loss of original properties) ensures that aluminium has multiple applications across industries such as transport (automotive), food preparation, packaging, space, aerospace, architecture, defence and electrical transmission.

While the power sector consumes the largest proportion of primary aluminium in India, better cost economics of secondary aluminium and healthy demand for non-ferrous castings from the automotive sector, the largest consumer of secondary aluminium, are the major demand drivers of secondary aluminium in the country.

Key end-use segments and rationale for usage of aluminium (fiscal 2022)



*Others include defence, aerospace, machinery and equipment amongst others; B&C: Building and construction

Source: Industry, CRISIL Research

Key end-use segments and rationale for usage of aluminium

- **Power:** Aluminium is primarily used in overhead conductors of transmission lines; transformer coils, bus bars and foil wraps for power cables, etc. This usage is primarily driven by a favourable strength to weight ratio, better conductivity and lower costs compared with copper. Owing to these properties, the power segment was estimated to account for the highest share of aggregate aluminium volumes (both primary and secondary) at about 30-35% in fiscal 2022. The increase in industrial development, rapid urbanisation and infrastructure developments and government initiatives for electrification of villages has resulted in healthy growth in the sector. Going further, the government’s initiatives such as the “Make in India” scheme, “Smart Cities” programme, 100% rural electrification are expected to result in growth of aluminium demand. Demand from the power segment accounted for 53-55% of total primary aluminium volumes in fiscal 2022 and a negligible share of secondary aluminium volumes (about 1-2%) on account of conductivity losses.
 - **Solar power:** The Government’s move towards Aatmanirbhar Bharat is expected to aid the sector through increased focus on enhancing the solar power capacity in India through scaling up of domestic solar manufacturing units rather than resorting to imports. The government imposed basic customs duty with effect from April 2022 on both solar modules/panels and solar cells. Hence, with this imposition of duties, if the shift towards local manufacturing increases, it is anticipated to lead to an increase in aluminium demand from solar panels.

- **Automotive:** Aluminium is extensively utilised in both passenger and commercial vehicle segments due to its intrinsic characteristics and properties. The strength-to-weight ratio makes aluminium invaluable in the transportation industry. Use of aluminium, instead of steel, enhances performance, safety, fuel efficiency and durability, and also provides many environmental benefits. Aluminium reduces the total weight of vehicles and light-weight vehicles reduce energy consumption and emissions considerably.

Within the automotive space, aluminium is used in engine components, gearbox, brake casings, radiators, cylinder heads, transmission housing, wheels, window frames and panels, etc. Of the total casting requirement, secondary aluminium occupies a major share on account of better molecular properties owing to pre-existence of desired elements in the scrap. According to primary interactions, aluminium intensity in automobiles manufactured in India is much lower than the global average. Thus, improvement in aluminium demand is expected in the subsequent years, primarily driven by increased intensity of usage within the sector.

EVs could also prompt a shift in the material composition of vehicles. Light weight requirements to improve the efficiency of EVs would mean a greater proportion of plastics and aluminium in them than petrol and diesel vehicles, resulting in an inevitable increase in aluminium demand in this sector. Demand for secondary aluminium is expected to increase in the automotive sector due to the government's stringent vehicular emission norms manufacturers to reduce the vehicle curb weight. Moreover, electric vehicles have a higher intensity of aluminium than ICE vehicles.

The government of India issued standards related to average fuel consumption for passenger vehicles (using petrol or diesel or liquefied petroleum gas or compressed natural gas and comprising not more than nine seats including driver's seat, and of gross vehicle weight not exceeding 3,500 kilograms tested). These standards became effective in fiscal 2018 and the second set of norms is expected to be effective from fiscal 2023. These norms are known as corporate average fuel efficiency (CAFE) which relate the Corporate Average Fuel Consumption (in litres/100 km) to the Corporate Average Curb Weight. With fuel efficiency in question one clear focus of auto OEMs because of these norms is to reduce the weight of the vehicles. The demand from the automobile industry can be met either through recycling of higher quantity imported auto grade scrap or production of primary auto grade alloyed aluminium. A majority of the players in the automotive component space prefer secondary aluminium owing to better cost dynamics and inherent alloy properties, resulting in the segment accounting for a 40-45% share in secondary aluminium volumes, as against a 7-8% share in primary aluminium volumes as on fiscal 2022.

- **Building and construction (B&C):** Aluminium is widely used in building and construction because of its intrinsic properties of lightness and corrosion resistance. It is used for making of windows, door frames, roofing, partitions, false ceilings and other building hardware. Extrusion and aluminium flat rolled products (FRPs) are mainly used in the building and construction sector.

Aluminium's light weight lowers the load on any construction, while the metal's strength lends durability. The weight of aluminium structures is one half to two-thirds the weight of steel structures. By weight, aluminium also is lighter than reinforced concrete structures with the same bearing capacity. Its resistance to corrosion protects structures, especially those being built in regions with extreme weather conditions.

The share of B&C volumes in total primary and secondary aluminium was 15-17% and 21-22%, respectively, in fiscal 2022.

Typically, premium real estate players rely more on primary aluminium for their requirement. The sector witnessed a slowdown for a few months due to unavailability of manpower amid Covid 19. The government's

push to build smart cities, coupled with the growing trend of high rises has encouraged a greater concern for environmentally friendly construction where aluminium can fit into potential applications such as fenestration, facades, curtain walling, structural glazings, roofing and cladding.

- **Consumer durables:** Aluminium is used in appliances such as refrigerators, washing machines, air conditioners (ACs), etc. The penetration is high in appliances such as ACs and washing machines. Low weight, thermal efficiency, corrosion resistance, and non-reactivity to chemicals favour the use of aluminium in this segment.

However, low quality scrap with high lead content and presence of radioactive particles is particularly dangerous in consumer durables and can cause serious problems in electrical equipment.

The demand from consumer durables for primary and secondary aluminium volumes is estimated to be 7-8% and 6-7%, respectively, in fiscal 2022.

- **Packaging:** The metal is non-toxic, so aluminium foil used to wrap foods does not contaminate them. Aluminium foil offers 100% protection against light, moisture, oxygen and other gases as well as against microorganisms and bacteria. Most common applications within the segment include personal care products, pharmaceuticals, processed foods (soft drink cans), containers and bottle caps. Laminated aluminium pouches (aseptic or retort pouches) are used to pack food products such as biscuits, confectionery, butter, oil, and beverages. Aluminium FRPs have a wide- range of applications in the packaging segment.

In India, the penetration of aluminium in the packaging segment is lower than global averages owing to high costs. There could be a potential boom in the packaging sector with growing health consciousness given aluminium's hygienic properties and the boom in pharmaceutical industries.

As of fiscal 2022, the demand from the packaging segment for primary and secondary aluminium volumes is estimated to be 8-9% and 8-10%, respectively.

2 Secondary aluminium demand assessment

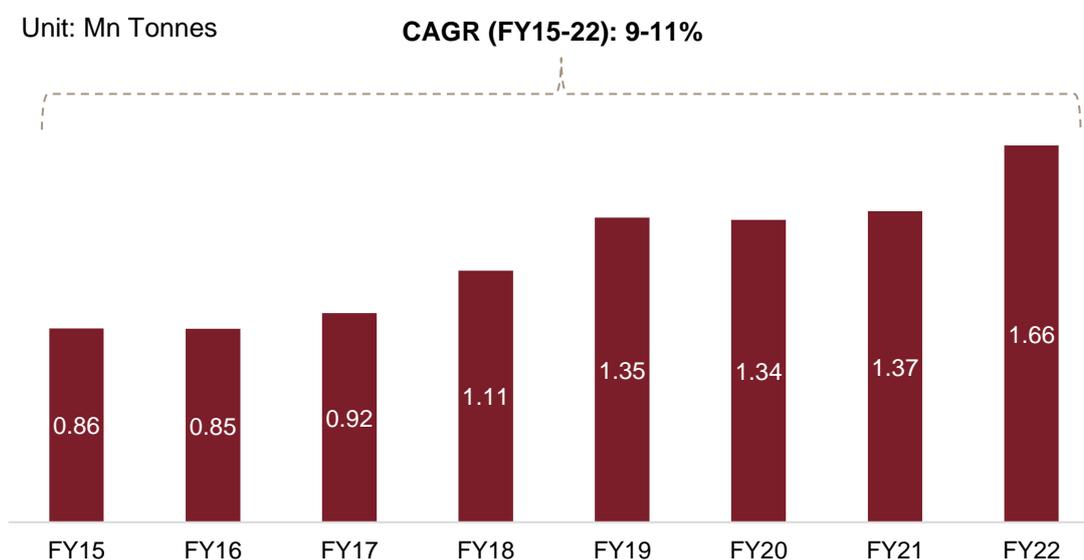
2.1 Secondary aluminium demand review (fiscal 2015-2022)

Robust demand growth over the past seven year

Between fiscals 2015 to 2022, the demand for secondary aluminium is estimated to have grown by a 9-11% CAGR to 1.66 million tonnes in fiscal 2022. Better cost economics of secondary aluminium fuelled this growth.

There is a healthy demand for non-ferrous castings from the automotive sector, which consumes 40-45% of secondary aluminium in India. Further, demand from the building & construction sector, which consumes 21-22% of overall secondary aluminium, has also increased with rising penetration of recycled extrusions, especially in window frames. The packaging segment too witnessed faster growth (for secondary) during the years, largely as a result of healthy growth in key underlying industries such as food products, beverages and pharmaceuticals.

Secondary aluminium demand trend in India



Source: Industry, CRISIL Research

The growth rate of secondary aluminium demand has outpaced primary aluminium demand, led by better cost-economics, especially in the price-sensitive automotive castings space. This, in turn, has led to a surge in scrap imports, which soared to 1.66 million tonnes in fiscal 2022 from 0.87 million tonnes in fiscal 2015, due to limited availability of required and optimum quality of scrap in the domestic market.

2.2 Secondary aluminium demand segmentation

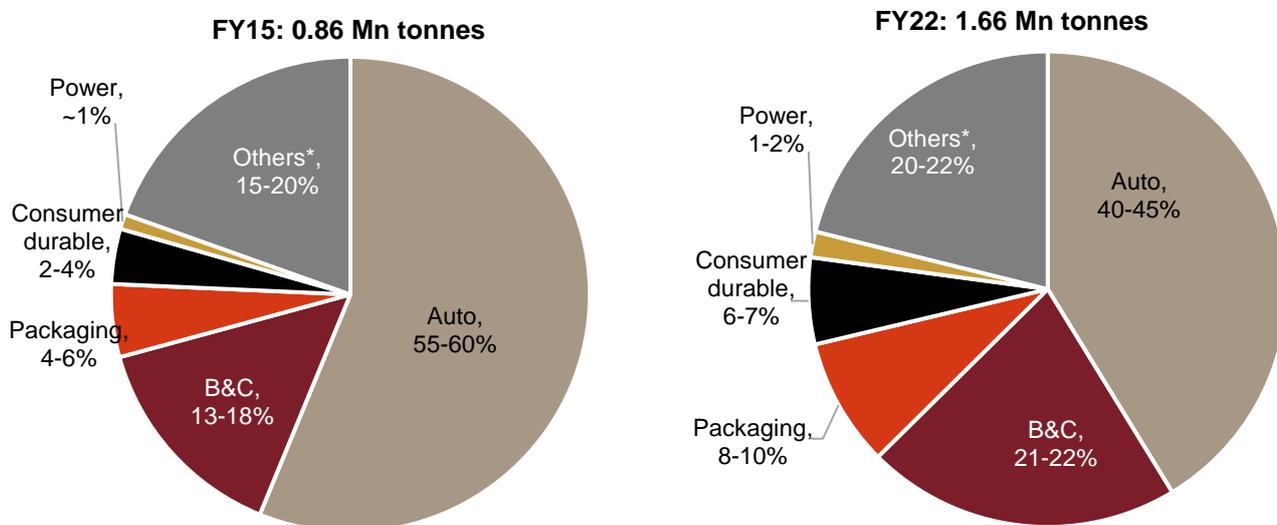
Demand prospects for secondary aluminium closely linked to the auto industry

The automotive segment accounted for 40-45% of the total secondary aluminium sector in fiscal 2022. Within the automotive segment, two-wheelers account for 70% of the total non-ferrous casting demand.

In fiscal 2022, the B&C segment accounted for 21-22% of the overall secondary aluminium sector with demand growth driven by increasing penetration of secondary aluminium owing to cost advantages.

The share of packaging segment increased to reached at 8-10% of the total demand. The share of consumer durables too witnessed an improvement on the back of modestly rising sales volumes. The power segment's share remained negligible over the years with primary aluminium finding higher application in the segment.

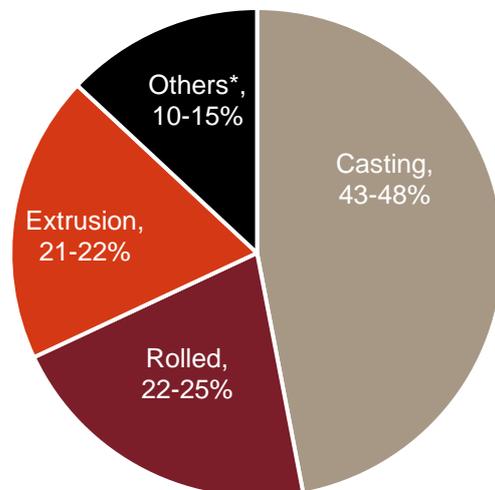
Secondary aluminium end-use demand breakup (fiscal 2015 and 2022)



*Others include defence, aerospace, machinery and equipment amongst others; B&C: Building and construction
Source: Industry, CRISIL Research

Product-mix of secondary aluminium largely dominated by casting

Aluminium is used in the form of semi-fabricated products which are produced from aluminium ingots, slabs and billets by various processes, such as rolling, extruding, drawing, casting and forging.

Secondary aluminium product-wise breakup: Fiscal 2022 (1.66 Mn tonnes)


**Others includes drawing, powders and pastes amongst others*

Source: Industry, CRISIL Research

Of the total ~1.66 million tonnes of secondary aluminium demand in fiscal 2022, 43-48% is estimated to be consumed in the casting form. A majority of casting volumes was consumed in the automotive segment for manufacturing various components such as engine blocks, transmission systems, etc.

With their application in the B&C segment, extrusions are estimated to account for 21-22% of total secondary aluminium volumes. Within the B&C segment, around 90% was estimated to be consumed in the form of extrusions.

Rolled products find maximum application in automotive and packaging segments (to the extent of 85-90% of total rolling volumes) and some applications in the construction segment. In fiscal 2022, the share of rolled products in overall secondary aluminium demand was 22-25%.

Others forms of aluminium include drawn products such as aluminium wires and tubes. Powder and paste, other forms of aluminium consist of finely ground particles of aluminium. Powder is used in inks and explosives, while the paste is used in paints and for providing a metallic finish to automobiles.

2.3 Regional split of secondary aluminium demand

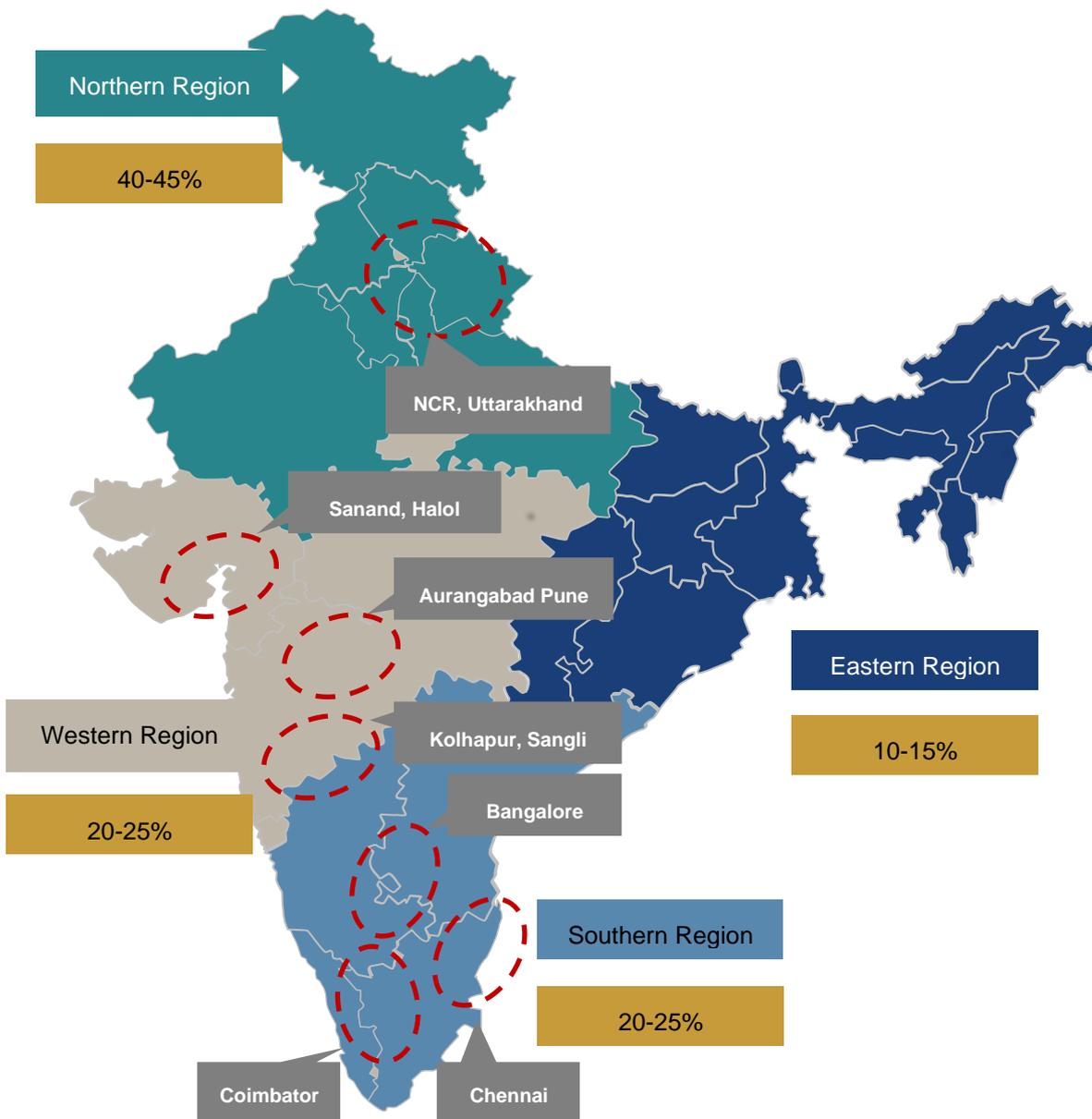
Recycled aluminium demand is largely concentrated in and around key auto clusters

Of the total estimated demand for secondary aluminium of ~1.66 million tonnes in fiscal 2022, a majority (to the tune of ~40-45%) is concentrated in the northern region, followed by southern and western regions. This is primarily on the back of key auto hubs/clusters in the NCR belt with key OEMs such as Maruti Suzuki, Hero Motocorp, Bajaj Auto, Tata Motors, etc. located in the region.

Auto clusters in Chennai, Coimbatore, and Pune, coupled with a significant presence of extruders in West and South, aid a significant share of secondary aluminium demand in the regions at 20-25% each.

The eastern region, however, with no major auto component belt has the lowest share of about 10-15% during the year under consideration. De-ox (deoxidiser) and utensils are key end-users in the eastern belt. With newer OEMs being setup in these hubs, growth in each segment is expected to increase, leading to increased demand for secondary aluminium.

Pan-India secondary aluminium demand breakup (fiscal 2022)



Source: Industry, CRISIL Research

Increasing demand of molten metal

Over the past few years, molten form on aluminium has found rising utility amongst key end-use segments (particularly auto). It is estimated that molten metal constitutes ~15-20% of share in overall secondary aluminium demand and has managed to keep its share consistent owing to several advantages it offers.

Key advantages of molten metal:

- **Savings in melt loss (oxidation loss):**

Manufacturing of secondary aluminium through the molten route is estimated to result in savings of melt-loss to the extent of 2-3% of the cost to manufacturers (casters), as against manufacturing through the solid route. This supports a higher demand for the molten form from manufacturers.

- **Less energy requirement for casters:**

Using aluminium in the molten form saves significant time and energy (estimated to be at approximately 3% of the total metal cost) for recyclers as they skip the re-melting process as in the case of solid ingots. This eventually helps component manufacturers to optimise their operations.

- **Environmental savings:**

Manufacturing of molten metal further leads to additional savings in the emission of greenhouse gases due to avoidance of the re-melting process, thereby containing the negative environmental impact as against manufacturing through the solid route. As per UNFCCC (United Nations Framework Convention on Climate Change) norms, molten metal qualifies for carbon credits. This acts as an added advantage for a company to grow sustainably.

- **Savings in operational and inventory carrying cost:**

Component manufacturers can eliminate the need to set up re-melting arrangements, thereby saving significant operational costs (such as interest, depreciation, manpower, electricity, etc.). Further, molten metal is supplied Just-in-time (JIT), thereby saving storage costs due to lower inventories for manufacturers.

- **Quick turnaround time:**

While the solid aluminium ingot requires some time to settle down and solidify in casters, molten metal doesn't require any settling time and is transported immediately after collecting it from the furnace. This, in turn, results in increased frequency of supply dispatches as against the solid form. As per the industry estimates, the usage of liquid metal results in about Rs.10-12 per Kg savings.

Key challenges of molten metal:

- **Higher compliance requirement for transportation:**

Transporting metal in the molten form requires recyclers to adhere to compliance guidelines prescribed by various authorities, including getting a special license for vehicles and making necessary arrangements. These arrangements come at relatively higher costs than compliance required for transporting the metal in a solid form.

- **Transportation to be time-bound:**

Transportation of metal in liquid form typically takes place for destinations up to 20-25 km of radius and travel time not more than 45-60 minutes keeping the time safety margin into consideration. The supply of molten metal is both time critical and important from the perspective of continuous manufacturing line. The deliveries are made multiple times per shift and any delay can lead to loss in production. Traffic congestions or vehicle failure may lead to solidifying of the metal (as it gets solidified below 620-640° Celsius) and can potentially affect the supplies.

Typically, the average realisation of molten metal tends to be marginally higher than solid ingots, thereby providing some incremental profitability benefit to both - recyclers as well as casters.

3 Secondary aluminium supply landscape

3.1 Industry structure

Analysis of the value chain



Source: Industry, CRISIL Research

- **Scrap collection:**

Aluminium scrap is often categorised as new and old. New scrap originates during the manufacturing of semi-fabricated and final products (shavings, off-cuts, moulded parts, etc), where the quality and composition are usually known. It is melted without any preliminary treatment. Old scrap refers to products collected after disposal from consumers, i.e. at the end of their life vehicles, such as cables, pots, radiators, etc. This raw material is more contaminated than new scrap and requires preliminary treatment.

The different amount of available metal and impurity in aluminium scrap depend on the origin of scrap. However, these characteristics can be changed before the melting process by means of specific treatments. The principal preliminary treatments are: comminution, sorting, color sorting, magnetic separation, air separator, density separators and eddy currents. These processes intend to increase bulk density, remove non-aluminium scrap, and reduce impurity.

Scrap aluminium is processed for return to the market in a series of steps: pre-processing, melting, alloying, refining, and casting. Two general types of scrap are available: furnace-ready scrap and scrap requiring pre-processing. For large-scale shredding facilities, scrap sorting is typically through magnetic and floatation techniques in order to separate non-ferrous scrap from other varieties. Manual sorting also takes place to separate and obtain aluminium scrap from other valuable scrap such as copper, especially in small and mid-sized firms. Indian recyclers prefer to set up sourcing from multiple countries in order to enjoy uninterrupted supply, better quality control, and faster processing. Scrap is sorted into various categories as per guidelines laid by the Institute of Scrap Recycling Industries (ISRI).

- **Scrap trading:**

Categorisation of scrap (defined on the basis of the source industry, components, types of aluminium and its content, etc) determines its price. The domestic scrap trading market is largely fragmented. Well-known players are Mahakaal Metal Brothers, Adhunik Niryat Ispat, and PG International to name a few (import as well as domestic trading).

- **Pre-processing of scrap:**

The initial process within pre-processing includes segregating of scrap as per various properties or alloy grade, followed by cleaning (open air storage exposes it to dust and other impurities). After this, recyclers typically shred large and bulky pieces of scrap and impurities such as chemicals, oil and paints are removed. Pre-processing includes baling and shearing; and in the more high-tech plants de-coating if lacquered or painted.

- **Melting and re-alloying of scrap:**

While recyclers are able to remove most of the impurities through cleaning, sorting, and segregation, some impurities such iron or steel remain and are removed separately from the bottom of the furnace during the melting process. Scrap is loaded into the furnace using a charger and is heated to a high temperature.

Most of the secondary aluminium is produced in furnaces fired with fossil fuels, heavy oils, commonly natural gas, where reverberatory and rotary furnaces are the main technologies. Electric furnaces are typically used in small processing operations, i.e., where scrap is usually home-made rather than purchased material. Electric furnaces cannot compete in terms of melting capacity with the large-scale fossil-fuel furnaces, such as reverberatory and rotary furnaces. The melting process maximises metal recovery, i.e., the ratio between aluminium present in the scrap and secondary aluminium obtained. Fluxing indicates the addition of chemical compounds in the scrap feed to improve recovery of the metal and quality.

After melting of scrap, re-alloying is carried out based on specifications such as tolerance levels, proportions of various alloying elements, etc as provided by the client. In order to ensure that the final product meets the required specifications, recyclers use quality control measures such as tensile strength testing, spectrometric analysis, and microscopic testing. As the required configuration varies client-wise, alloy manufacturers typically install furnaces with small capacities (5-10 tonne/ batch), enabling them to switch grades at any time during production.

- **Casting into ingots or liquid form:**

This is the last stage in the value chain. Molten aluminium may be kept in its liquid state or cast into large slabs called ingots or billets. In some cases, alloying elements are added to liquid aluminium to produce the desired metal for a specific product type. Aluminium ingots may be rolled back into a sheet product (like can or auto body sheet), while billets can be extruded into a shaped product.

There has also been an increasing trend of supplying alloy metal in the molten stage to the final consumer (typically auto component manufacturers) owing to several operational advantages to manufacturers as well as consumers (by eliminating the re-melting process, reduced power and fuel consumption, lowering other operational costs).

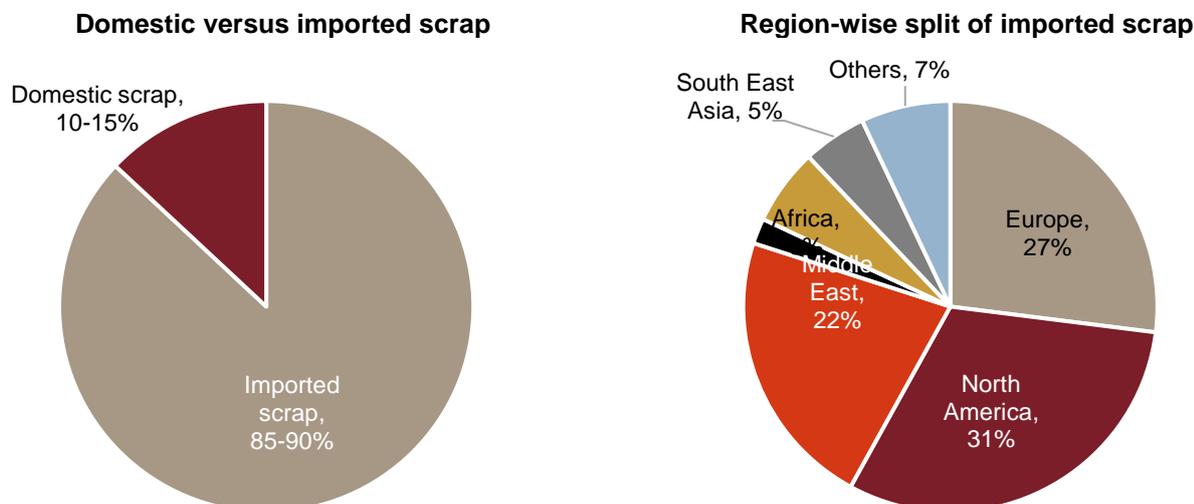
3.2 Aluminium scrap consumption mix

Imported scrap dominates recycling requirement in the country

India is heavily dependent on imports of aluminium scrap. Of the total demand for aluminium scrap in fiscal 2022, 85-90% was met through imports. Higher share of imported scrap is largely on account of lack of an efficient

ecosystem for scrap collection and processing facilities (such as scrap yards). Also, a large chunk of scrap collected domestically is used by small and mid-sized players such as utensil making.

Aluminium consumption mix in fiscal 2022



Note: Asian countries here include: Afghanistan, Bangladesh, Taiwan, People’s Republic of China, Hongkong, Japan, Republic of Korea, Maldives, Myanmar, Nepal, and Sri Lanka. Southeast Asian countries include: Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam

Source: DGFT, Industry, CRISIL Research

Aluminium scrap imports (net) increased at a 7-year CAGR of 9.7% to 1.66 million tonnes in fiscal 2022. Imported scrap is used by domestic foundry and extrusion sectors to produce items inputs for the auto sector.

Europe, North America and the Middle East accounted for ~80% of the total scrap imports in fiscal 2022, followed by contribution from Africa. Within Europe, key countries include the UK, the Netherlands, and Germany; key countries in North America include the US, Canada, and Mexico; and key countries in the Middle East include United Arab Emirates, Saudi Arabia, Kuwait, Israel, and Qatar. Also, the top five countries accounted for almost ~60% of the total import volume.

3.3 Key success and risk factors in secondary aluminium industry

Key success factors

- **Strong demand growth:**
 - Demand for secondary aluminium clocked a CAGR of 9-11% between fiscals 2015 and 2022, outpacing 1-2% CAGR for primary aluminium demand. This was largely supported by growth in the auto and B&C sectors, led by rise in penetration of secondary aluminium.

- This increased the share of secondary aluminium from 29-30% in fiscal 2015 to 42-43% in fiscal 2022. Moreover, perpetual recyclability of the metal without any significant loss in metallic properties should continue to support demand for secondary aluminium in the overall aluminium consumption.
 - **Low capital expenditure (capex) requirement:**
- Though capex for setting up a recycling plant is based on plant characteristics such as the technology being installed, it is considered to be significantly lower than setting up a greenfield primary aluminium plant.
 - **Environment friendly:**
- Compared with manufacturing through the primary route, recycling of aluminium consumes significantly less power (5-7% of the total energy requirement for primary aluminium). Each tonne of aluminium manufactured through recycling results in saving of 5-6 MT of bauxite, 1-1.5 MT of limestone, 20-25 MT of water and ~14000 kwh of energy (~90-95% of energy savings as per International Aluminium Institute). Also, 1 tonne of aluminium manufactured through the recycling process results in savings of ~3,500 kg of CO₂ emission (as per the BIR).
- Liquid aluminium also contributes to the environmental benefits through generation of carbon credits.
 - **Perpetual recyclability and scrap availability:**
- The inherent quality of aluminium is not affected by recycling and remains high irrespective of the number of recycling cycles. The other key characteristic that drives demand for secondary aluminium is its perpetual recyclability, with an advantage of pre-existence of desired properties (as it is pre-alloyed specific to end-use requirement when in scrap form).

Also, aluminium scrap is estimated to be available in abundance globally and is also expected to grow in the future, which is expected to result in increased recycling of the metal for end-use products.

Key risk factors

- **Heavy dependence on imports:**
- Scrap imports account for 85-90% of the total raw material requirement. This exposes recyclers to several risks such as currency fluctuations, volatility in prices of scrap globally, upfront cash payment for settlement of trades (leading to working capital crunch), higher turnaround time, etc. Also, with high reliance on imports, any potential upward revision in duty structure (for scrap) may impact recyclers' profitability negatively unless such costs can be passed down to the customers in an effective manner. It is also noteworthy that the availability of the domestic scrap has also been increasing over the years.
- **High material cost:**
- Raw material cost (scrap) typically accounts for 80-85% of the total cost (inclusive of all taxes and duties), which is considerably high for any given industry and, thereby, has a high bearing on recycler's profitability.

- **Lack of automation:**
 - The aluminium scrap recycling business in India is not fully automated with regards to recycling activities like sorting, cleaning and segregating the scrap. This industry in India is typically labour intensive. Also, majority of the manufacturers (small and mid-sized players) prefer to operate semi-mechanised plants in order to save on capex costs. Heavy reliance on labour as against investment into mechanised operations results in loss of productivity as well as lack of quality control compared with large players.
- **Fragmented nature of the industry:**
 - The aluminium recycling industry is highly fragmented with most companies being run as family enterprises/ proprietorships, and having regional presence with the exception of CMR group. This intensifies competition, lowering the bargaining power of small recyclers.
- **Risk of impurities:**
 - Presence of impurities in secondary aluminium could pose a serious threat to all major end-use industries such as packaging, automobiles, B&C, and consumer durables.

Global scrap markets

Metal recycling has been of an importance in the international market. As per ISRI estimates, 40% of the world raw material needs is met through recycled commodities. This is due to the advantages observed due to cost and energy savings in the recycling process. In addition to this, recycling enables sustainability through circular economy for certain metals which do not lose their properties despite multiple recycling. Ferrous scrap is known to be the most recycled scrap as compared to other commodities. Production of steel from ferrous scrap is estimated to require 60% lesser energy. The largest source of this ferrous scrap consisting of iron and steel is from consumer product segment and automobile industry.

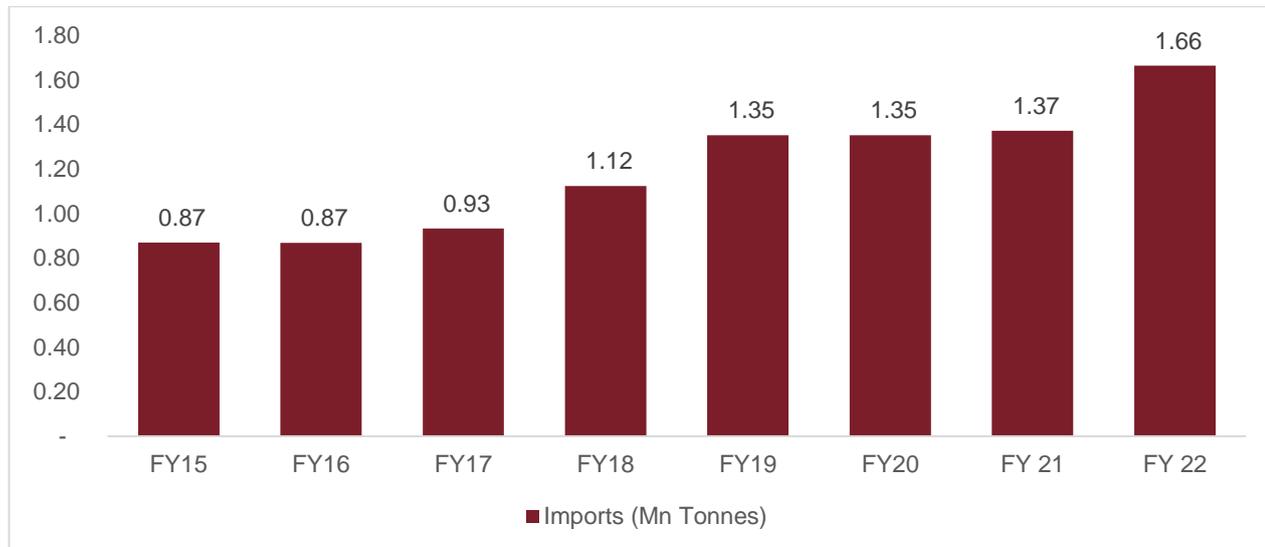
For non-ferrous scrap such as aluminium, highest recycling is observed in the construction and transportation sector. In 2021, countries such as United States, Germany, Germany, Canada, China, United Kingdom, France, The Netherlands, Mexico and Australia were the top exporters of scrap. In the US, a significant proportion of the aluminium demand is met through scrap because of high availability. Germany being one of the world's largest auto making countries, contributes to approximately 25% of the total aluminium market in Europe. Europe also encourages usage of secondary aluminium. Due to the country's heavy dependence on the auto sector, the scrap generated from this sector is also high. It is estimated that in 2019, primary and secondary aluminium held 67% and 33% shares, respectively, in total aluminium demand globally.

3.4 Trend of aluminium scrap imports

Imports up due to cost advantage of secondary aluminium, unavailability of local scrap

In India, majority of demand for secondary aluminium is met by imports due to cost benefits and unavailability of scrap in India. Imports of aluminium scrap increased at a 7-year CAGR of 9.7% to 1.66 million tonnes in fiscal 2022 from 0.87 million tonne in fiscal 2015.

Aluminium scrap imports on the rise



Source: DGFT, Industry, CRISIL Research

Despite a huge primary aluminium production capacity and the potential to generate enough domestic scrap, 85-90% of scrap is imported. India does not have adequate institutional mechanisms to check proper collection, sorting, and processing of domestic scrap.

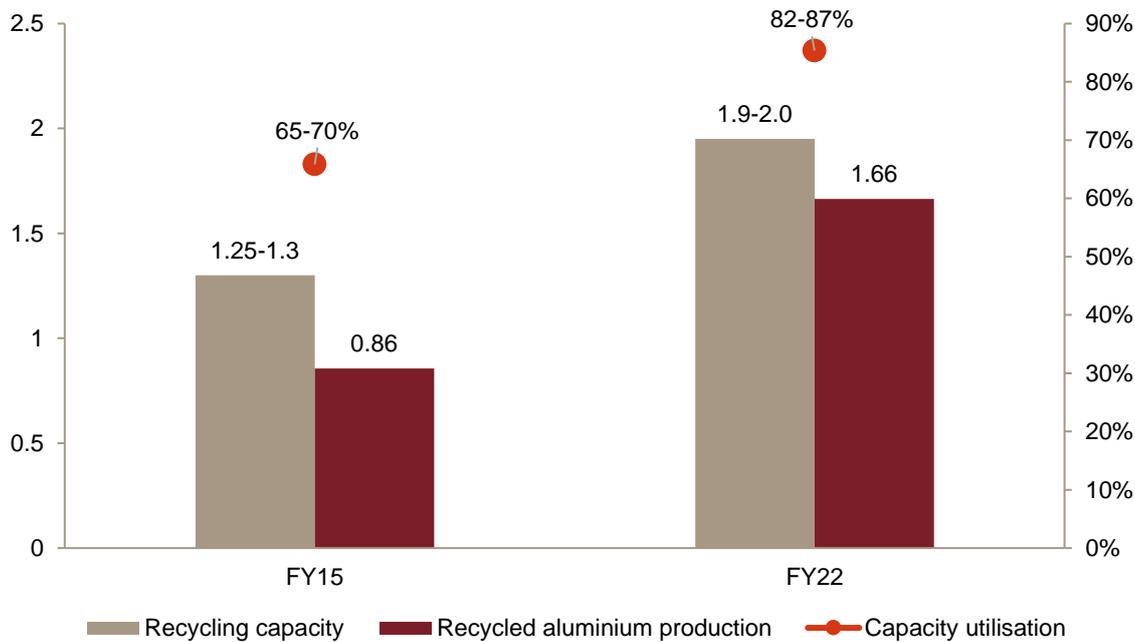
Secondary aluminium continues to be 25-30% cheaper than primary aluminium. Primary aluminium manufacturers have been lobbying with the government to increase the import duty on scrap. However, the government recognizing the importance of recycling and considering aluminium's recycling properties has kept the import duty at 2.5% since 1st May 2022.

3.5 Secondary aluminium capacity review

Recycling capacity added at a CAGR of 6-6.5% over the past seven years

The aluminium recycling industry is dominated by small and medium players and the total recycling capacity in India is estimated to have expanded from 1.25-1.3 million tonne in fiscal 2015 to 1.9-2.0 million tonne in fiscal 2022, at a CAGR of 6-6.5%. Capacity addition followed healthy demand growth.

Trend in recycling capacity and production of secondary aluminium (million tonne)



Note: Figures are estimated

Source: Industry, CRISIL Research

Capacity utilisation is estimated to be 82-87% in fiscal 2022, up from 65-70% in fiscal 2015.

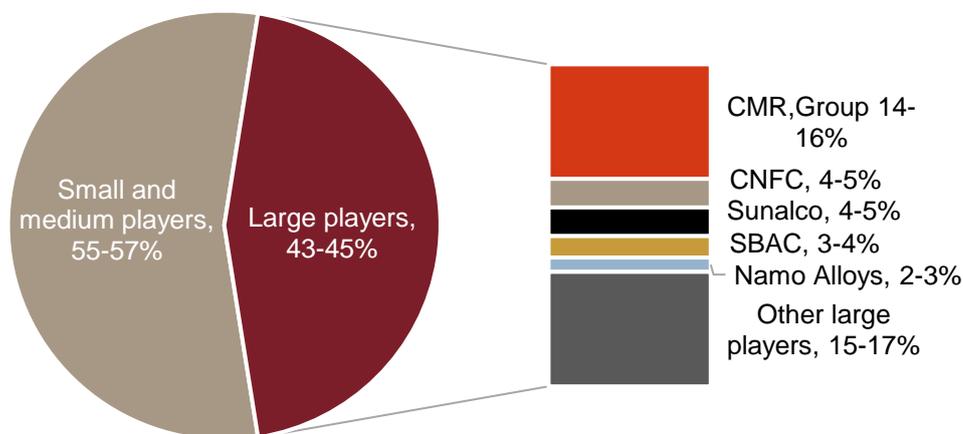
With capacity of 90,000 tonne added from fiscal 2016 to fiscal 2021, CMR Group (CMR Green Technologies Limited, CMRT, CMRN) is one of the largest contributors from the recycling segment. Other players, including the smaller companies, also added capacities over the period under consideration. Overall capacity addition is estimated to be around ~560 KT during fiscal 2015 to fiscal 2022 of which ~300 KT has been added over fiscal 2019 to fiscal 2021.

3.6 Supply analysis of recycling industry

Domestic aluminium recycling industry dominated by small and medium players

All activities related to aluminium scrap recovery are largely limited to the small and medium players in the sector, catering to utensil and casting industries. Based on the size of players, this industry can be broadly segregated into small and medium players, and large players.

Small and medium players have more capacity than large players



*Note: Note: i) CMR Group , CNFC – Century NF Casting, SBAC – Shree Balaji Alumnicast
 ii) Large players are defined as known players with an annual capacity of 40K tonne or above
 iii) Share is calculated based on estimated installed capacity for fiscal 2022
 Source: Industry, company websites, CRISIL Research*

The aluminium recycling market is predominantly dependent on small and medium players, commanding 55-57% of aggregate supply estimated for fiscal 2022, while large players accounted for the remaining 43-45%. Better economies of scale, steady order book, large client pool, mechanised operations, technological advancement, and better productivity are some of the characteristics exhibited by large players.

Moreover, large players tend to have well-diversified geographical presence with plants at multiple locations against single location presence of small and medium players. This enables large players to hedge against the risk of demand volatility in any region/ cluster. Also, it may be expected that the large players will exhibit better growth with the industry.

Majority of the larger players (CMR Group, CNFC, SBAC, and Sunalco) have significant presence in the key auto clusters.

Northern India leads in installed capacities



Source: Industry, CRISIL Research

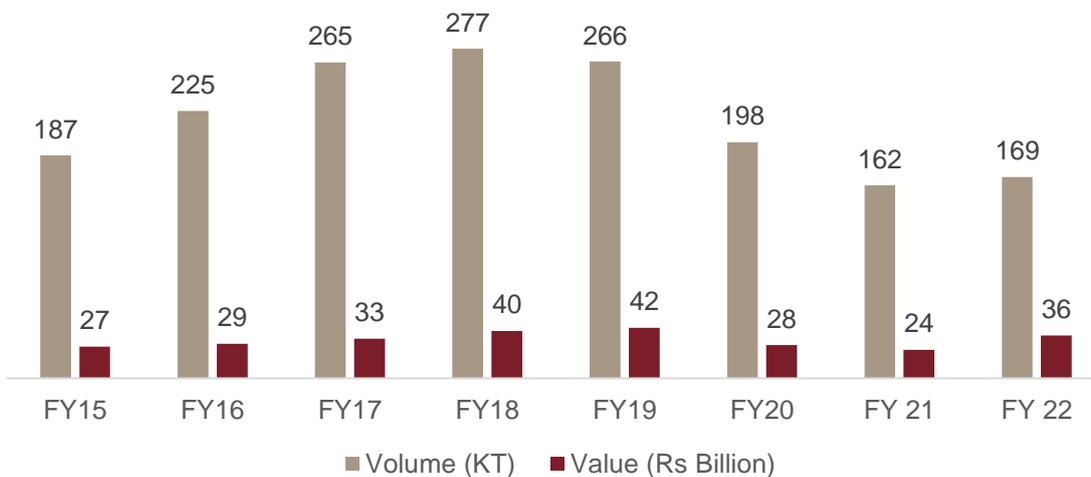
Northern India houses 45-50% of the country’s secondary aluminium recycling capacity led by close proximity to key demand centre – the NCR auto cluster. It is followed by western and southern regions at 20-25% each, where recyclers have diversified offerings for the automotive, B&C, and consumer durables industries. The eastern region accounts for only ~10% of the total capacity. Recyclers in the region largely cater to the deoxidizer segment (with steel plants present in the region) as well as utensil manufacturing.

3.7 Imports of alloy ingots

Imports down on weak demand

Imports of aluminium alloy ingots was 277 thousand tonnes (KT) in fiscal 2018, highest over the last seven years. It declined 25% on-year to 198 thousand tonnes in fiscal 2020 owing to pandemic-caused weak demand from the auto industry. The imports have been weak ever since declining to 169 thousand tonnes in fiscal 2022. Meanwhile the exports rose from 431 thousand tonnes in fiscal 2019 to 791 thousand tonnes in fiscal 2022, suggesting improving domestic production of aluminium alloys.

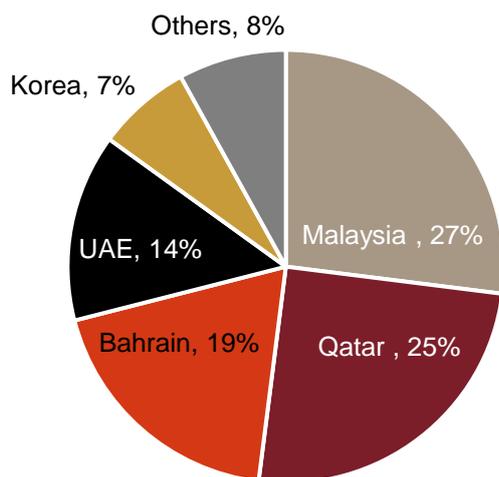
Alloy ingot imports down



Source: DGFT, CRISIL Research

Malaysia is the largest exporter of alloy ingots to India (~27% of overall imports in fiscal 2022), followed by Qatar (25%), Bahrain (19%) and UAE (14%). Together, the top five exporting countries accounted for ~91% of the total volumes imported during the year. Higher share of imports from Malaysia is attributed to India's free trade agreement (FTA), which leads to import of ingots at highly competitive prices, though the benefit is partially offset to the extent of relevant freight charges.

Malaysia is the largest exporter of alloy ingots to India



Source: DGFT, CRISIL Research

4 Secondary aluminium: Demand outlook

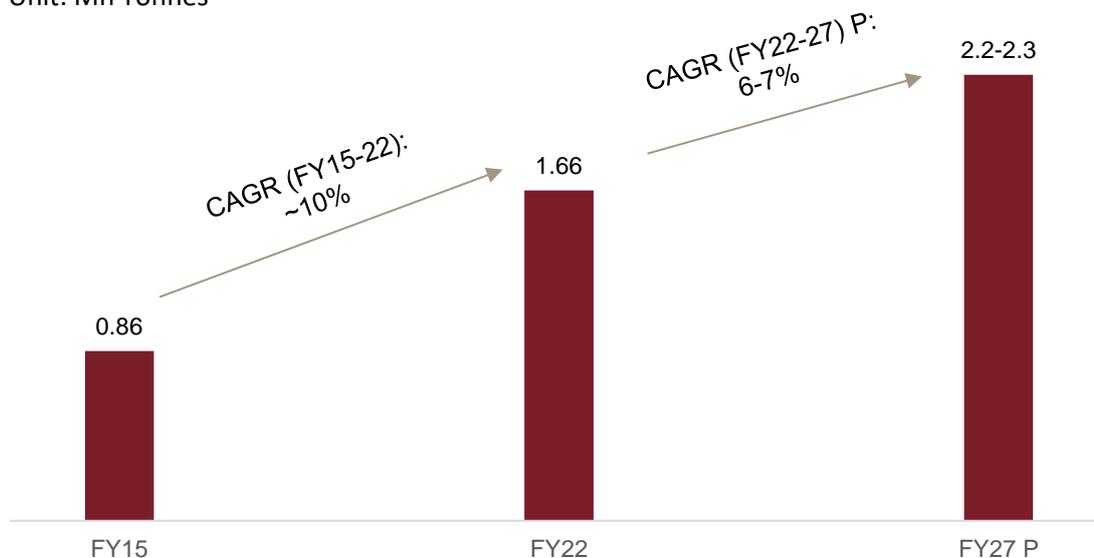
Secondary aluminium demand expected to log CAGR of 6-7% from fiscal 2022 to fiscal 2027

Aluminium (primary and secondary) consumption in India de-grew in fiscal 2020, because of slow demand from key end-use industries such as power, auto and B&C; and due to the pandemic-led economic slowdown. Recycled aluminium demand, too, was subdued due to slowdown in the domestic auto sector, key consumer of secondary aluminium in India. The impact of pandemic was felt in fiscal 2021 as well and the secondary aluminium grew by 2-3% only. Demand for secondary aluminium revived by 21-22% on-year and the industry increased at a CAGR of 10% to 1.66 million tonnes in fiscal 2022, from 0.86 million tonnes in fiscal 2015. Revival in fiscal 2022 would have been higher if not for the incidence of the second wave, which resulted in lockdowns in all major Indian states in April and May 2021. Moreover, any further increase in domestic demand was limited by semiconductor shortage, which impacted automobile production.

Demand is likely to stay healthy in the long term supported by growth in the auto industry, pick-up in execution of construction projects, recovery in consumer durable spending, and increased demand from the packaging segment. Also, stimulus measures by the government are expected to create investment demand in the construction segment. Thus, total secondary aluminium demand is expected to increase at a CAGR of 6-7% to reach 2.2-2.3 million tonnes by fiscal 2027, from current demand of 1.66 million tonnes in fiscal 2022.

Demand for secondary aluminium expected to be healthy

Unit: Mn Tonnes



Note: P: projected

Source: Industry, CRISIL Research

Growth in demand for secondary aluminium will continue to outpace primary aluminium demand growth, largely on account of anticipated healthy volumes as a result of revival across key end-use industries as well as increased

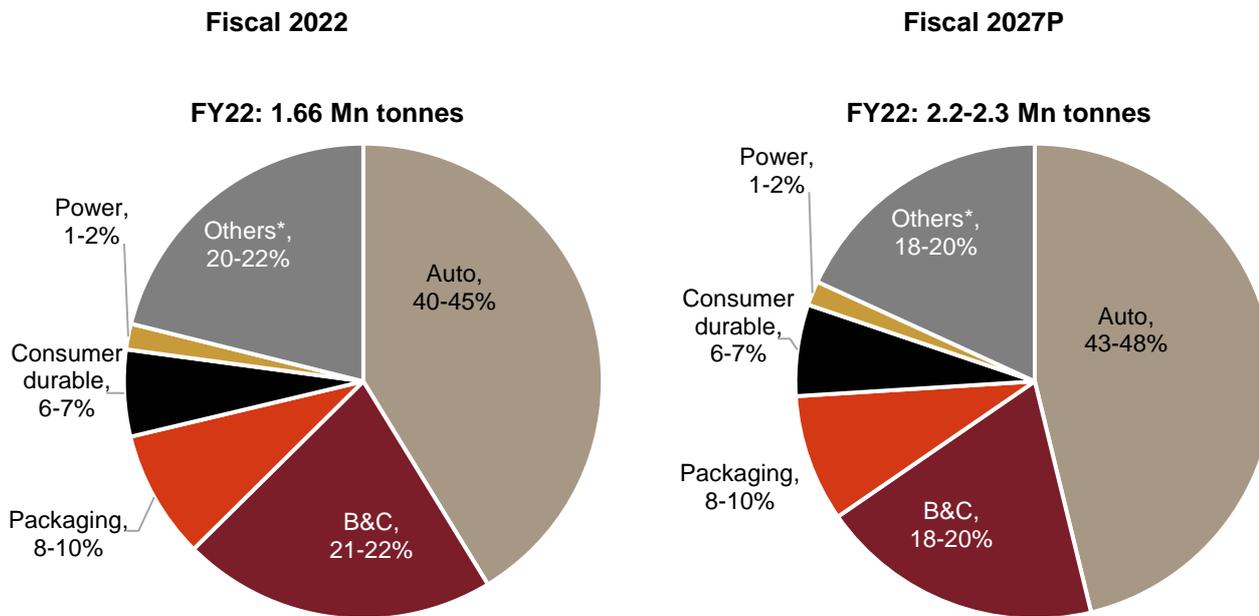
intensity of secondary aluminium in applications like auto. Some of the key government initiatives that will support aluminium recycling in India are as follows:

- **National Resource Efficiency Policy (NREP):** The Ministry of Environment, Forest and Climate Change (MoEF&CC) is in the process of formulating National Resource Efficiency Policy (NREP). The policy aims at efficient use of natural resources and promoting recycling across all sectors, with aluminium as one of the priority sectors. It will help India live up to its commitments under the UN Sustainable Development Goals by 2030.
- **Draft National Non-Ferrous Metals (Aluminium and Copper) Scrap Recycling Policy:** Published in March 2020 by the Ministry of Mines, the policy envisages a framework to address the challenges faced by the Indian non-ferrous metal recycling industry, with a special focus on aluminium.
 - The policy foresees the country shifting towards a circular economy in the coming years for base metals, including aluminium.
 - It also aims to make the Indian aluminium scrap recycling industry less dependent on imported scrap through organised and scientific metal scrapping and collection mechanism throughout the country to produce high quality scrap for quality secondary production.
 - According to the policy, the government's role will also include laying down minimum recycled content requirement for manufacturing of select products. The government may set targets for manufacturers to use recycled metal in their products.

As a result, the share of secondary aluminium is expected to steadily increase from 42-43% in fiscal 2022 to 44-46% in fiscal 2027.

Auto and B&C segments, which collectively constitute 61-67% share in total demand of secondary aluminium in India, are expected to maintain similar share in fiscal 2027 as well. Usage of aluminium in the auto segment driven by light weighting trend, government emission norms etc and better economies of secondary aluminium over its primary counterpart are expected to drive the demand for secondary aluminium in this segment.

Secondary aluminium demand by end-use industries



Note: P: Projected

*Others include defence, aerospace, machinery and equipment amongst others; B&C: building and construction

Source: Industry, CRISIL Research

Key end-use industry-wise demand growth: Automotive

Aluminium is one of the most preferred materials in the automobile industry due to its light weight, cost effectiveness, and eco-friendliness. Aluminium improves the dent resistance power of the vehicle by increasing the thickness of body panels while maintaining a low overall weight. The use of aluminium also enhances handling, fuel-efficiency, braking, and acceleration of the vehicle. Keeping the growing concerns on global warming in mind, major automobile manufacturers are progressively using secondary aluminium. Therefore, the increasing use of aluminium in the automobile industry will have a positive impact on the growth of global aluminium scrap recycling market during the forecast period.

The pandemic has resulted in uncertainties in both domestic and international markets. The contraction in GDP and production, along with slowdown in the manufacturing segment has reduced the supply of aluminium. The secondary aluminium demand decreased due to shortage of workers in the manufacturing space along with contraction in demand from the aerospace and automobile industries.

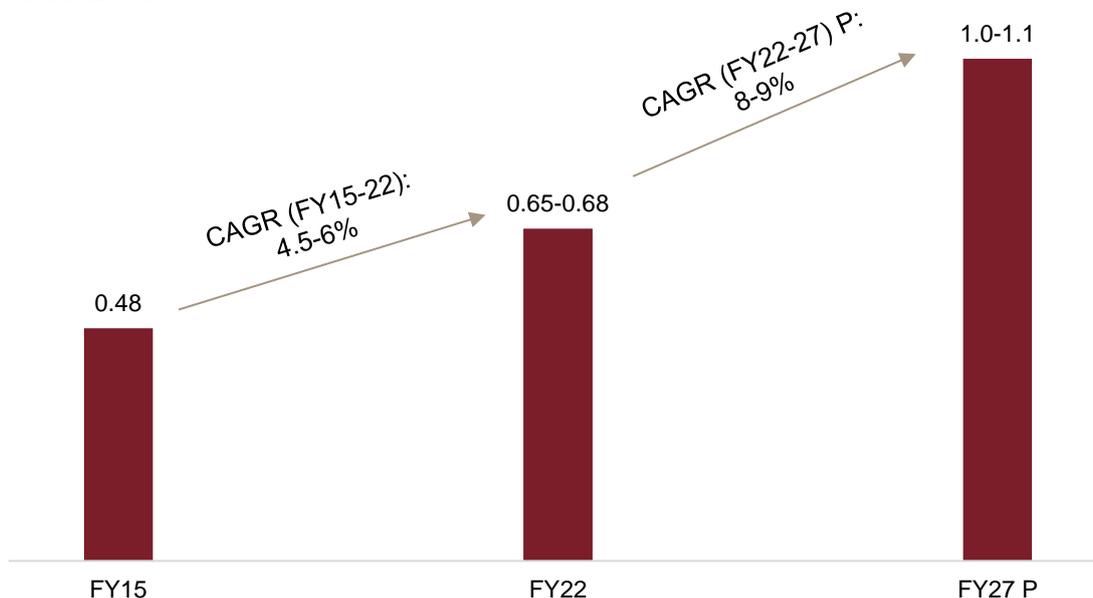
However, growing automotive sector demand and rising adoption of lighter vehicles to lead to increase in penetration of aluminium into this segment. Moreover, increasing acceptance and government incentives on the EVs may also propel aluminium demand as this category has higher intensity of aluminium usage than ICE vehicles.

Thus, among the major key end-use industries, demand from the automotive industry (that forms a large portion of total volumes) is expected to drive majority of the secondary aluminium demand between fiscals 2022 and 2027.

The secondary aluminium demand from the automotive segment is expected to witness a CAGR of 8-9% and reach approximately 1.0-1.1 million tonnes by the end of fiscal 2027, from 0.65-0.68 million tonne in fiscal 2022.

Trend in secondary aluminium demand: Automotive

Unit: Mn Tonnes



Note: P: Projected

Source: Industry, CRISIL Research

The vehicle scrappage policy too is expected to boost secondary aluminium consumption in India. The policy was announced by the Union Minister of Finance in the Budget speech on February 1, 2021. Later, the Union Minister for MSME and Road Transport & Highways approved the scrappage policy. With the policy introduction, passenger vehicles that are more than 20 years old and commercial vehicles that are more than 15 years old will undergo a fitness test. However, passenger vehicles over 20 years old are quite limited in the country. Therefore, this policy can provide better impetus to commercial vehicle sales if more incentives are provided to promote scrappage of commercial vehicles. Import duties have been levied on select auto-components to increase focus on localisation. The demand for commercial vehicles is anticipated to grow due to construction-led infrastructure push in the roads and urban infrastructure sectors.

While the scrappage policy is likely to create demand in the automotive industry (improving demand of vehicles will lead to increasing consumption of secondary aluminium as automotive is a key end-user) and will help in reducing pollution, it will also enable re-use of metals such as steel and aluminium. The policy is expected to ensure better availability of auto-grade domestic aluminium scrap, thereby boosting aluminium recycling in India. The policy came into effective from April 1, 2022.

The government of India issued standards related to average fuel consumption for passenger vehicles (using petrol or diesel or liquefied petroleum gas or compressed natural gas, and comprising not more than nine seats including driver's seat, and of gross vehicle weight not exceeding 3,500 kilograms tested). These standards became effective

in fiscal 2018 and the second set of norms is expected to be effective from fiscal 2023. These norms are known as corporate average fuel efficiency (CAFE) which relate the Corporate Average Fuel Consumption (in litres/100 km) to the Corporate Average Curb Weight. With fuel efficiency in question one clear focus of auto OEMs because of these norms is to reduce the weight of the vehicles

Trend in automotive production in India: Two-wheeler

During the forecast period, the domestic two-wheeler demand is expected to grow, driven by low base of fiscal 2022, after three consecutive years of volume decline. Growth will also be aided by demand from under-penetrated rural market and rising income. Volume in urban market is expected to be driven by recovery in scooter sales as educational institutions and offices re-open, more people commute to office, and urban income sentiment improves. Normal monsoons prediction is expected to support demand for motorcycles segment positively.

The two-wheeler industry has been negatively impacted by Covid-led disruptions and high cost of ownership owing to BS VI emission norms that has resulted in higher vehicles prices. The price is estimated to have increased by ~15-20% since fiscal 2019 owing to safety norms, BS-VI implementation, and higher input costs.

In the long term, it is expected that growth will pick up for the two-wheeler industry post fiscal 2022. Consequently, the two-wheeler industry is expected to register a 9-10% production CAGR between fiscals 2022 and 2027. Further, it is expected that scooters will adopt to electrification earlier than motorcycles, as the cost of ownership of an electric two-wheeler (mainly scooter) will be less than that for Internal Combustion Engine (ICE) scooter. However, electric two-wheelers will be more expensive than motorcycles.

In the medium to long term, the manufacturers are expected to focus on expansion in distribution network in semi-urban and rural areas, new model launches in the 125cc segment for scooters and premium segment for motorcycles.

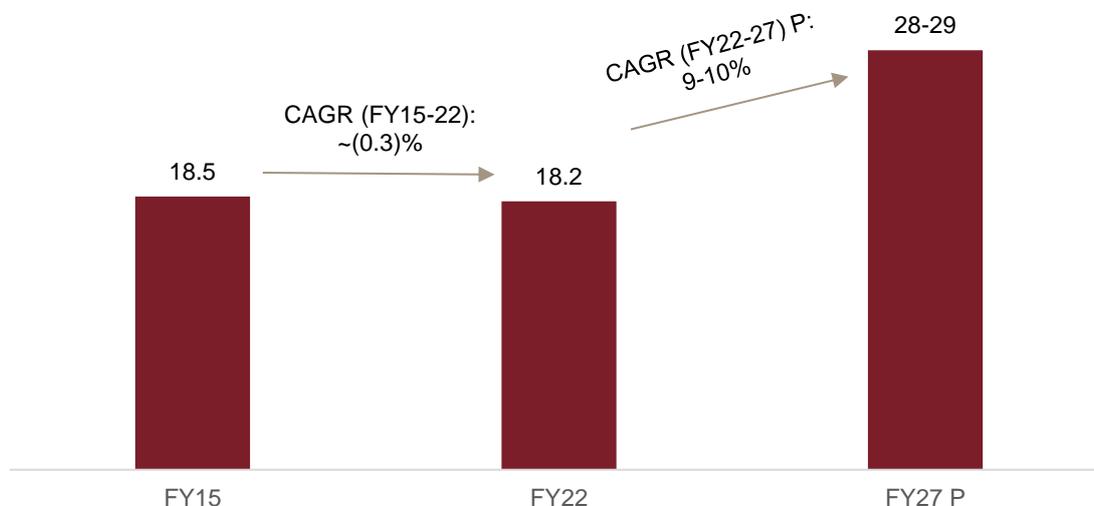
Improving rural productivity, diversification towards horticultural crops, government income support schemes and structural measures taken by the government such as Pradhan Mantri Kisan Samman Nidhi (PM-KISAN), National Agriculture Market (eNAM), Pradhan Mantri Fasal Bima Yojna (PMFBY) to name a few, will aid rural income in the long run. This is expected to drive sales of motorcycle segment, which will be a primary beneficiary of the rural growth.

Scooters are expected to witness higher penetration in the rural market (scooters have an urban market share of ~65-75%) which will drive growth. The consumer preference shifting towards higher 'cc' scooters (125cc) is also likely to aid demand. This is due to a ramp up seen in road construction over the last few years. However, EV penetration is going to eat up scooters market share in the long run.

Adoption of electric two-wheelers in the next five years seems favourable because of government initiatives such as FAME II subsidies, Delhi EV policy and increasing affordability of batteries, albeit the growth is likely to be moderate.

Trend in two-wheeler production in India

Unit: Mn units



Note: P: Projected

Source: SIAM, CRISIL Research

Trend in automotive production in India: Passenger vehicle

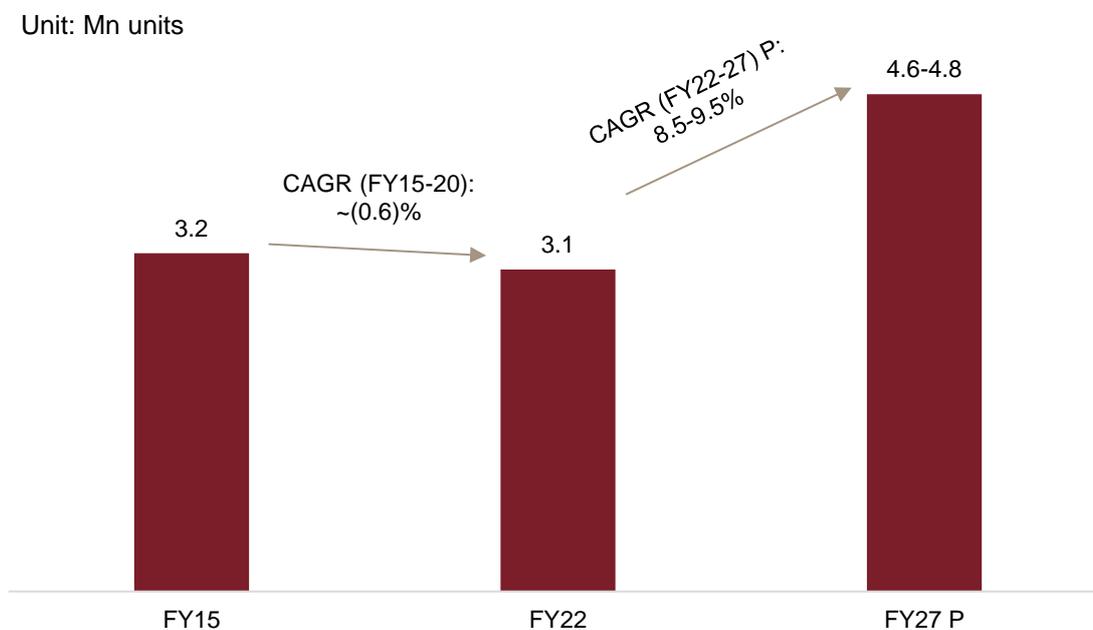
Passenger vehicle witnessed decline in two consecutive years due to Covid-19 pandemic. Volumes de-grew by 18% in fiscal 2020 and by 2% in fiscal 2021. Lifting of lockdown measures and improving economic activity in fiscal 2022 resurrected the demand. However, the supply side remained constricted as OEMs began to face semiconductor shortages due to sudden surge in demand. As a result, the overall growth was restricted to 13% in fiscal 2022.

From fiscal 2023 onwards, passenger vehicle sales are expected to increase at a healthy pace, anticipating continuous improvement of economic activities, increasing average and disposable income, rising penetration, favourable financial parameters, as well as a deeper reach in the rural markets, tier-III and tier-IV cities. Other factors that would aid demand are increasing urbanisation, government support to farm income, and increasing access to vehicle loans.

Sales of small cars estimated to log a modest growth over the forecast period due to the increasing cannibalization by multiple UVs (utility vehicles) in the same price bracket as small cars. Large-car sales are expected to be driven by significant low base.

The UV segment is expected to exert pressure on the small-car and large-car segments, limiting growth prospects. UV and van sales are expected to be driven by a continued shift in consumer preferences, multiple model launches and availability of superior features at affordable prices. Entry of new players in the UV segment is also expected to aid traction. Moreover, replacement demand is likely to rise, as car owners opt for newer models due to higher affordability, competitive pricing of new models, and easy availability of finance. Overall, the passenger vehicle segment is expected to sustain 8.5-9.5% production CAGR over fiscals 2022 to 2027.

Trend in passenger vehicle production in India



Note: P: Projected

Source: SIAM, CRISIL Research

Trend in automotive production in India: Commercial vehicle

Within the automobile industry, the commercial vehicle (CV) industry was hit the hardest in fiscal 2020 as sales plunged with freight capacity increasing due to the new axle norms and limited support from freight demand. Supply chain constraints and labour availability issues hampered OEM's attempt to build up inventory at dealer end in the first quarter of fiscal 2021 as a result of Covid-19. OEMs also refrained from pushing inventory in a low-demand scenario resulting in ~85% on-year decline in the commercial vehicle segment. CV sales plummeted ~29% in fiscal 2020 and further by ~21% in fiscal 2021. The fall in sales had created a low base over which volumes have witnessed growth of ~26% in fiscal 2022.

During the period until fiscal 2027, production of commercial vehicles is expected to register a 10-11% CAGR and reach ~1.3- 1.4 million units by fiscal 2027-end, following strong demand. Demand is expected to increase during the period led by an improvement in industrial activity, increase in infrastructure expenditure, rising replacement volume and government's thrust on rural transportation.

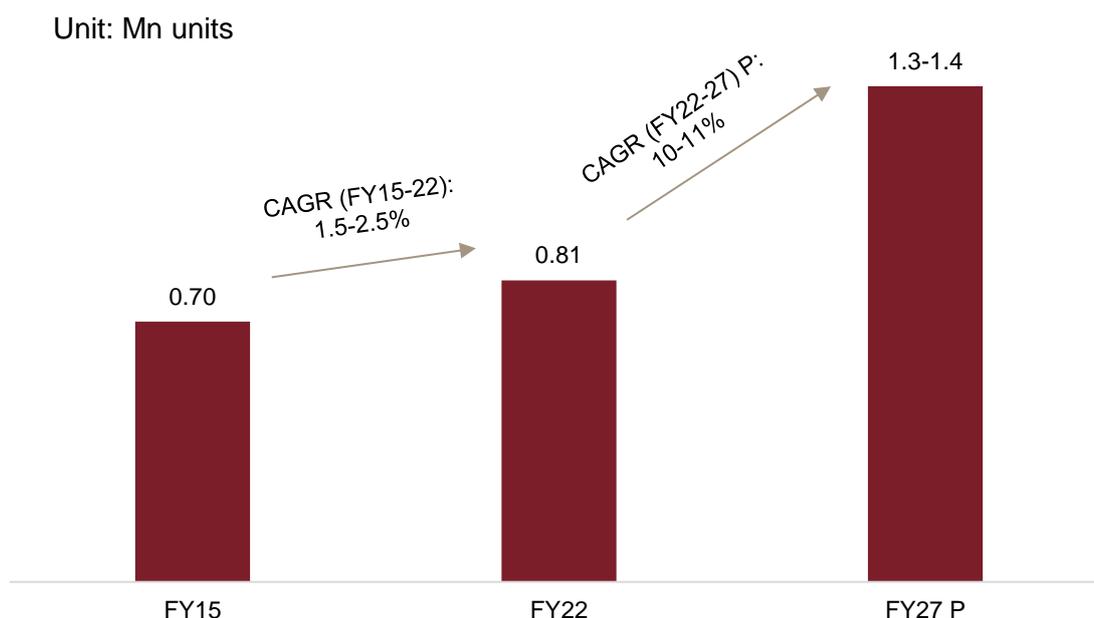
Medium and heavy commercial vehicles (MHCV) sales are likely to rise by ~9-11% compound annual growth rate (CAGR), over a low base, from fiscal 2022 to 2027 (five-year CAGR), as compared to the previous five-year (fiscal 2017 to fiscal 2022) fall in CAGR of ~2%. Factors driving long-term MHCV sales will be the improving industrial activity in the country, steady agricultural output, and the government's focus on infrastructure. However, volume growth will be limited due to efficiencies achieved from the goods and services tax (GST), better road infrastructure along with the commissioning of the dedicated freight corridor (DFC).

Light commercial vehicle (LCV) demand is expected to expand at ~8-10% CAGR from fiscals 2022 to 2027, due to higher private consumption, lower penetration, greater availability of redistribution freight and improved finance.

Upper-end light commercial vehicles (ULCVs) offer the transporter lower returns, as compared with ICVs, and are most suited for captive use.

Domestic bus sales is projected to expand at ~29-31% CAGR between fiscals 2022 and 2027. Growth to be supported by increasing demand for inter-city/state travel, aided by better road infrastructure, and higher personal disposable incomes. The unregulated segment, which primarily caters to demand from schools, companies and inter-city travel by private operators, will remain the largest end-user.

Trend in commercial vehicle production in India



Note: P: Projected

Source: SIAM, CRISIL Research

Along with increasing production, a moderate rise in intensity over the next five years will further drive the overall demand for secondary aluminium from the auto segment.

Moreover, increasing acceptance and government incentives on the EVs may also propel aluminium demand as this category has higher intensity of aluminium usage than ICE vehicles. EV adoption in India over the next five years is likely to be driven majorly by two-wheelers and three-wheelers. Electric two-wheelers are seen to have lower cost of ownership and acquisition versus scooters that account for over 30% of the two-wheeler industry.

- Government initiative for faster adoption of the electric vehicles and their manufacturing has been launched under the National Electric Mobility Mission Plan (NEMMP 2020). This scheme has been designed to improve the national fuel security and to provide environment friendly and affordable transportation.

Under NEMMP 2020, the Department of Heavy Industry launched a scheme in fiscal 2015 for promotion of electric and hybrid vehicles known as Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME) in two phases. Phase I (providing incentives to buyers of electric/hybrid in the form of upfront reduced purchase price)

came into effect from fiscal April 1, 2015 after which the phase II (mainly for electrification of public and shared transportation) was launched which was effective from April 1, 2019 to promote faster adoption of electric mobility and development of the manufacturing eco-system in the country. In addition to the FAME-2 benefits, state governments are providing various incentives such as purchase concessions, 100% exemption of road tax and registration fee, 100% tax exemption to all battery-operated vehicles etc. Such favourable tax laws are expected to encourage electric vehicle adoption for personal mobility

Trend in EV penetration in India

Vehicle segment	EV penetration	
	FY22	FY27 P
Passenger vehicles	1%	6-8%
Two-wheelers	2%	20-25%
Buses	5%	10-12%
LCVs	0%	2-3%
Three-wheelers	5%	30-35%

Note: P: Projected

Source: Industry, CRISIL Research

Key end-use industry-wise demand growth: Others

B&C segment

The demand for secondary aluminium increased with a CAGR of 15-17% from fiscals 2015 to 2022 owing to low base and improving acceptance of the metal in the segment.

However, the growth remained stagnant in fiscal 2021. Under real estate segment in India, many developers focused on completing the existing projects and the launch of new projects were limited. However, improving affordability led to faster than envisaged rebound in fiscal 2021.

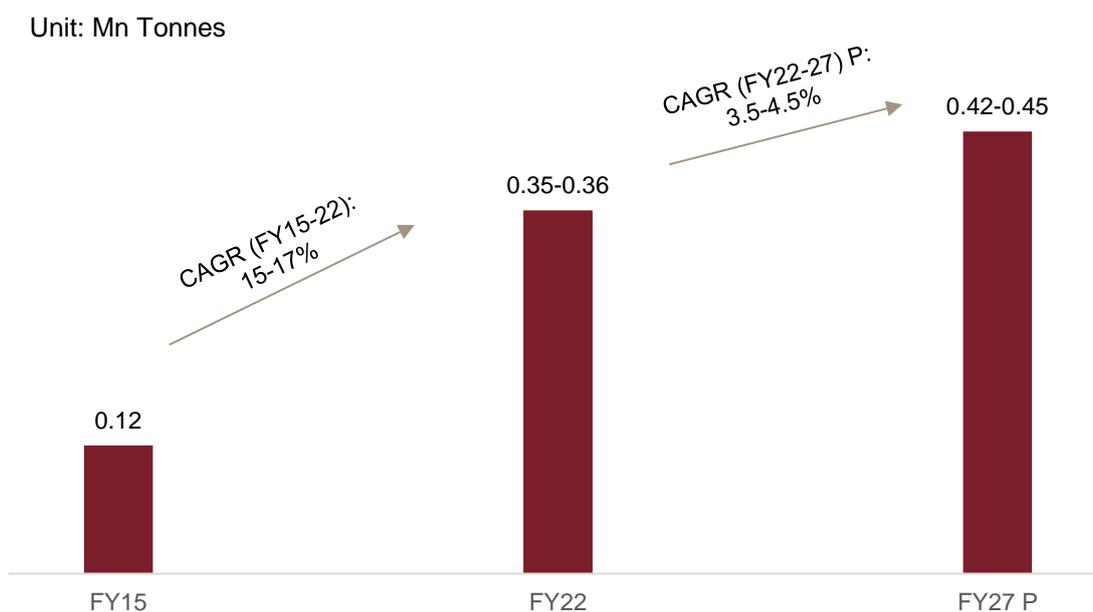
Despite challenges due to Covid-19, the capex in construction industry in fiscal 2022 showed an estimated rise of 35-40% on a low base of fiscal 2021. The growth in capex is expected to continue over the forecasted years as well.

Investments through projects such as Bharatmala, smart cities, AMRUT, refinery expansion plans by RIL, Nayara Energy etc., and launches through PMAY houses are expected to drive aluminium (secondary and primary) demand in the B&C segment. The growth will also be driven by increase in urban housing demand, demand from premium urban projects and improvement in usage intensity. Increasing focus on sustainable buildings (green buildings) is expected to result in incremental demand for secondary aluminium due to its inherent nature of recyclability of the metal. Also, innovative products like Aluminium Composite Panels (ACPs) and Aluminium

Honeycomb Panels (AHPs), used for panelling and cladding, have also started making in-roads in the construction industry in India.

Over the forecast period of fiscal 2022 to 2027, the demand from the B&C segment is expected to grow at 3.5-4.5% CAGR. Demand from construction is expected to reach 0.42-0.45 million tonnes in fiscal 2027 from demand of ~0.35-0.36 million tonne in fiscal 2022.

Trend in secondary aluminium demand: B&C



Note: P: Projected

Source: Industry, CRISIL Research

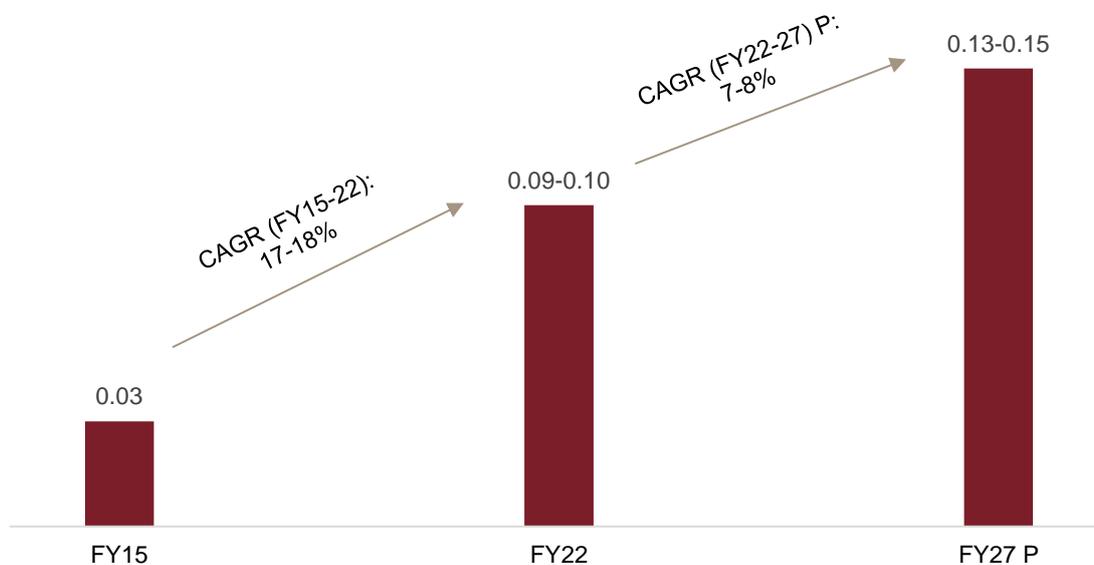
Consumer durables segment

Between fiscals 2021 and 2026, revenue of the industry is forecasted to grow at 12-14% CAGR. Revenue CAGR over the last 5 year was ~3%, mainly on account of decline in revenues in fiscal 2021. CRISIL Research envisages healthy demand growth for household appliances in the long term, in tandem with sustained economic recovery. Growth will be driven by better affordability, shorter replacement cycles, multiple ownership (in case of CTVs) and low penetration levels (in case of other appliances).

The segment, which, over a low base, registered a CAGR growth of 17-18%, for secondary aluminium demand over the past seven years (between fiscals 2015 to 2022), is expected to record a 7-8% CAGR over the next five years (between fiscals 2022 to 2027), to reach a demand of 0.13-0.15 million tonne by fiscal 2027.

Trend in secondary aluminium demand: Consumer durable

Unit: Mn Tonnes



Note: P: Projected

Source: Industry, CRISIL Research

The average secondary aluminium intensity is expected to remain stable as penetration levels are estimated to have reached optimum levels.

Packaging segment:

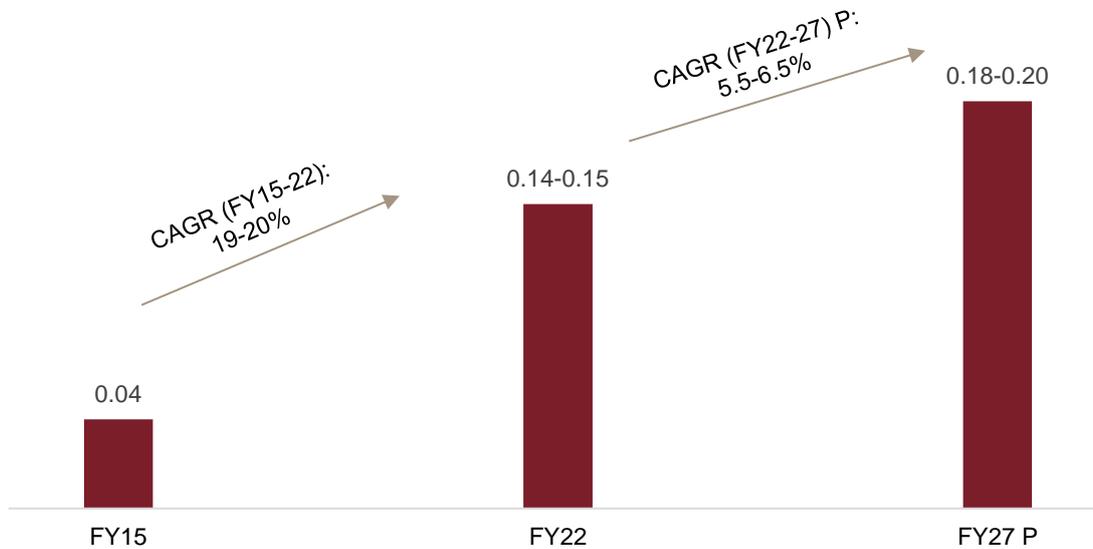
The packaging industry witnessed decent volume growth due to high demand from the food products, pharma and e-commerce industries in fiscal 2021. Further, CRISIL Research expects the packaging industry to witness a strong 7-9% CAGR from fiscal 2022 to 2026 on the back of a complete recovery and continuous demand across all segments.

The share of metal packaging (currently at 8-10% of the total packaging market) is expected to remain unchanged over the next three years, owing to the continuous healthy demand from the F&B and pharma industry. Besides, there are no major and cheaper substitutes (of other packaging materials) for aluminium foil, primarily used in strips, blisters, and pilfer-proof caps. Moreover, aluminium foil has special properties such as protection from light, moisture, oxygen, odour, and, most importantly, bacteria. These features make it almost irreplaceable.

Over the past seven years, the demand for secondary aluminium from packaging segment registered a CAGR of 19-20%, driven by low base. It is expected to record moderate CAGR of 5.5-6.5% between fiscals 2022 and 2027 to reach ~0.18-0.20 million tonnes in fiscal 2027.

Trend in secondary aluminium demand: Packaging

Unit: Mn Tonnes



Note: P: Projected

Source: Industry, CRISIL Research

Robust demand growth from the packaging industry, led by rising sale of aluminium foil in the wake of restrictions on plastic usage is expected to boost demand. Further, higher usage of secondary aluminium in packaging and limited foil capacity of primary aluminium manufacturers will drive growth from the segment in the near term.

Some key highlights of Union Budget 2021 that will support secondary aluminium demand:

With an increase in infrastructure spending through various sectors, aluminium demand is expected to improve through various end-use sectors such as B&C, auto/ automotive components, and power. The latter two are the top two end-use industries of secondary aluminium. Following are some of the budget highlights that will support secondary aluminium demand:

- Introduction of the vehicle scrappage policy to boost secondary aluminium demand
- Higher amount has been allocated to roads and railways (relative to fiscal 2021) along with encouragement in private investments through expansion of projects under National Infrastructure Pipeline. The budget not only focusses on pushing central capex but also state government capex.
- The budget provides a support to the manufacturing sector that was predominantly impacted by Covid-19. Around Rs 1.97 lakh crore are expected to be spent over the next five years in electronics, automobiles/auto components, pharma, telecom, and textile sectors. The budget complements the reforms by the announcement of customs duty rationalisation.
- In a year since the pandemic, the government has kept up capital spending despite reorientation among other sectors. In fiscal 2022, capex through budget is expected to increase by 26.2% to Rs 5.5 lakh crore. Total capex

through budget and central public sector enterprise (CPSE) is estimated to rise by 4.8% to Rs 11.4 lakh crore. The increase in capital spending is concentrated in sectors such as national highways, railways, defence and power.

- The budget is set to have a neutral impact on the housing sector. The government is yet to achieve its targeted completion of 11 million houses through the PMAY urban programme. Moreover, extensions under sections 80EEA and 80-IBA are expected to drive affordable housing and bring profit-linked tax exemptions, respectively.
- The infrastructure push will further create demand for key input materials such as cement, steel and aluminium.

Growth opportunities for secondary aluminium ingots and extrusions:

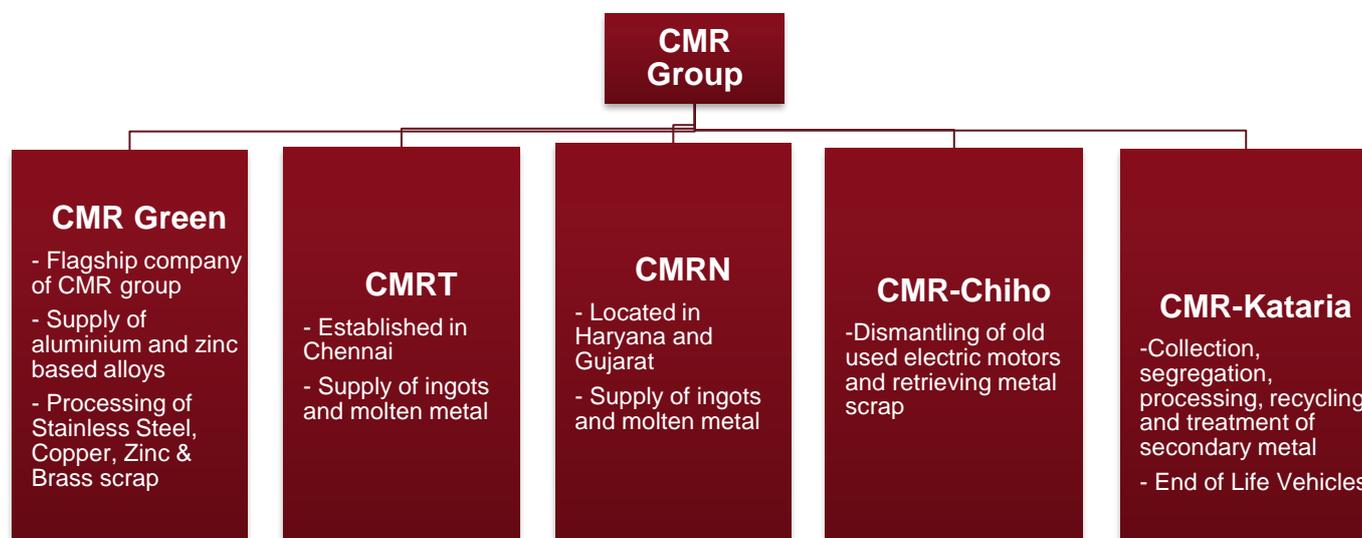
In fiscal 2022, India exported ~0.79 million tonne of aluminium alloy ingots and these exports were majorly to countries such as China, USA, Japan, Mexico, Spain etc. Also, during the same period, aluminium extrusions were mainly exported to USA, Canada etc.

With regards to global trade scenario for aluminium, opportunities arise to Indian market on the account of various anti-dumping restrictions imposed on Chinese aluminium products. For instance, in 2020, the European Union imposed anti-dumping duty on the imports of aluminium extrusions originating from China. The anti-dumping duties ranged from 21.2% to 32.1%. Increasing local demand in China for aluminium owing to infrastructural developments in the country might result in lowered exports. This can act as a growth opportunity for Indian aluminium market.

5 Company profile: CMR Group

With reference to Order of National Company Law Tribunal, Chandigarh Bench dated 6th August, 2021 (Ref: NCLT/Chd/ Reg/288), Century Metal Recycling Limited alongside with Grand Metal recycling Private Limited, Suvridhi Financial Services Limited, Sanjivani Non Ferrous Trading Private Limited, Ramayana Polymers Private Limited and Forever Multimedia Private Limited have been amalgamated into Grand Metal Industries Limited. Additionally, Grand Metal Industries Limited has undergone a name change to “CMR Green Technologies Limited” (“CMR Green”) as per Certificate of Incorporation pursuant to change of name dated 11th August, 2021.

CMR Group is the largest metal recycler in the domestic aluminium recycling industry and amongst the largest in the world



Source: Industry, CMR Group

About CMR group¹

Set up in 2006, CMR group is currently engaged in the business of aluminium, zinc, stainless steel and electric motor recycling. Based on primary interactions and data available about the competition companies as listed on page number 22 and under section ‘Supply analysis of recycling industry’, CMR Group is the largest aluminium recycler in the domestic Indian market and amongst the largest in the world. In 2008, the group had set-up a plant for molten aluminium in Haridwar, after which multiple units were set up in Gurgaon, Bhiwadi and Manesar in subsequent years.

¹ CMR Group consists of CMR Green Technologies Limited, Century Metal Recycling Limited, Grand Metal recycling Private Limited, Suvridhi Financial Services Limited, Sanjivani Non Ferrous Trading Private Limited, Ramayana Polymers Private Limited, Forever Multimedia Private Limited, CMR Toyotsu Aluminium India Pvt. Ltd. (CMRT), CMR Nikkei India Pvt. Ltd (CMRN), CMR-Chiho Recycling technologies Pvt. Ltd, CMR-Chiho Industries India Pvt. Ltd., CMR-Kataria Recycling Pvt. Ltd., CMR Aluminium Pvt. Ltd., Nikkei CMR Aluminium India Pvt. Ltd.

The group caters to the following portfolio of products and services to its end users:

- Aluminium alloy ingots
- Zinc alloy
- Aluminium alloy – molten form
- Stainless steel scrap recycling
- Electric motor dismantling
- Copper, Zinc, Brass and other scrap recycling
- ELV recycling

In 2012, the group entered into two joint venture (JV) agreements with Nikkei MC Aluminium and Toyota Tsusho Corporation for manufacturing of aluminium alloys. The group ventured into recycling of stainless steel and electric motors in fiscal 2018 and 2020, respectively. This not only enlarged CMR group's recycling portfolio but also helped the group reduce its dependence on auto sector. CMR Group is currently operating through 12 manufacturing plants, including four plants under two JVs with Toyota Tsusho Corporation and Nikkei MC Aluminium.

In 2020, CMR Group opened 11th manufacturing plant under a 50-50 JV with Chiho Environmental Group Limited to engage in dismantling of old used electric motors and retrieving various metal scrap, its processing and recycling.

In fiscal 2021 CMR Green Technologies entered into a partnership with Kataria Group (51% CMR Green and 49% Kataria group) to incorporate an entity named CMR Kataria recycling private limited which is proposed to carry out business of collection, segregation processing, composting, recycling, treatment and disposal of all types of scrap, including end of life vehicles (ELVs). This can be seen as an important engine of growth in light of government policy push. Very recently, CMR Green Technologies Ltd, Pune entered into a new JV with Nikkei MC Aluminium.

Current annual capacities (in tonnes) of CMR group's key products are as follows:

Aluminium alloy	302,000
Zinc alloy	8,700
Stainless steel recycling	60,000
Electric motors recycling	50,000
Sales of other metal scrap such as brass/ copper etc	Upto 60,000

Source: Industry, CMR Group, CRISIL Research

The plant locations are spread across various locations in Tamil Nadu, Gujarat, Rajasthan, Haryana and Uttarakhand hence enabling the company to reach to its end markets in an efficient manner. The company caters to some of the largest automotive OEMs of the country such as Maruthi Suzuki, Toyota, Honda, Yamaha, Ford, Royal Enfield etc.

About CMR Green Technologies Limited

CMR Green Technologies Limited (CMR Green) is a flagship company of CMR Group. It is engaged in the recycling of aluminium, zinc and stainless steel, with a total installed capacity of 166,000 TPA, 8,700 TPA and 60,000 TPA, respectively, in fiscal 2022.

About CMR Toyotsu Aluminium India Private Limited

CMR Toyotsu (CMRT) is a JV between CMR green technologies, India, (CMR Green – 70%) and Toyota Tsusho Corporation, Japan, (TTC- 30%). CMRT was established in 2014, spread across nine acres, with a state-of-the-art facility for supplying ingots and molten metal, and has a current production capacity of 66,000 tonnes. CMRT has two manufacturing plants and is a leading producer of aluminium alloys in south India and is a single largest supplier in molten metal supply in the region.

About CMR Nikkei India Private Limited

CMR Nikkei India Private Ltd was established in November 2013 with an annual production capacity of 40,000 tonne, spread across five acres, at Bawal, Haryana. Its current production capacity stands at 70,000 tonnes with plant locations in Haryana and Gujarat. This is a JV between CMR Green (74%) and Nikkei MC Aluminium (26%) the second largest producer of aluminium alloys in Japan.

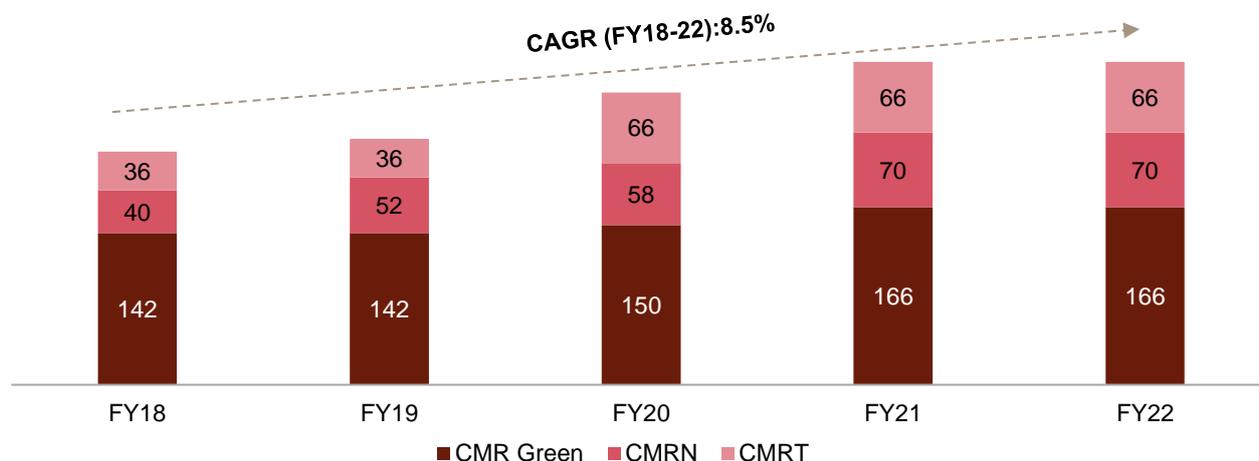
About CMR-Chiho Industries India Private Limited

CMR Green entered into a 50:50 JV with Chiho Environmental Group Limited (CEG) and incorporated a JV, CMR Chiho Industries India Private Ltd (CCIIPL) in December 2019. The business of the JV is dismantling of old used electric motors and retrieving various metal scrap, its processing and recycling; towards that end, a state-of-the-art plant has been established at Mahesana, Gujarat, with a capacity of 50,000 TPA.

CMR Group has consistently added aluminium recycling capacities over the past three years, supporting its market share

CMR Group is estimated to have added 84,000 tonnes of capacity for aluminium alloy over fiscals 2018 to 2021. Based on our industry interactions, it is estimated that the total installed capacity for aluminium recycling in India was ~1.9-2.0 million tonne in fiscal 2022. Thus, CMR Group accounted for a ~14-16% of the market share.

Capacity (aluminium recycling) expansion of CMR Group during FY18-22



Source: Industry, CMR Group

The capacity addition in the aluminium segment for the group is as follows:

CMR Group capacity (tonnes)	FY18	FY19	FY20	FY21	FY22
CMR Green Technologies	142,000	142,000	149,500	166,000	166,000
CMRN	40,000	52,000	58,000	70,000	70,000
CMRT	36,000	36,000	66,000	66,000	66,000
Total capacity	218,000	230,000	273,500	302,000	302,000

Source: Industry, CMR Group, CRISIL Research

The capacity additions have been made year on year to cater to the anticipated future growth and also to maintain the market leadership in the segment. Some of the other global aluminium recycling major’s include Novelis (2,500,000 tonnes), Daiki (960,000 tonnes), Ye Chiu (300,000 tonnes), Matalco (500,000 tonnes) and Real Alloy (330,000 tonnes)².

CMR Group primarily caters to the auto segment, which accounts for a ~95% share of its aluminium alloy sales. A quick analysis of the demand for secondary aluminium originating from the auto segment and sales of CMR Group for fiscal 2022 suggest that it accounted for about ~28% market share in this segment. Further, CMR Group is exploring application of recycled aluminium in auto-wheel application as well. This is expected to help CMR Group gain more share in the auto segment.

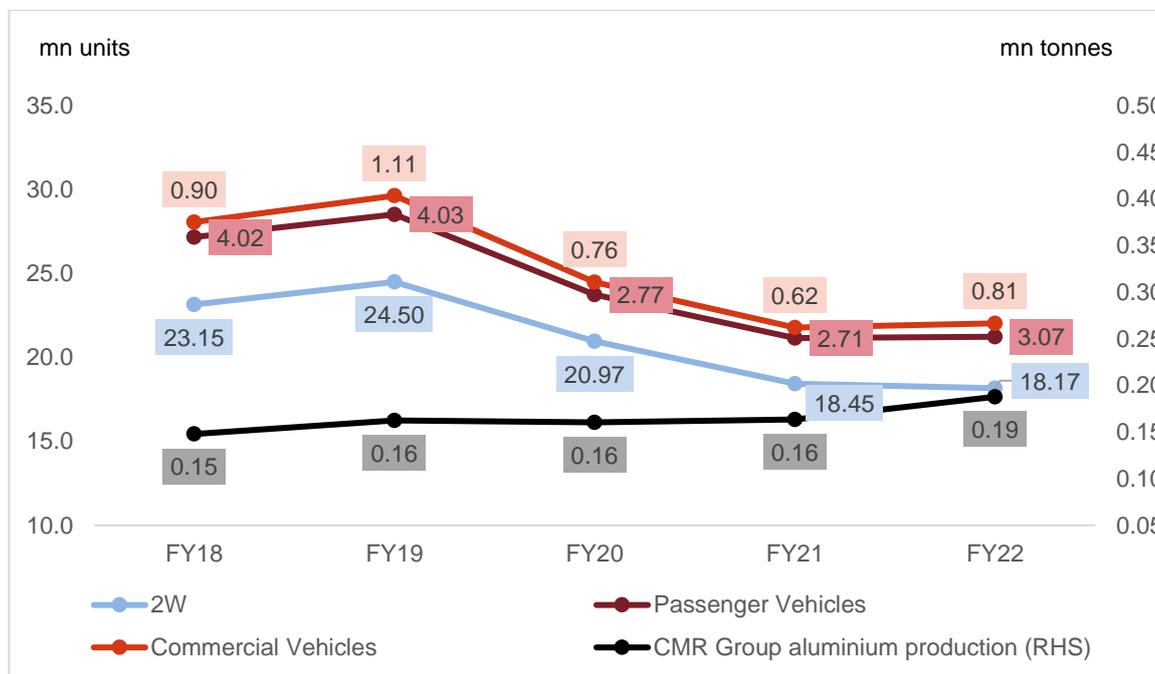
An analysis of the market share of secondary aluminium for CMR Group (capacity, million tonne, fiscal 2022)



² Capacities for global players are for CY 2020 based on company websites and public data

Source: Industry, CMR Group, CRISIL Research (considering 95% of sales to the auto segment)

Trend in production of two wheelers, PVs and CVs versus CMR Group production

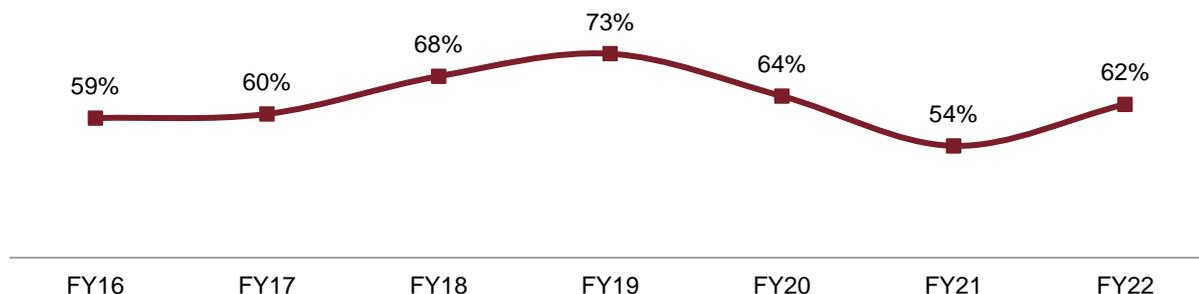


Source: Industry, CMR Group, CRISIL Research

Production of two-wheeler de-grew at a CAGR of about 4-5% over the duration of fiscals 2018 to 2022. Production of passenger vehicles and commercial vehicles too registered de-growth over the same duration. The segments' CAGR was calculated at -5.3% and -2.1%, respectively from fiscal 2018 to fiscal 2022. CMR group's aluminium production, on other hand, registered a CAGR of 4.5-5.5% over the same period.

The slowdown in the auto segment impacted the sales of CMR Group in fiscal 2020. The sales volume grew at a CAGR of ~9% between fiscals 2016 and 2019, with flattish growth in fiscal 2020. Consistent capacity addition in fiscals 2019 and 2020, amid a slowdown in sales, took a toll over production and the capacity utilisation dropped in fiscal 2020. Fiscal 2021 too was a flattish year in terms of production. However, with recovery in economy, sales of CMR pick-up in fiscal 2022 and about 14.8% on-year growth was observed. Capacity utilisation for the year stood at ~62%. However, the company has capabilities to attain 70-75% capacity utilisation in coming years.

Capacity utilisation (%) for aluminium of CMR Group during FY16-22



Source: Industry, CMR Group, Annualization of Capacity considered for estimation utilization levels

Majority of the company's volumes are concentrated in the northern region (the largest aluminium-recycling hub), followed by the south. CMR Group is estimated to occupy a market share of ~20% in the north and a 12-13% market share in the south in terms of total demand of secondary aluminium in the country as of fiscal 2022. It is estimated to account for ~7-8% of share in western region in fiscal 2022.

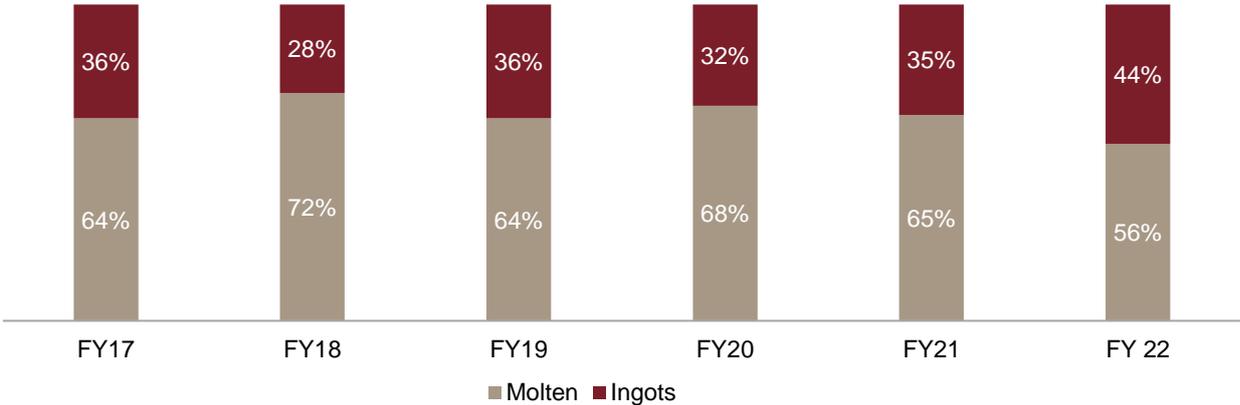
In terms of regional sales split, north India is CMR Group's key market. The region accounted for about ~60% of the total CMR Group sales in fiscal 2022. South and west contributed to about ~24% and ~16% of the CMR Group's sales, respectively, in the same fiscal.

Predominant presence in liquid/molten aluminium

The company's product portfolio includes both liquid as well as solid form of aluminium alloy ingots. CMR Group is a pioneer in the molten aluminium segment in the country. The company has consistently increased its metal sales in the molten form, largely attributed to several advantages offered to both manufacturers as well as end-consumers in the auto segment.

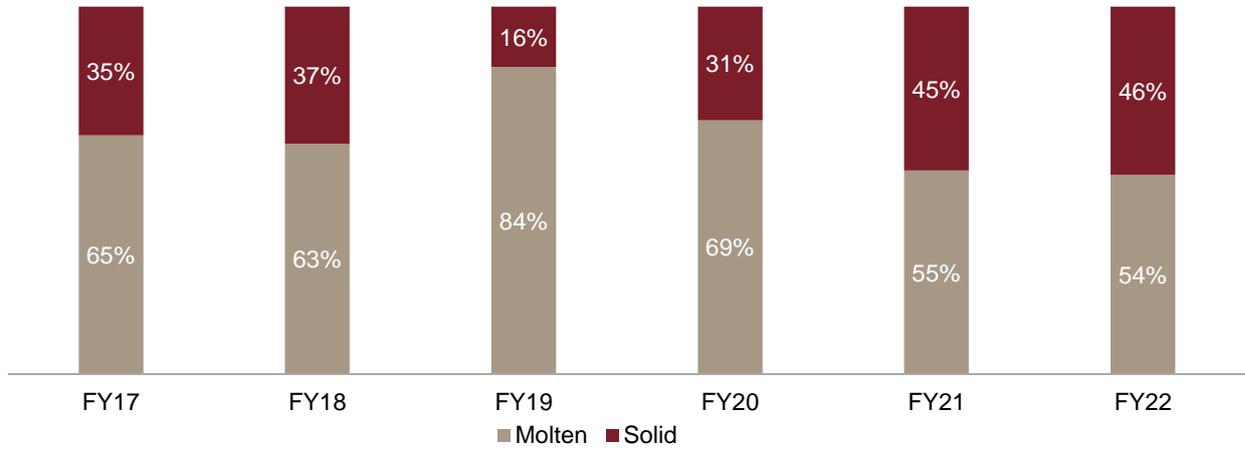
According to estimates molten metal constitutes ~15-20% of share in overall secondary aluminium demand in the country. It is estimated that CMR group accounts for about 35-40% to the total secondary aluminium demand through molten route in India in fiscal 2022. Also, the company is one of the leading suppliers of molten aluminium in auto segment.

Split of sales volume of molten aluminium versus solid aluminium for CMR Green Ltd



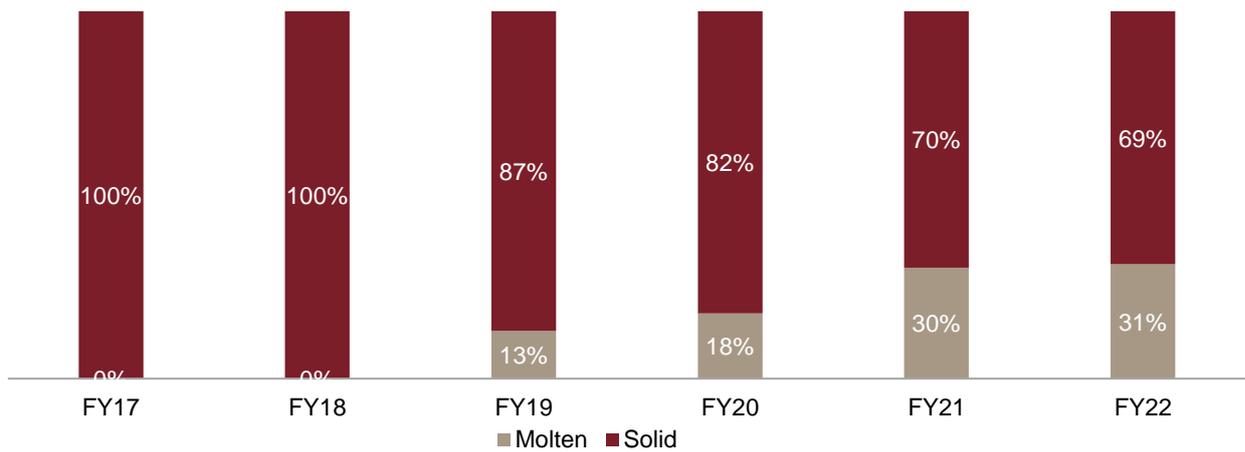
Source: CMR Green

Split of sales volume of molten aluminium versus solid aluminium for CMRN



Source: CMR Group

Split of sales volume of molten aluminium versus solid aluminium for CMRT



Source: CMR Group

CMR Group sales volumes split (molten versus solid)

North India sales volume split



Source: CMR Group

In other regions, while CMR Group’s sales in the south region are predominately solid aluminium, in the western region, its sales have a good share for both molten and solid aluminium sales.

Cutting edge technologies implemented in the recycling process

The group ensures usage of high-end technologies in its manufacturing process with technological upgradation being taken up every 2-3 years to produce quality products. Partnering through JVs has helped the group build its technology expertise. The group has a significant technological superiority with state-of-the-art machinery for media separation (for segregation of non-ferrous scrap), induction sorters (for segregation of stainless steel), colour sorters (for sorting of heavy metals), pump furnace (to maintain homogenised melt quality) and bag houses for pollution control. Apart from this, the group has also filed multiple patents for electric degassing and ladle safety for molten metal supply.

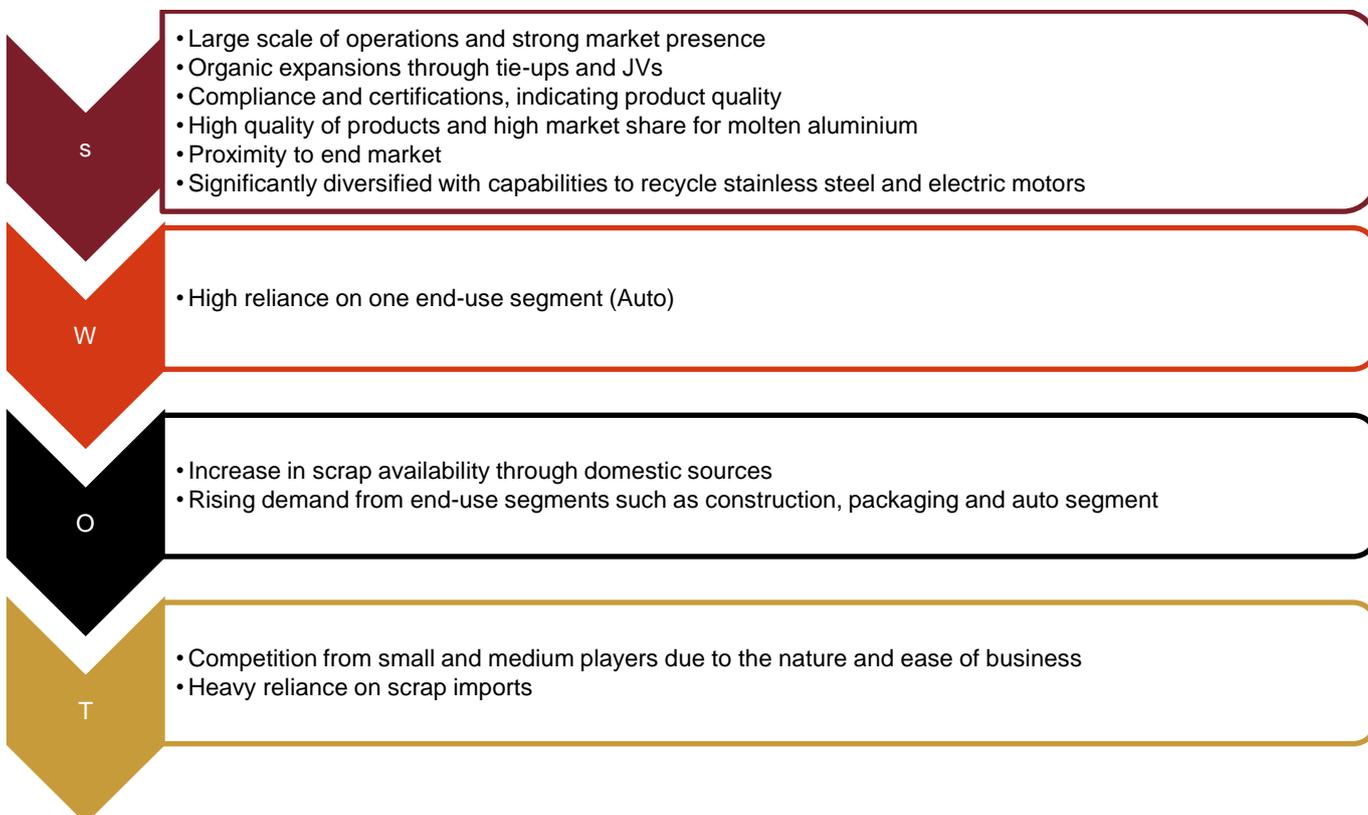
With a well-equipped quality lab, the group has been recognised for its efforts in quality control through various ISO certifications over the years such as ISO 45000: 2018, ISO 14001:2015, ISO 14001:2004, ISO 9001: 2008, BS OHSAS 18001:2007 and ISO TS 16949:2009.

Greater focus towards ESG norms

It is also notable that CMR Group has kept its focus on initiatives regarding to environmental, social and corporate governance norms. With periodic energy audits, the group has well established systems for energy conservation, waste and water management and use of latest pollution control systems. The Bhiwadi plant located in Rajasthan has been registered by UNFCCC for certified emission reduction under clean development mechanism scheme.

Various CSR activities have been taken up by the group towards women empowerment, healthcare and youth skill development. With regards to the company’s recycling mechanism, CMR Group stands to be a zero-discharge company where all the by-products formed during the recycling process are effectively used.

SWOT analysis of CMR Group



Source: CMR Group, Industry, CRISIL Research

Key strengths:

• **Large operating scale**

CMR Group is India’s largest recycler of aluminium and zinc alloy ingots with a combined annual capacity of over about 310,700 MT as of fiscal 2022 along with a large yard space of 60000 MT scrap-handling capacity. Since inception, it has maintained a fast-paced growth by leveraging latest technologies and continuous improvement. CMR group’s installed capacities accounted for ~14-16% of the aggregate capacity installed domestically as of fiscal 2022. Typically, large-scale operational capabilities enable players to achieve economies of scale, especially in the form of raw material procurement (relatively high bargaining power) and low overhead costs.

The group has significantly diversified to other business segments and is hence catering to the stainless-steel market and in dismantling of electric motors.

- **Organic expansion through tie-ups and JVs**

CMR Group is currently operating through ten manufacturing plants, including four plants under two joint ventures with renowned Japanese companies, Toyota Tsusho Corporation and Nikkei MC Aluminium. Recently, the group has also set up a manufacturing plant under a 50-50 JV with Chiho Environmental Group Limited to engage in dismantling of old used electric motors and retrieving various metal scrap, its processing and recycling. Through these joint ventures, the company is able to expand its presence across various parts of the country.

- **Compliance and certifications, indicating product quality**

The company has high control over quality (compared with small and medium-sized players) with compliance levels at par with the best industry practices. All of CMR group's manufacturing facilities are equipped with the latest pollution control systems. The company also has several ISO certifications, such as ISO 14001, TS16949, ISO 45001, IATF16949 and OHSAS 18001, and has been accredited by the Department of Scientific and Industrial Research

- **Strong market presence**

Due to the company's brand recognition and associations, the firm is a market leader in the recycling space. CMR group has a strong supply chain with a large supply base from various countries such as the US, Europe, Middle East, India, Australia, the UK, New Zealand, Africa and Thailand. The customer base for the company is also quite strong with renowned players in the automotive space.

- **Nearness to the end market (proximity to key demand clusters)**

The company's manufacturing plants are strategically located to the vicinities of its customers' manufacturing units, enabling it to supply just-in-time inventory and, thus, realise higher profitability margins. The group supplies molten aluminium to some large auto component majors, such as Rockman Industries, Sunbeam Auto, Maruti Suzuki, Rico Auto, Honda Cars and Yamaha India.

CMR group's manufacturing facilities are spread across Tatarpur, Haridwar, Gurgaon, Bhiwadi, and Manesar, Bawal and Chennai, largely covering major markets within the northern and southern regions, such as NCR and Chennai, respectively. Proximity to these clusters help CMR group cater to the requirements of a few large OEMs and auto-component manufacturers. As a result, over years, the company has established a significant presence in these clusters and holds a major share in the auto-component market. Such geographical diversification in operations also immunises the company from any unforeseeable volatility in cluster/region specific demand dynamics, as against players having a presence in a single location.

- **Higher market share for molten metal**

Molten metal occupies sizable share in CMR Group's product mix, and accounted for ~49% of the total sales volume in fiscal 2022. As per the company report, CMR Group is also the largest player offering molten metal. With necessary infrastructure already set up (such as ladle transport vehicles and tilting furnace), increasing preference for molten metal by auto component manufacturers should bode well for such players.

Key weakness:

- **Heavy reliance on the auto sector**

The group is highly dependent on the auto sector, as it is observed that secondary aluminium finds its maximum utilisation in this particular segment. The firm is also expecting to increase export orders through its joint ventures of Nikkei Mc Aluminium Company Ltd and Toyota Tsusho Corporation (both large aluminium alloy importers in Japan). In order to mitigate the risk of dependence on only the auto segment, the group has diversified its business into other verticals such as stainless-steel scrap recycling, ELV recycling and electric motor dismantling.

Key opportunities areas:

- **Rising demand growth from auto sector**

In line with light weighting, aluminium is anticipated to play a vital role in the automotive industry. Electric vehicles are expected to witness growth in the coming years, as government incentives (such as FAME II, NEMMP etc) increase.

Government initiative for faster adoption of the electric vehicles and their manufacturing has been launched under the National Electric Mobility Mission Plan (NEMMP 2020). This scheme has been designed to improve the national fuel security and to provide environment friendly and affordable transportation.

Under NEMMP 2020, the Department of Heavy Industry launched a scheme in fiscal 2015 for promotion of electric and hybrid vehicles known as Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME) in two phases. Phase I (providing incentives to buyers of electric/hybrid in the form of upfront reduced purchase price) came into effect from fiscal April 1, 2015 after which the phase II (mainly for electrification of public and shared transportation) was launched which was effective from April 1, 2019 to promote faster adoption of electric mobility and development of the manufacturing eco-system in the country.

CMR Group, being a major player in the automotive segment, stands to be benefited from higher demand from the sector (ICE and increasing penetration of EVs). With increased focus of the government on implementation of an electric-vehicles policy, continued vehicle weight reduction will further support a rise in demand for aluminium, though in the long term.

- **Increasing scrap generation**

The government of India's scrappage policy is designed to make metal scrap centres more efficient, providing a structure for their operations. It is thought to be a first step towards formalising the still-fragmented scrapping industry. India is taking measures to fulfil the circular economy's requirements, and raw-material sustainability is a critical component of achieving this goal. This is expected to improve the scrap value chain and facilitate the flow of coordinated global scrap trade. Ease of obtaining raw materials for the production of secondary aluminium is expected to support CMR Group's value chain by reducing its dependence on foreign markets and lowering the risk associated with currency fluctuations during the trade cycle.

- **Increase in demand due to an expected increase in infrastructure spending**

With the growing economy and government policies related to investments being made in the infrastructure domain, an increase in demand for lighter and stronger metals is predicted, indicating opportunities for secondary aluminium recyclers. This is beneficial for CMR Group to diversify its portfolio into segments other than auto as well.

- **Higher customer retention**

Molten metal supply chain involves adhering to stringent timelines. The customers' productivity may get effected due to any delays in molten metal supply. Hence, in most cases, customers do not tend to change their supplier for molten metal. Considering this, CMR Group has an advantage due to its efficient molten metal supply and infrastructure leadership in the industry.

Key threats:

- **Competition from the fragmented market**

The Indian aluminium recycling industry, with an annual installed capacity of ~1.9-2.0 million tonne estimated as of fiscal 2022, is dominated by medium and small players, accounting for nearly 55-57% of the aggregate capacity. These medium and small sized players incur significantly lower capital expenditure to set up a plant as against large players, primarily because of low level of mechanisation and less adherence to necessary compliance. This may result in faster break-even period for small and mid-sized players, as the price differential between large and small players is typically minimal. However, higher compliance requirement post-GST implementation will lead to increasing compliance costs for small and mid-sized players.

- **Heavy reliance on scrap imports**

The principal raw materials used in the manufacturing process include aluminium-based scrap, such as zorba, taint, tabor, tense, troma, turning and tally, among others. CMR Group does not have long-term agreements with any of the raw-material suppliers. Raw material supply and pricing can be volatile due to a number of factors beyond the company's control, including global demand and supply, general economic and political conditions, tariff disputes, transportation and labour costs, labour unrest, natural disasters, competition, import duties, tariffs and currency exchange rates. Given the nature of the international scrapping industry, CMR Group's purchase contracts are made at spot prices. This exposes the company to a significant risk of price and currency fluctuations. Due to longer lead times in the supply chain due to high imports, the scrap markets and forex rate may fluctuate in the intervening time, and the company may not be able to adjust prices of the finished products against what CMR Group would have paid for the raw materials. It should also be noted that as an industry practice, most of the players negotiate rates on monthly basis and all price fluctuations are passed on to the customers.

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