# Assessment of market potential for Industrial engineered components

**Shivalik Engineering Industries Ltd** June 2024

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# 1. Macroeconomic Overview of Global and Indian economy

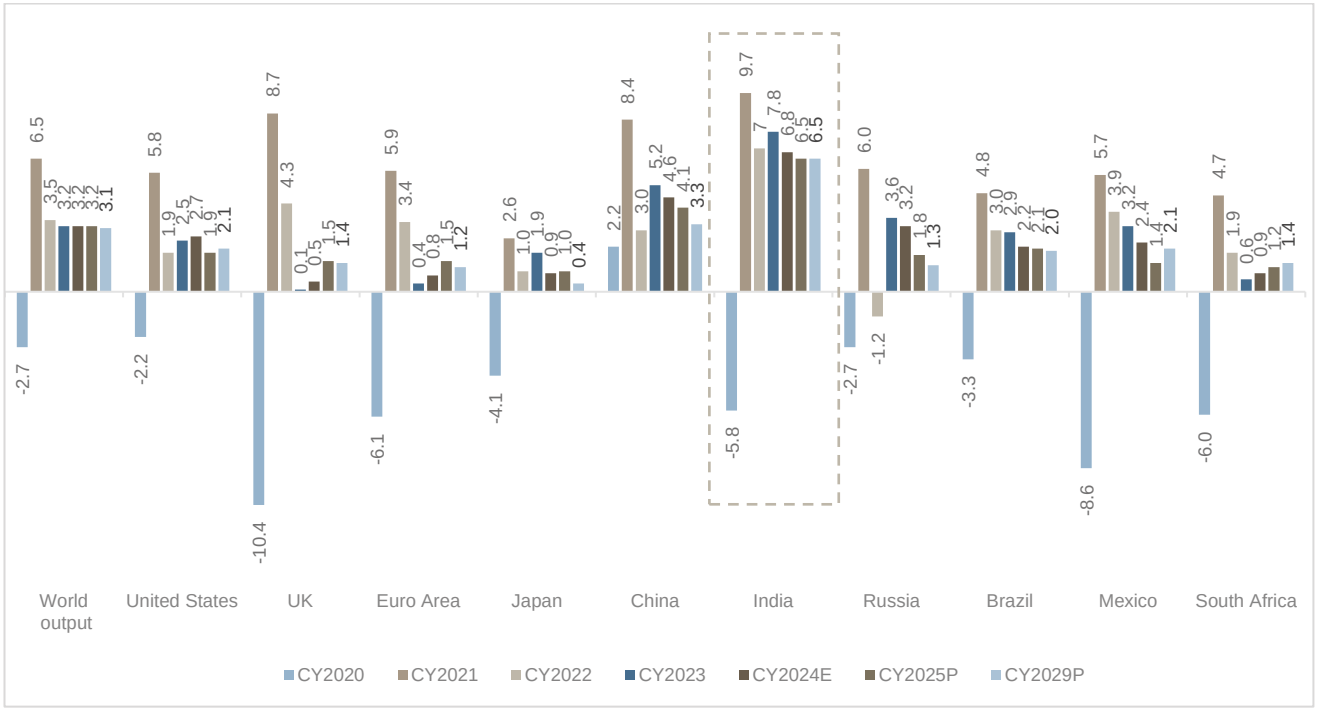
## Overview of the Global Economy

### Review and outlook of global GDP

The global economy continues to recover from challenges heaped by the Covid-19 pandemic, geopolitical uncertainties in Europe and the Middle East, and considerable tightening of global monetary conditions to address elevated inflation. In fact, a return to the pre-pandemic growth rate was challenging, particularly in the case of emerging and developing economies, owing to the convergence of factors such as long-term fallout of the pandemic and increasing geoeconomic fragmentation. Other issues include elevated central bank policy rates in several large emerging and developed economies to control inflation and withdrawal of fiscal support amid high debt levels, and extreme weather events.

Despite these challenges, the India economy saw strong growth momentum, with a major push fueled by investments and sectors such as information technology, services, agriculture and manufacturing.

**Nominal GDP growth of key economies**




CY – calendar year

Note: Euro area comprises 19 member countries of the EU

*Source: International Monetary Fund (IMF; World Economic Outlook – April 2024 update), CRISIL MI&A Consulting*

As per the International Monetary Fund's (IMF) World Economic Outlook:

- The global GDP growth is estimated at 3.2% in the CY2024 with the forecast 0.1% higher than the previous estimates due to the upgrades for China, the United States (US), large emerging markets and developing economies. The forecast for CY2024 is however, below the historical (CY2000-2019) annual average of 3.8%

with elevated central bank policy rates to fight inflation, a withdrawal of fiscal support by major economies amid high debt weighing on economic activity and low underlying productivity growth.

- In the case of advanced economies which include the US, Japan and Euro area, growth is projected to rise from 1.6% in CY2023 to 1.7% in CY2024. A marginal upward revision of 0.2% for CY2024 compared with previous estimates of 1.5% is due to stronger growth momentum in the US that is partly offset by weaker growth in the Euro area.
- The growth rate in emerging market and developing economies which include China, India, Russia, Brazil, Mexico, and South Africa is expected to remain at 4.2% in CY2024, with a moderation in emerging and developing Asian countries such as India and China's growth offset mainly by rising growth for economies in Middle East, Central Asia and Sub Saharan Africa. Emerging and developing economies are expected to experience stable growth through 2024 and 2025 albeit with some regional differences.

Real gross domestic product (GDP) growth rate of the US was revised down from 2.5% in CY2023 to 2.1% in CY2024. There was an upward revision of 0.6% for CY2024 from the previous estimates, largely due to stronger than expected growth outcome for 2023.

Growth for the Euro area is projected to recover from its low rate of an estimated 0.4% in CY2023 which was due to high exposure to the war in Ukraine, to 0.8% in CY2024. Stronger household consumption due to the decrease in energy prices and drop in inflation is supporting real income growth and is expected to drive the recovery. Growth is revised downward from the previous estimates, largely on account of carryover from the weaker than expected outcome for CY2023.

Among other advance economies, growth in the United Kingdom is projected to rise modestly from an estimated 0.1% in CY2023 to 0.5% in CY2024, due to the lagged negative effect of high energy prices. Output in Japan is projected to slow from an estimated 1.9% in CY2023 to 0.9% in CY2024. This is due to fading of the one-off factors that supported growth in 2023, including surge in inbound tourism, depreciation of the Yen, pent up demand, and a recovery in business investment following earlier delays in implementing projects.

Growth in emerging and developing countries of Asia is expected to decline from an estimated 5.6% in CY2023 to 5.2% in CY2024. Growth in China is projected at 4.6% in CY2024 due to carryover from stronger than expected growth of 5.2% in CY2023 and increased government spending on capacity building against natural disasters. India is the fifth largest economy and among the fastest growing major economies. Growth in India is projected to remain strong at 6.8% in CY2024 and 6.5% for CY2025 with the strong growth led by continuing strength in domestic demand and a rising working age population.

Economic activity in major developed countries was also resilient, with economic momentum continuing in the US and the Euro area avoiding a contraction in the fourth quarter of CY2023. Growth picked up in the fourth quarter of CY2023 in China as well. However, the slowdown in the UK economy accelerated in the fourth quarter of 2023, with a recession now being recorded. Japan's economy too slowed down in the fourth quarter of CY2023.

Meanwhile, the global headline inflation is expected to fall from an average of 6.8% in CY2023 to 5.9% in CY2024 mainly due to expected decline in inflation in advanced economies by 2% in CY 2024.The fall in global inflation in CY2024 reflects a broad-based decline in global core inflation (all item except food and energy). This dynamic differs from that in 2023, when global core inflation fell marginally on an annual average basis and headline inflation declined mainly on account of lower fuel and food price inflation. In CY2024, core inflation is expected to fall by 1.2% after contracting by 0.2% in CY2023. As in case of headline inflation, the fall in core inflation is faster for advanced economies. Diminished inflation reflects the fading of relative price shocks, notably in energy prices. In near term, inflation expectations have fallen in major economies with long term expectations remaining anchored.

**GDP growth (quarter-on-quarter seasonally adjusted annualized, %)**

| | Q2-2022 | Q3-2022 | Q4-2022 | Q1-2023 | Q2-2023 | Q3-2203 | Q4-2023 |
|---|---|---|---|---|---|---|---|
| US | (0.6) | 2.7 | 2.6 | 2.2 | 2.1 | 4.9 | 3.2 |
| UK | 0.1 | (0.1) | 0.1 | 0.2 | 0.0 | (0.1) | (0.3) |
| Euro area | 0.8 | 0.5 | 0.0 | 0.0 | 0.1 | (0.1) | 0.0 |
| Japan | 4.8 | (0.7) | 1.8 | 4.0 | 4.2 | (3.2) | 0.4 |
| China | 0.4 | 3.9 | 2.9 | 4.5 | 6.3 | 4.9 | 5.2 |
| India | 9.1 | 5.2 | 4.0 | 12.8 | 6.2 | 4.3 | 6.2 |

*Source: Statistical Bureau, respective countries*

## Review and outlook of inflation in key economies

Meanwhile, inflation has declined faster than expected. Global headline inflation in the fourth quarter of 2023 was estimated at ~0.3% lower on-quarter on a seasonally adjusted basis vs the previous IMF estimate. Cooling inflation reflects the fading of price shocks, notably energy prices. In fact, in the near term, inflation expectations have fallen in major economies and long-term expectations are anchored.

However, there is regional divergence on inflation in the US. Hence, S&P Global Ratings, in its February 21,2024 release, did not expect the US Federal Reserve (Fed) to cut rates before June 2024. Also, while inflation in the euro area eased further in February, it remained above the European Central Bank's (ECB) target. And though inflation in Japan continued to ease as well, that also still trended above the Bank of Japan's target. In contrast, inflation in China rose in February after four months of deflation, led by increase in non-food prices.

**Consumer price inflation (on-year, %)**

| | Jul-2023 | Aug-2023 | Sep-2023 | Oct-2023 | Nov-2023 | Dec-2023 | Jan-2204 | Feb-2024 | Mar-2024 | Apr-2024 |
|---|---|---|---|---|---|---|---|---|---|---|
| US | 3.2 | 3.7 | 3.7 | 3.2 | 3.1 | 3.4 | 3.1 | 3.2 | 3.5 | 3.4 |
| UK | 6.8 | 6.7 | 6.7 | 4.6 | 3.9 | 4.0 | 4.0 | 3.4 | 3.2 | 2.3 |
| Euro zone | 5.3 | 5.2 | 4.3 | 2.9 | 2.4 | 2.9 | 2.8 | 2.6 | 2.4 | 2.4 |
| Japan | 3.3 | 3.2 | 3.0 | 3.3 | 2.8 | 2.6 | 2.2 | 2.8 | 2.6 | 2.5 |
| China | (0.3) | 0.1 | 0.0 | (0.2) | (0.5) | (0.3) | (0.8) | 0.7 | 0.1 | 0.3 |
| India | 7.4 | 6.8 | 5.0 | 4.8 | 5.5 | 5.6 | 5.1 | 5.1 | 4.9 | 4.8 |

*Source: Statistical Bureau, respective countries*

## US inflation inches up while unemployment decreases

According to a Bureau of Economic Analysis (BEA), US GDP grew at 3.4% in the fourth quarter of CY2023, lower than 4.9% in the previous quarter. Consumer expenditure grew 0.7% month-on-month in December 2023, up from 0.4% in the previous month.

The US labour market remained robust, adding 303,000 non-farm payroll jobs in March 2024, which was up from 270,000 in February 2024 and above the average monthly gain of 231,000 in the previous twelve months. However, the unemployment rate rose to 3.8% in March 2024 compared to 3.9% in the February 2024.

US inflation grew to 3.5% in March 2024 from 3.2% in the previous month, driven by resurgence in energy price inflation. The energy inflation rose to 2.1% in March 2024 compared to a 1.9% fall in February 2024. However, food inflation remained steady in March 2024 at 2.2%. Core inflation eased to 3.8% in March 2024.

Goods and services trade deficit widened to USD 68.9 billion (seasonally adjusted) in February 2024, compared with USD 64.2 billion in January 2024, as exports rose 1.8% month-on-month versus imports growth of 0.8% in February 2024

Given the resilience of economic activity and the uneven disinflation process, S&P Global Ratings does not expect a rate cut before the Federal Reserve's June 2024 meeting.

## Economic activity revives in the Euro area, inflation eases

Euro area's GDP held steady at 0.0% growth on-quarter (seasonally adjusted) in the fourth quarter of 2023, against a 0.1% contraction in the previous quarter. Fourth quarter performance was mixed, with Italy (0.2%) and Spain (0.6% provisional) growing quarter-on-quarter while Germany (-0.3% estimated) contracted and French growth remained at 0.0%.

The HCOB Eurozone Composite Purchasing Managers' (PMI) Output Index, which is a weighted average of the HCOB Manufacturing PMI Output Index and HCOB Services PMI Business Activity Index, rose to ten months high of 50.3 in March 2024 from 49.2 in February 2024.The March reading indicates the Euro area economy has expanded for the first time since May 2023.

According to the flash estimate from Eurostat, inflation in the Euro area eased to 2.4% in March 2024 from 2.6% in February 2024, driven by moderation across most categories. Inflation eased significantly in the food related category (2.6% versus 3.9% in February 2024) while energy prices continued to decline as well (-1.8% versus -3.7% in February 2024). 'Core' inflation, except food and energy, eased further (2.9% from 3.1% in February). Inflation in non-energy industrial goods eased (1.1% versus 1.6% in February 2024) while services inflation remained steady at 4.0%.

The European Central Bank held the policy rates steady at its March meeting for the fourth consecutive time, as inflation remains above its target despite some easing.

Euro area merchandise exports increased 0.3% y-o-y in February 2024, while import fell 8.4%. This led to a trade surplus of EUR 23.6 billion in February 2024 compared with EUR 3.6 billion in February 2023.

## UK manufacturing begins to expand; inflation eases

S&P Global UK Manufacturing Purchasing Managers' Index (PMI) increased to 50.3 in March from 47.5 in February. The March reading marks an expansion in manufacturing activity for the first time since July 2022. S&P Global UK Services PMI Business Activity Index decreased to 53.1 from 53.8. While this was above the neutral 50.0 threshold, it signalled the slowest pace of business activity expansion since November 2023.

The UK's real GDP contracted 0.3% in the fourth quarter of CY2023, a sharper fall compared to the 0.1% contraction recorded in the third quarter. From an output perspective, all three major sectors contracted. Output in the construction sector contracted the most (1.3%), followed by the production sector (1.0%) and the services sector (0.2%). A decline in a manufacturing output was the main driver of the contraction in the production sector, while a contraction in wholesale and retail trade was primarily responsible for declining output in the services sector.

Inflation eased to 3.2% in March 2024 from 3.4% in February 2024, on the back of lower service and goods inflation. The latter was driven by significant reduction in food and non-alcoholic beverages inflation from 5% in February 2024 to 4% in March 2024. Housing and household services, and motor fuels exerted the highest upward pressure on the annual inflation rate, whereas food contributed to the largest downward pressure. Core inflation eased to 4.2% in March 2024 from 4.5% in February 2024. At its meeting that ended January 31, the Bank of England held its policy rate steady at 5.25%.

Goods and services trade deficit narrowed to GBP 2.3 billion (seasonally adjusted) in February 2024 from GBP 2.2 billion in January 2024.

## Inflation slows down in Japan

The Japanese economy contracted by an annualized rate of 0.4% in the fourth quarter of CY2023 due to weaker private consumption amid high domestic inflation.
The au Jibun Bank Japan Manufacturing Purchasing Manager Index (PMI) rose to 48.2 in March from 47.2 February, marked the tenth straight month of contraction in manufacturing activity. The contraction was, however, at its lowest in four months. Conversely, services activity continued expand in February, as indicated by the au Jibun Bank Japan Services Business Activity Index, through the index rising to 54.1 in March 2024 from 52.9 in February 2024.

Japan's core inflation slowed in March due to mild rises in food prices above the Central Bank's 2% target. It rose by 2.9% in March 2024, after increasing by 3.2% in February 2024. It was the first time since November 2022 that the index fell below 3%. Core consumer price index rose to 2.6% in March from 2.8% in February 2024.

During its March meeting, the Bank of Japan ended the negative interest rate and yield curve control policy in place since 2016, stating that it will maintain the key short-term interest rate between 0-0.1%. The Bank's decision was based on healthy wage growth in the economy (corporates have been revising up wage growth rates) and the fact that despite easing, inflation remains above the 2% target.

*Japan trade deficit decreased to JPY 377.8 billion in February 2024, compared with a deficit of JPY 928.9 billion in February 2023, as exports grew 7.8% year-on-year, while imports increased at a softer 0.5%. The first rise in 11 months, to JPY 8628.57 billion, as domestic demand started to recover. In 2023, Japan logged a trade shortfall of JPY 9.29 trillion, the third successive year of gap.*

## Manufacturing picks up pace in China

The Chinese economy grew by 5.3% in the first quarter of CY2024, slightly up from 5.2% in the fourth quarter of CY2023. Manufacturing activity began to expand in March 2024. The official National Bureau of Statistics (NBS) Manufacturing Purchasing Managers' Index stood at 50.8 in March compared with 49.1 in February. On the other hand, non-manufacturing activity continued to expand. The NBS Non-Manufacturing Business Index picked up to 53.0 in March 2024 from 51.4 in February 2024.

Inflation decreased to 0.1% in March 2024 from 0.7% in February 2024. Inflation declined in food and tobacco (-1.4% vs -0.1%), with non-food items inflation easing (0.7% versus 1.1%). 'Core' inflation, except food and energy, inched up as well (0.6% versus 1.2%). The People's Bank of China kept its one-year Loan prime rate unchanged at 3.45% in March 2024 however, it has been attempting to increase liquidity in the system and aid recovery.

China's total trade surplus widened to USD 39.7 billion in February 2024 from USD 16.8 billion in February 2023 as export increased 5.6% while imports declined by 8.2%.

Additionally:

China's total trade surplus stood at $125 billion in the first 2 months of 2024 compared with $116.9 billion during the same period of 2023. China exports have benefited from the recovery in the global tech cycle
China exports rose 7.1% growth on the basis of combined figures of January and February vs the same period of 2023. Growth was led by robust exports to some of China's emerging market trade partners, such as Africa, Latin America, India and Russia

China's export to Russia increased 12.5% on-year in the first 2 months of 2024, but this was on a low base. Russia became China's 10th largest trading partner in 2023, with record $240 billion worth of goods shipped between the two countries
In fact, strong demand from emerging markets supported China's trade surge at the beginning of 2024. Shipments to Africa, Latin America and India rose 21.0%, 20.6% and 12.8%, respectively

Strong export growth to India reflects strong domestic economy. Export to Africa and Latin America indicates growing trade ties between China and these emerging economies, amid a broad global geopolitical shift

China’s shipments to the US also increased, up 5% from a year earlier. However, its export to other traditional trading partners, such as the EU, Japan and Australia, declined

China’s imports picked up during the first two months of this year in volume terms as well – imports rose 3.5% on-year; the figures have been combined to smooth out the impact of the Lunar New Year holiday

## India to post fastest growth among large economies

India’s growth trajectory continued throughout fiscal 2024 wherein India’s GDP expanded at 7.8% in the first quarter, 7.6% in the second quarter and 8.4% in the third quarter. Core sector growth in February 2024 was the fastest in three months and manufacturing activity at five months high. Economic growth was encouraged by investment and manufacturing activity.

Consumer price index (CPI) inflation eased to five months low of 4.9% in March from 5.1% in February 2024. However, core inflation tapered to 3.2% in March 2024 from 3.3% in February 2024. Fuel inflation also tapered in March 2024 due to cut down in domestic fuel prices such as petrol and diesel. High food inflation at 8.5% in March 2024 due to higher cereals inflation, erratic vegetable inflation and elevated pulses inflation is a cause of concern given the Indian Meteorological Department's (IMD) prediction of higher-than-normal temperatures between April and June.

The Reserve Bank of India’s (RBI) Monetary Policy Committee (MPC) voted to keep the policy rates unchanged with a 5-1 majority. The repo rate remained at 6.50% in April 2024. The MPC noted encouraging signs for food inflation easing on the back of an expected bumper rabi output in the current season and a normal monsoon. However, it will remain vigilant about unpredictable weather events, the frequency of which has increased in recent years. The MPC kept its consumer price index (CPI) inflation forecast unchanged at 4.5% for this fiscal.

The International Monetary Fund in its latest report indicated that India’s gross investments as a percentage of GDP is expected to rise to 31.9% in fiscal 2025 from 31.7% in fiscal 2024. The National Statistical Office (NSO) reported that manufacturing output rose by 5% in February 2024 which is slightly lower as compared to 5.9% in February 2023. Industrial production expanded by 5.7% in February 2024. Mining production surged by 8% while power output grew by 5.7% in February 2024. India’s merchandise trade deficit widened to USD 18.71 billion in February 2024 from USD 17.49 billion in January 2024, as imports surpassed exports in value terms against the backdrop of the Red Sea conflict.

The Indian economy is expected to grow at a higher than estimated 7.6% in fiscal 2024, with GDP growth in the third quarter of the fiscal at 8.4% on the back of lower base, tax collections and healthy growth in the manufacturing sector and construction activities. Data released by the NSO in February 2024 revealed that the economy is expected to grow by 7.6% in fiscal 2024 as against the previous estimate of 7.3%.

India’s merchandise trade deficit widened to USD 18.71 billion in February 2024, from USD 17.49 billion in the previous month, as imports outstripped exports in value terms against the backdrop of the Red Sea conflict.
As per CRISIL MI&A, India’s economy is expected to grow at 6.8% in fiscal 2025 up from 6.5% projected earlier. This will be driven by expected easing of domestic financial conditions, disinflation leading to increasing purchasing power of consumers and growth in private capital expenditure.

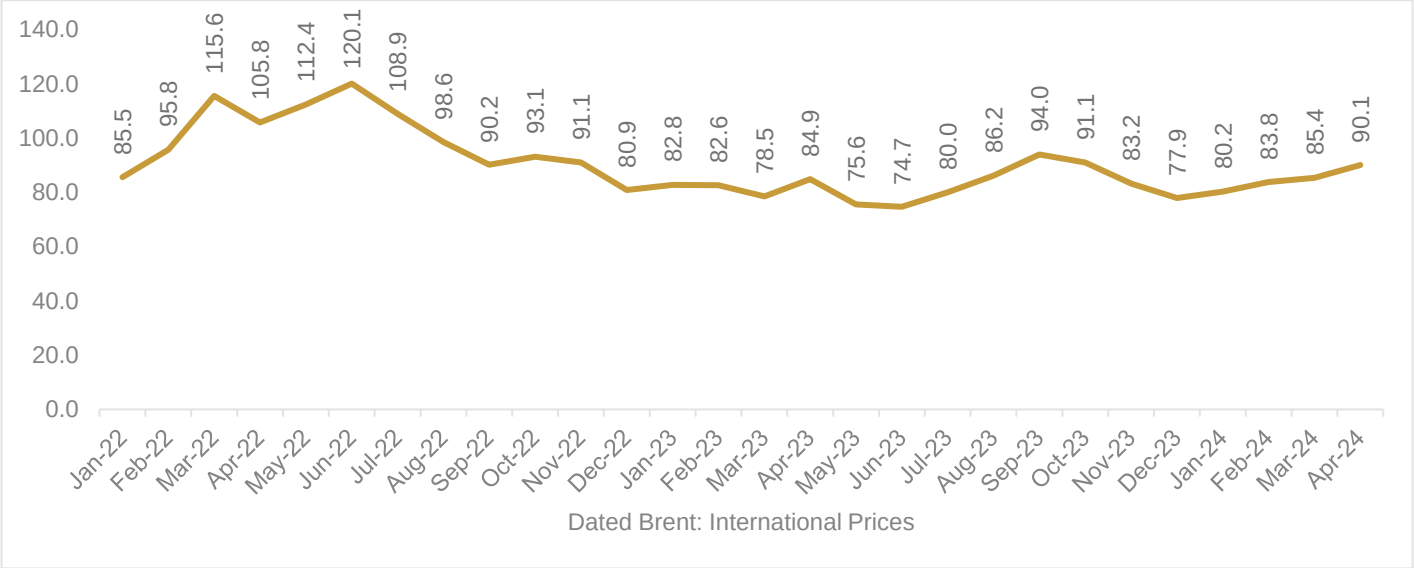
## Energy prices increase significantly, driven by a sharp increase in oil prices

Energy prices witnessed a 2% growth in March 2024 as compared to February 2024. This was due to the growth in Brent crude prices to an average USD 85.4 per barrel in March 2024, which grew from USD 83.8 per barrel in February 2024. Brent crude oil prices increased 5.5% on-month, a significant increase from the 1.9% rise in

March. The prices averaged $90.1/barrel in April, sharply up from $85.4/barrel on average in March on geopolitical uncertainty. That said, they remained below the September 2023 level of $94.0/barrel. Australian coal prices increased 2.7% to $135/metric tonne from $131.5/metric tonne.The hike in crude oil prices was fueled by ongoing tensions in the Middle East, drone attacks against Russian refineries and expectation of extended production cuts by Russia. Additionally, this price surge was also due to continued tightening of the global oil supply, largely attributed to the sustained oil production cuts implemented by Organization of Petroleum Exporting Countries (OPEC). A drop in US crude stocks indicates strong demand from the biggest oil consumer in the world along with the robust demand from China, which also supported hike in crude oil prices.

CRISIL MI&A expects crude oil prices to increase on a month-on-month basis with an expected average ranging between USD 88-93/barrel. There are multiple factors that will influence the oil market dynamics. Continuation of Middle eastern tension will keep prices elevated. A stable macroeconomic situation resulting in stable demand will further keep crude prices elevated in the month of April 2024.

**Brent Crude prices ($/barrel)**




*Sources: CRISIL MI&A Consulting*

On 3rd March 2024, multiple members of the OPEC and its allies OPEC+ announced extension of production cuts until end of Q2 2024, further tightening supply. The current oil prices have already factored decision of the OPEC+ and is unlikely to significantly impact oil prices. However, any further escalation in the Red Sea crisis will be key monitorable affecting crude oil prices in April-2024.

## Global trade stabilises

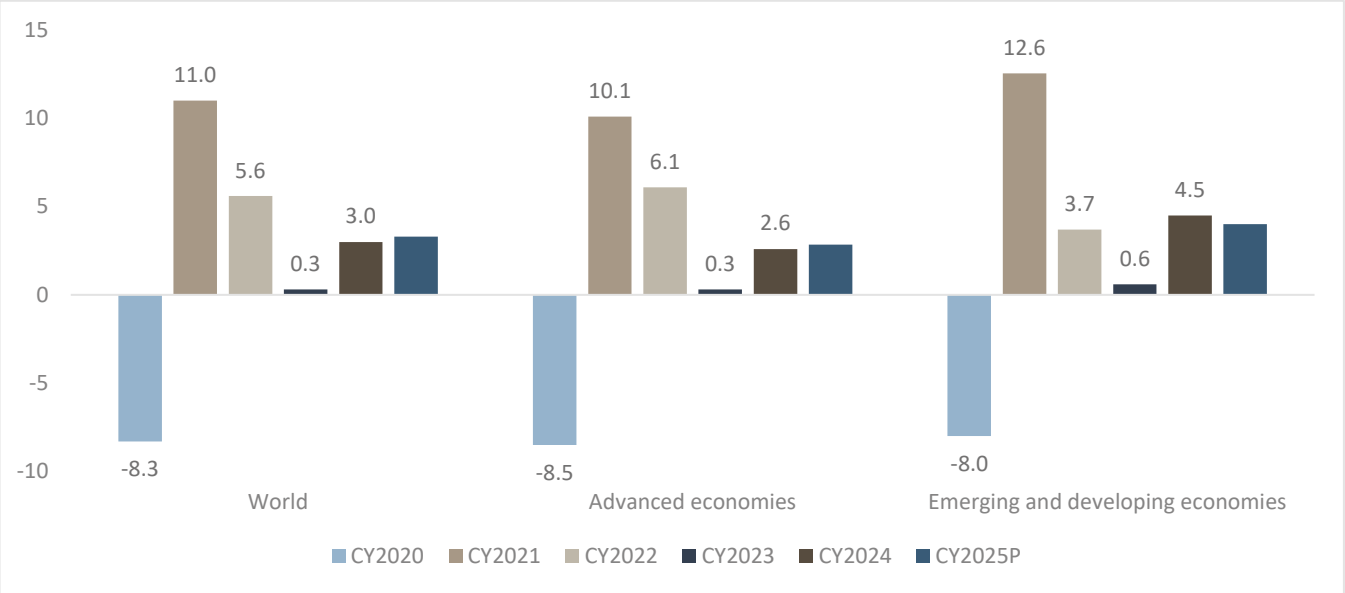
The value of global merchandise trade has continuously declined since mid-2022. The decline in 2023 was primarily because of lower demand in developed countries and subdued trade in East Asia and Latin America. Lower commodity prices further contributed to lowering the value of international trade during the year.

In contrast, trade in services has sustained growth throughout most of the period. Among services, tourism and travel related services rebounded strongly.

In volume terms, trade was modest through 2023. The slightly positive trend in the volume suggests resilient global demand for imported products. A weak US dollar also supported global trade volume in 2023.

However, on-quarter merchandise as well as services trade have stabilised. In 2024, global trade is projected to grow 3.3% on account of overall moderating global inflation and sustained growth of economies. That said, persistent geopolitical uncertainties and rising shipping costs, and high levels of debt weighing on economic activity in many countries may negatively impact further improvement in global trade.

**IMF world trade growth projection**




Advanced economies – US, Japan, Euro area; emerging market and developing economies – China, India, Russia, Brazil, Mexico, South Africa
Note: Average annual % change of export and import trade in goods and services has been considered
*Source: IMF (World Economic Outlook – April 2024 update), CRISIL MI&A*

## Key events and their impact on global trade

### Uncertainty in the Middle East

In the past few months, global trade has been affected by geopolitical uncertainty in the Middle East, leading to an increase in delivery times, and, thereby, disrupting supply chains. Also, a severe drought in the region of the Panama Canal has forced authorities to impose restrictions that have substantially reduced daily ship crossings, slowing down maritime trade through this key conduit, which typically accounts for 5% of global maritime trade. In the first two months of 2024, trade through the Suez Canal fell 50% from a year earlier and trade through the Panama Canal fell 32%.

### Commodity price spikes amid geopolitical and weather shocks

The geopolitical uncertainty in the Middle East region, which accounts for ~35% of the world's crude oil exports and 14% of natural gas exports, could affect a wider region in case of further uncertainty. Geopolitical uncertainties in Europe are also leading to fresh supply shocks, with food, energy and transportation costs spiking. In fact, container freight cost increased sharply between October 2023 and January 2024. Geoeconomic fragmentation could also constrain cross-border flow of commodities, causing additional price volatility. Extreme weather shocks, including floods and droughts, may lead to an increase in food prices as well, putting risk to global disinflation.

Tighter monetary policies

A slower-than-expected decline in core inflation in major economies, owing to persistent labour market tightness and supply chain disruptions, could impact interest rates and asset prices, thereby increasing financial stability risks, tighten global financial conditions, and strengthen the US dollar, with adverse consequence for trade and growth.

Key global central banks raised rates in quick succession in 2023, as several advanced economies confronted elevated inflation.

In the current cycle, the Fed and the Bank of England have each raised rates by 525 bps, while the European Central Bank has raised rates by 450 bps. In the past few months, however, these central banks have held interest rates steady as inflation moves closer to the targets. To be sure, the Fed has indicated that it will cut rates by a cumulative 75 bps in 2024.

## Growth faltering in China

With a substantial share of several economies' exports absorbed by China, a weaker-than-expected economic recovery in China would have significant cross-border implications, especially for commodity exporters. Fixed investment has already weakened, indicating weakness in external demand. Unintended fiscal tightening in response to local government financing constraints is also possible, which will reduce household consumption as well. Risks to the outlook also include ongoing weakness in the Chinese real estate market, which could pose a larger-than-expected drag on growth and potentially lead to financial stability risks.

## India-US trade

The US had communicated in August 2021 to India that it was not interested in a free trade agreement (FTA). India was pulled out of the US's Generalised System of Preferences that granted some tariff relief to its exports in 2019.

The government will now have to work on market access issues on both sides, lowering of non-tariff barriers, entering into mutual recognition pacts and adopting common quality standards, which could help Indian exports in the interim. There is even the possibility of providing domestic access to US agricultural products or easing import duties on automobiles, etc.

That said, the strong momentum in the India-US trade in goods and services has continued, with trade likely to have surpassed $200 billion in 2023 despite the challenging global trade environment. This is almost doubled the level in 2014, showcasing the benefits to both countries, highlighted in the latest India-United States Trade Policy Forum in January 2024.

Beyond trade, India and the US have strong ties in various policy areas. The countries regularly collaborate on initiatives such as the Indo-Pacific Economic Framework for Prosperity (IPEF). The two nations have also resolved seven disputes at the World Trade Organization (WTO), underlining deepening cooperation.

## Trade deficit narrows

The global economy is set to broadly expand at a steady pace in 2024. As per the IMF's World Economic Outlook January 2024 projection, the global economy will grow 3.3% in 2024 and 3.6% for 2025.

In 2023, major economies saw a downturn in merchandise trade, with Russia the notable exception, which saw imports rise 6%. However, this increase could be because of currency fluctuation on a very low base of 2022. In fact, Russian exports sharply declined during the year, largely tied to the energy markets. On the other hand, Brazil and the EU eked out growth.

On-quarter data, though, indicates a return to growth in some major economies, including China and India. Overall, a comparison of annual and quarterly trajectories suggest significant improvement in trends for several economies; however, at an overall level, the data still pointed to a negative for 2023.

The decline in global trade was more pronounced for developing countries. In 2023, imports and exports of developing countries declined 5% and 7%, respectively. Conversely, imports in developed countries decreased ~4% and in exports, 3%. On-quarter figures, though, indicated a positive trend for developing countries, while trade of developed countries remained stable.

Region-wise, South-South trade (developing countries, excluding East Asia) posted stronger-than-average on-year decline during much of 2023, with a reversal in the fourth quarter. In fact, on-quarter as well, trade in the fourth quarter rose ~3%.

Trade in most regions declined on-year in 2023, though. The exception was a significant increase in intra-regional trade for the African region. Also, the region comprising Russia and Central Asian economies registered sharp decrease in exports, but strong increase in imports. Trade in East Asian exhibited notable weakness as well, as was the case with intra-regional trade. Trade also was weak in Latin America during the last quarter and in the region comprising Russia and the Central Asian economies.

Conversely, trade grew for Africa and East Asia.

## WTO negotiation: India secures multilateral victory

By January 2023, a total of 61 WTO members that were participating in the Joint Statement Initiative on Service Domestic Regulation had submitted requests for certification of their updated General Agreement on Trade in Services (GATS).

India, along with South Africa, has achieved a breakthrough in WTO negotiations on domestic service regulations. After objections to certification requests for updated GATS, India withdrew objections following consultations. India emphasised adherence to multilateral processes, ensuring non-discrimination principles.

India’s key objective was reiterated during meeting and outlined in the revised certification requests of the WTO member involved. Working Party on Domestic Regulations agreed on the course of action for those WTO members aiming to include regulations on domestic matters in their GATS schedules as additional commitments. This outcome addressing a topic mandated by multiple parties within multilateral forum, reaffirmed India’s commitment to preserving the multilateral nature of WTO.

## Regional Comprehensive Economic Partnership

The Regional Comprehensive Economic Partnership (RCEP) is a multilateral FTA between Australia, China, Japan, New Zealand, South Korea and member states of the Association of Southeast Asian Nations (ASEAN, comprising Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam). The 15 countries account for ~30% of the world’s population and nearly 30% of global GDP.

To be sure, RCEP is the world’s largest FTA by members’ GDP.

RCEP countries have agreed to progressively abolish 90% of all tariffs on goods between participating members. The agreement also simplifies customs procedures and rules of origin laws between countries. Rules of origin restrictions generally tend to constrain the development of regional supply chains, which means the new provision will reduce the potential regulatory friction for firms and countries in terms of trade.

On November 2019, India decided to opt out of RCEP. India has a trade deficit with 11 out of the 15 RCEP countries and the content of the RCEP deal did not provide protection for the Indian economy. India's reservations were related to tariff commitments, investments, electronic commerce, rules of origin and auto trigger mechanisms. Further, given the economic slowdown then, the Indian government faced tremendous pressure from different sections of the industry and political organisations to not join the RCEP. Various ministries such as agriculture, steel, chemical and MSME had also opposed the deal.

Joining the RCEP would have made India a part of the rule-making body of what was supposed to be the largest trade agreement in the world. The RCEP was also expected to push India to pursue much needed domestic reforms to make the manufacturing sector more competitive. India already had bilateral FTAs with ASEAN, South Korea, Japan and negotiations were underway with Australia and New Zealand. Also, the inclusion in the RCEP of China, with whom India had a trade deficit $54.7 billion in 2018 – that accounted for half of the country's total trade deficit – was a cause of concern for India.

# Overview of the Indian economy

## Review of GDP growth over fiscals 2019-2024 and Outlook for fiscals 2024-2029

India ranks as the world's 5$^{th}$ largest economy and is the fastest growing among major economies. The Indian economy logged 4.3% CAGR between fiscals 2019 and 2024. This was a sharp deceleration from a robust 6.7% CAGR between fiscals 2017 and 2019, which was driven by rising consumer aspiration, rapid urbanisation, the government's focus on infrastructure investment and growth of the domestic manufacturing sector. Economic growth was supported by benign crude oil prices, soft interest rates and low current account deficit. The Indian government also undertook key reforms and initiatives, such as implementation of the Goods and Services Tax (GST), Insolvency and Bankruptcy Code, Make in India, financial inclusion initiatives, and gradual opening of sectors such as retail, e-commerce, defence, railways, and insurance for foreign direct investments (FDIs).

A large part of the lower growth between fiscals 2018 and 2023 was because of the economy contracting 5.8% in fiscal 2021 owing to the fallout of Covid-19. The pandemic's impact was more pronounced on contact-sensitive services and social distancing norms-affected services such as entertainment, travel, and tourism, with many industries in the manufacturing sector also facing issues with shortage of raw materials/components as lockdown in various parts of the world upended supply chains.

Over the period, India's economic growth was led by services, followed by the industrial sector, while in part impacted by demonetisation, the non-banking financial company (NBFC) crisis, slower global economic growth, and the pandemic.

As lockdowns were gradually lifted, economic activity revived in the second half of fiscal 2021. After a steep contraction in the first half, owing to rising number of Covid-19 cases, GDP moved into positive territory towards the end of fiscal 2021. Subsequently, in fiscal 2022, India's real GDP grew 9.7% from the low base of fiscal 2021.

India's gross domestic product (GDP) exceeded expectations during first three quarters of fiscal 2024. According to the National Statistics Office's (NSO) second advance estimates (SAE), real GDP growth accelerated to 8.4% year-on-year in the third quarter of fiscal 2024 from 8.1% in the second quarter. Growth of the past two quarters were revised up (second quarter was revised to 8.1% from 7.6%, and first quarter to 8.2% from 7.8%)

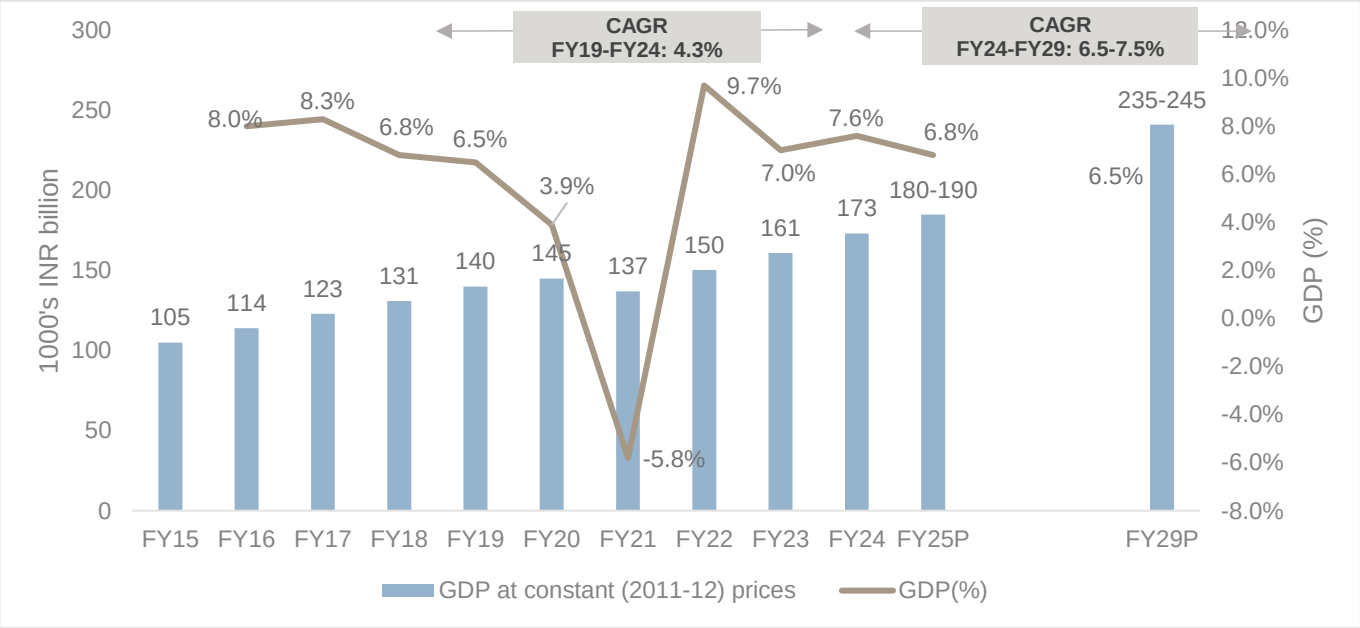
NSO now pegs GDP growth at 7.6% in fiscal 2024 compared with 7.3% as per the first advance estimates. Based on this second advance estimate, growth in the fourth quarter of this fiscal is estimated to slow to 5.9%. Additionally, the estimate for fiscal 2023 was revised to 7.0%, while for fiscal 2022 it was revised to 9.7%.

Growth surpassed forecasts in the second quarter of fiscal 2024, driven by strong government spending and a sharp rise in manufacturing and construction growth. Globally, growth in major economies such as the US and China beat estimates, contributing to better export earnings for India.

After a strong GDP estimate in the past three fiscals, CRISIL MI&A expects GDP growth to moderate to 6.8% in fiscal 2025. Fiscal consolidation will reduce the fiscal impulse to growth. Rising borrowing costs and increased regulatory measures could weigh on demand. Exports could be impacted due to uneven growth in key trade partners and any escalation of the Red Sea crisis. On the other hand, another spell of normal monsoon and easing inflation could revive rural demand.

Reducing the fiscal 2024 deficit will reduce the government's direct support for economic growth, but investing in high-quality spending could still boost investment and rural incomes. CRISIL MI&A anticipates a return to normal levels of indirect tax impact on GDP. However, uneven economic growth in major trade partners like the US and EU, along with escalating tensions in the Red Sea, may hinder exports.

**India’s GDP growth trend and outlook**




Note: P – projected

*Source: National Statistical Office (NSO), International Monetary Fund (IMF), CRISIL MI&A Consulting estimates*

In the third quarter of fiscal 24, fixed investments posted year-on-year growth of 10.6% while private consumption (3.5%), despite a modest uptick, remained sluggish. The drag from net exports eased in the third quarter. From the supply side, growth was highest for manufacturing (11.6%), followed by construction (9.5%) and services (7.0%), while growth in agriculture contracted in the third quarter (-0.8%).

Similarly, growth in the fiscal year 2024 till Q3 has been driven by fixed investments (10.2% growth), while private consumption at 3.0% trailed overall GDP growth. On the supply side, industry grew the most (9%), followed by services (7.5%), while agriculture (0.7%) lagged.

## Near-term review and outlook on GDP

India transition to the world’s fifth largest economy and fastest growing among major economies has been on the back of services, industry and agriculture sectors firing.

## Services sector key growth driver

In fiscal 2020, the services sector accounted for 55.3% share of India's GDP vs 52.4% in fiscal 2015. However, in fiscal 2021, its share had dipped to 53.6%, owing to the onset of the pandemic, with marginal improvement in fiscal 2022 following gradual normalisation of market operations.

The industrial sector, which logged a 7.1% CAGR between fiscals 2015 and 2019, was the second-largest contributor, at ~31% share of GDP. As was the case with services, the contribution of industrial declined in GDP declined in fiscal 2021 as well, with slowdown in economic growth. Before the slowdown in overall economic activity in the fiscal, India's industrial sector output growth was supported by the government's Make in India initiative, rising domestic consumption and implementation of GST. The initiatives improved India's position on the World Bank's Ease of Doing Business index to 63 in fiscal 2019 from 142 in fiscal 2014.

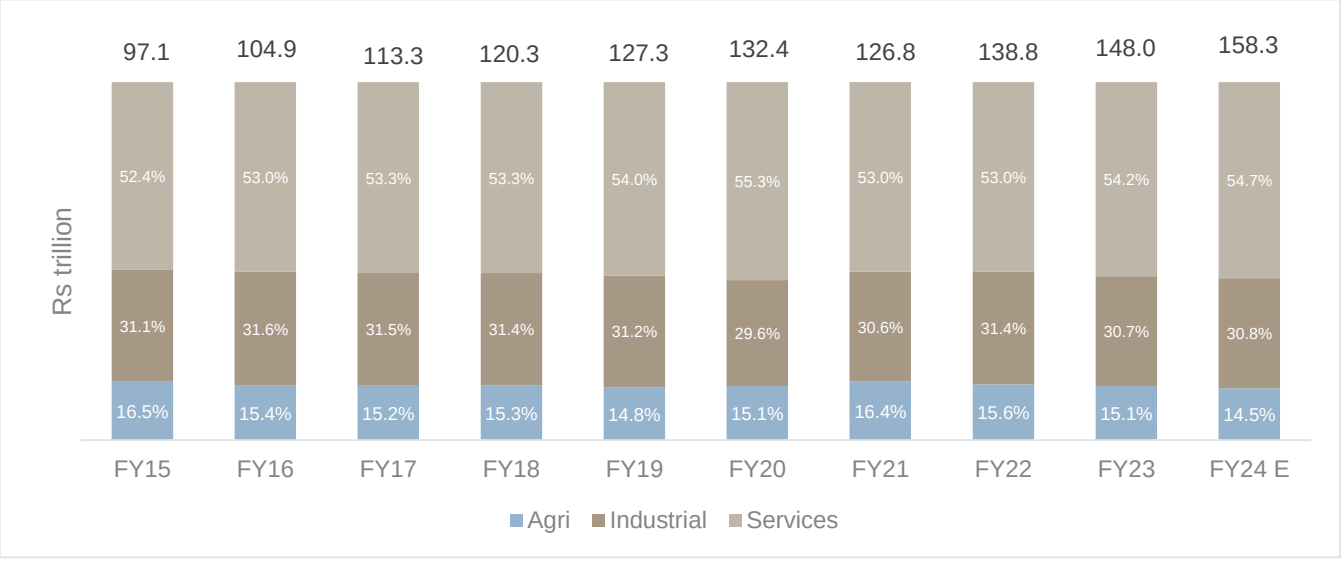
To be sure, the pandemic and subsequent lockdown exacerbated the economic slowdown in fiscal 2021, with the services segment the worst affected, declining 8.2% on-year, mainly because of decline in trade, hotels, transport and communication services (THTC) by 19.7% as well as decline in public administration, defence and other services by 7.6%. The industrial sector followed, declining 0.9% on-year. Agriculture was the only sector that grew 4.1% on-year, thereby restricting a further contraction in GDP.

In fact, during the fiscal, the agriculture sector's share in GVA at constant prices expanded, while the share of the services and industrial sectors contracted.

In fiscal 2022, agriculture GVA rose 3.5% and the industrial sector, 12.0%, on a low base of fiscal 2021, whereas the service sector grew 8.8%. This primarily supported a 9.7% rise in GDP.

In fiscal 2023, agriculture GVA continued to grow at a steady 4.0%, thereby its share in GDP continued to expand. The share of industrial sector in GDP also rose 4.0% on a high base, mainly because of utility services, which rose the sharpest among the industrial components, by 8.0%. Other growth segments were mining (grew 5.0%) and manufacturing and construction (grew marginally). The services sector grew 9% in fiscal 2023. Trade, hotels, transport, and communication services (THTC) saw strong on-year growth of 14% in fiscal 2023.

**Share of sector in GVA at constant prices**




E – estimated

*Source: RBI; CRISIL MI&A Consulting*

In fiscal 2024, the agri sector is estimated to have expanded ~0.7% on-year, thereby contributing to 14.4% of the GVA. The services sector, though, is expected to remain the economy’s engine, growing 7.5%, with its share in GVA at 54.7%, whereas industry will maintain a 30.8% share.

In fact, services growth picked up (7.0% in the third quarter vs 6.0% in the second quarter). Within the space, growth in THTC accelerated (6.7% vs 4.5%), spurred by the festive season. Financial, real estate and professional services also picked up 7.0% from 6.2%, supported by an acceleration in services export growth (5.5% vs 4.6%) and favourable base effect. Financial services benefited as well from healthy credit momentum. And public administration, defence and other services grew 7.5% vs 7.7%.

Meanwhile, agriculture and allied GVA contracted 0.8% in the third quarter of last fiscal (compared with 1.6% growth in the second quarter). While partly the result of a highly unfavourable base, it was also because of a fall in kharif output as per the government's second advance estimates. Hence, owing to the higher growth in services, CRISIL estimates that the contribution of the agri sector to have lost ground.

## Manufacturing leads growth in third quarter of fiscal 2024

Among the major producing sectors, the highest growth in the third quarter of fiscal 2024 was manufacturing, at 11.6% on-year, though the rate of increase was a moderation from 14.4% growth in the previous quarter. Construction GVA grew at a healthy pace despite some slowdown (9.5% vs 13.5%) and was supported by continued government capital expenditure (capex) in infrastructure.

## Real GDP growth over fiscals 2024 to 2029

For the fiscal 2025, India's gross domestic product (GDP) growth is expected to moderate to 6.8% after a better-than-expected 7.6% expansion in fiscal 2024, given that high interest rates and lower fiscal impulse (from reduction in fiscal deficit to 5.1% of GDP) would temper demand and the net tax impact would normalize.

Additionally, uneven economic growth of key trading partners and escalation of geopolitical uncertainties can lower exports. But there will be support from other areas. Continued disinflation will prop up the purchasing power of consumers. Healthy rabi sowing and good kharif output (assuming another spell of normal monsoon is ahead) will bolster agricultural incomes. Further, a gradual pick-up in private capital expenditure (capex) will make investment growth more broad-based. The government has also provided budgetary support to rural incomes and infrastructure spending.

The lowering of fiscal deficit will mean curtailed fiscal impulse to growth, but good quality of spending would provide some support to the investment cycle and rural incomes. CRISIL also expects a normalisation of the net indirect tax impact on GDP witnessed in the current fiscal. Uneven economic growth in key trade partners such as the United States (US) and the European Union, and an escalation of the ongoing Red Sea tensions can act as drag on exports.

## Risks to growth

### Weak monsoon

Rainfall in the country during June to September 2023 was 94% of the long period average (LPA). To be sure, deficient rainfall has a significant impact on the rural demand.

### Inflation pressure

Inflation data released in April 2024 showed Consumer Price Index (CPI) inflation eased to a 5-month low of 4.9% in March from 5.1% in February. While core inflation declined to a record low of 3.3%, fuel inflation declined to

3.2% on the back of lower domestic fuel prices. The worry, though, remains on persistently high food inflation, at 8.5%.

**External drag on growth**

Global growth is likely to slow down this year because of higher interest rates. Central banks in key advanced economies have maintained policy interest rates in their latest meetings. However, improving inflation outlook will allow the RBI to initiate rate cuts in fiscal 2025. Geopolitical uncertainty, though, will continue to disrupt global trade.

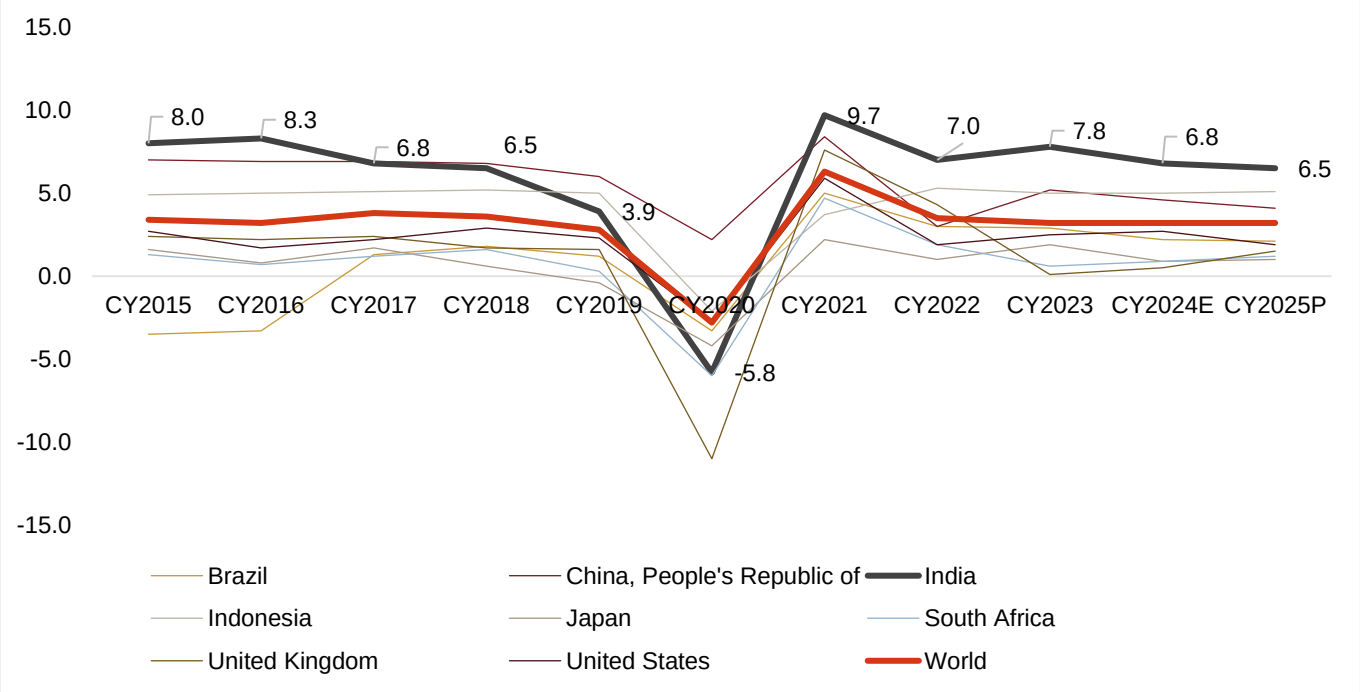
**Impact of higher interest rates**

The transmission of past rate hikes by the RBI's Monetary Policy Committee (MPC) is still playing out amid tight liquidity conditions, which suggests a further rise in market lending rates in the near term. This will moderate domestic demand. The RBI's move to increase the risk weights on consumer credit exposure of banks and NBFCs is also expected to mildly affect overall credit growth this fiscal.

**India to remain a global outperformer**

Despite slowdown in the near term, India's economy is expected to outperform over the medium run. CRISIL MI&A expects GDP growth to average 6.8% between fiscals 2025 and 2029 vs 3.2% globally, as estimated by the IMF.

**India is one of the fastest growing economies (GDP growth, % year-on-year)**




E – estimated; P – projected

Note: GDP growth based on constant prices

*Source: IMF (World Economic Outlook – April 2024 update), CRISIL MI&A Consulting*

**Drivers for India's economic growth**

Capital will continue to be the biggest contributor to growth. However, as the government pursues fiscal consolidation, its role in boosting overall capex will partly diminish compared with the past few years.

Also, strong domestic demand is expected to drive India’s growth over peer economies in the medium term.

Investment prospects are optimistic, given the government’s capex push, progress of the Production Linked Incentive (PLI) scheme, healthier corporate balance sheets, and a well-capitalised banking sector with low non-performing assets.

India is also likely to benefit from its diversification of the supply chain for incoming FDI flows, as global supply chains get reconfigured with focus shifting from efficiency towards resilience and friend shoring.

Further, rising employment and notable increase in private consumption, buoyed by growing consumer confidence, are poised to drive GDP growth in the coming months.

The government's future capex is expected to be supported by tax buoyancy, simplified tax structures with lower rates, reassessment of the tariff structures and digitalisation of the tax filing process.

Medium-term growth is anticipated to be bolstered by increased capital spending on infrastructure and asset development projects, thereby translating into enhanced growth multipliers.

## Near-term review and outlook on inflation

Consumer price inflation (CPI) eased to a 5-month low of 4.9% in March 2024 from 5.1% in February 2024. While core inflation declined to a record low of 3.3%, fuel Inflation declined to 3.2% on the back of lower domestic fuel prices. The food inflation is high, at 8.5%. Higher cereals inflation, erratic vegetable inflation and elevated pulses inflation are a cause of concern given the India Meteorological Department's (IMD) prediction of higher-than-normal temperatures between April and June.

Although headline inflation eased to 5.4% on-year in fiscal 2024 from 6.7%, food inflation surged to 7.5% from an already high 6.6% in fiscal 2023. The March 2024 reading of 8.5% food inflation creates some disquiet given the prediction of higher-than-average temperatures over the next few months that can stress vegetable production and some of the rabi crop that is yet to be harvested. Beyond that, we expect food inflation to ease a tad on the back of the prediction of a favourable monsoon (above normal rains as per the IMD), some benefit from a high food inflation base and an expected season downturn in pulses inflation.

We expect non-food inflation to remain comfortable, supported by softness in consumer demand, a pass-through of the previous year’s oil price decline to domestic fuel (petrol and liquefied petroleum gas (LPG)) prices and an expectation of benign crude prices. Under these assumptions, we expect CPI inflation to average 4.5% in FY25. Intensification/persistence of geopolitical concerns and weather shocks, if any, pose an upside risk. Meanwhile, the government’s budget is slimmer, which means the fiscal impulse to growth is also leaner and, therefore, less inflationary. All these factors contribute to the favourable conditions for interest rate reductions during this fiscal year, provided that potential hindrances such as food inflation or geopolitical escalations do not intervene and defer this decision.

### Food inflation remains high

In March 2024, there was a slight softening in overall vegetable inflation to 28.3% from 30.2% in February 2024. However, specific vegetables like onions and potatoes saw increased inflation, while tomato inflation decreased but remained high. Excluding tomatoes, onions, and potatoes, vegetable inflation decreased to 24.4% in March 2024 from 34% in February 2024, mainly due to cooling inflation in garlic, brinjal, and lady’s finger.

Foodgrain inflation inched up to 10.2% in March from 9.8% in February 2024, with cereals inflation rising to 8.4% in March 2024 vs 7.7% in February 2024. Wheat inflation (from non-Public Distribution System (PDS) sources)

accelerated to 4.7% in March from 2% in February 2024 partly due to an adverse base. Rice inflation, on the other hand, inched down to 12.7% in March from February's 12.9%.

However, easing pulses inflation to 17.7% in March from 18.9% in February 2024, capped the rise in foodgrains inflation. Among pulses, inflation eased in arhar upto 33.5% in March vs 36.8% in February and moong to 11.5% in March from 12% in February. Inflation in meat and fish accelerated for the second straight month to 6.4% in March from 5.2% in February driven by chicken which increased to 8.5% in March which was 5.6% in February 2024 and fish and prawn to 6.6% in March from 6.1% in February. The pace of deflation in edible oils slowed significantly. Prices declined 11.7% on-year compared with 14% in the February month. Spices inflation moderated for the seventh straight month to 11.4% in March 2024 from 13.5% in February. Inflation in sugar eased for the first time in over a year to 7.3% in March from 7.5% in February 2024.

**Fuel inflation falls further**

Fuel prices fell 3.2% year-on-year in March 2024 compared with a 0.8% decline in the previous month, remaining negative for the seventh straight month. LPG prices fell by a sharper 22.3% in March year-on-year compared with a 13.3% decline in February. This was due to the central government cutting prices since March. Inflation remained unchanged in electricity, at 10.4%, for the third consecutive month. Inflation picked up in PDS kerosene to -7.4% in March from -11.2% in February 2024 and Inflation in fire and woodchips increases to 3.2% in March 2024 from February's 3%.

**Core inflation eases to a record low**

Core inflation inched down to a record low of 3.3% in March 2024 from 3.4% the previous month. Inflation eased in the essential categories of education to 4.7% from 4.8%, in health to 4.3% in March from 4.5% in February, and in housing to 2.8% in March as compared to 2.9% in February. On the other hand, inflation picked up in personal care and effects to 6% in March from 5.2% in February, led by rising gold prices to 12.9% in March as compared to 10.2% in previous month. There was a slight uptick in recreation and amusement inflation to 2.8% in March vs 2.7% in February. Core goods eased to 2% in March from 2.5% in February, while services inflation remained unchanged at 3.3%.

**WPI inflation rises**

Wholesale Price Index (WPI)-linked inflation increased to 0.5% in March from 0.2% in February, mainly due to a rise in food inflation. Food inflation rose to 4.6% in March from 4.1% in February, driven by higher prices of cereals (9.0% vs 6.6%), which more than offset the decrease in pulse prices (17.2% vs 18.5%). This resulted in an uptick in foodgrain inflation to 10.5% in March from 8.7% in February. Vegetable inflation remained largely unchanged at 19.5% in March compared to 19.8% in the previous month. Crude oil inflation decreased to 10.3% in March from 16.7% in the previous month. The rate of deflation in fuel and power slowed to -0.8% in March from -1.6% in February, influenced by increasing inflation in electricity (6.4% vs 3.5%), coal (0.5% vs 0.3%), and mineral oils (-3.5% vs -3.8%). Inflation on manufactured products rose to -0.8% in March from -1.3% in the previous month. Furthermore, the pace of deflation eased in basic metals (-5.3% vs -5.7%), chemicals (-4.6% vs -5.2%), and textiles (-1.7% vs -1.9%). Inflation in machinery and equipment remained unchanged at 1.6%.

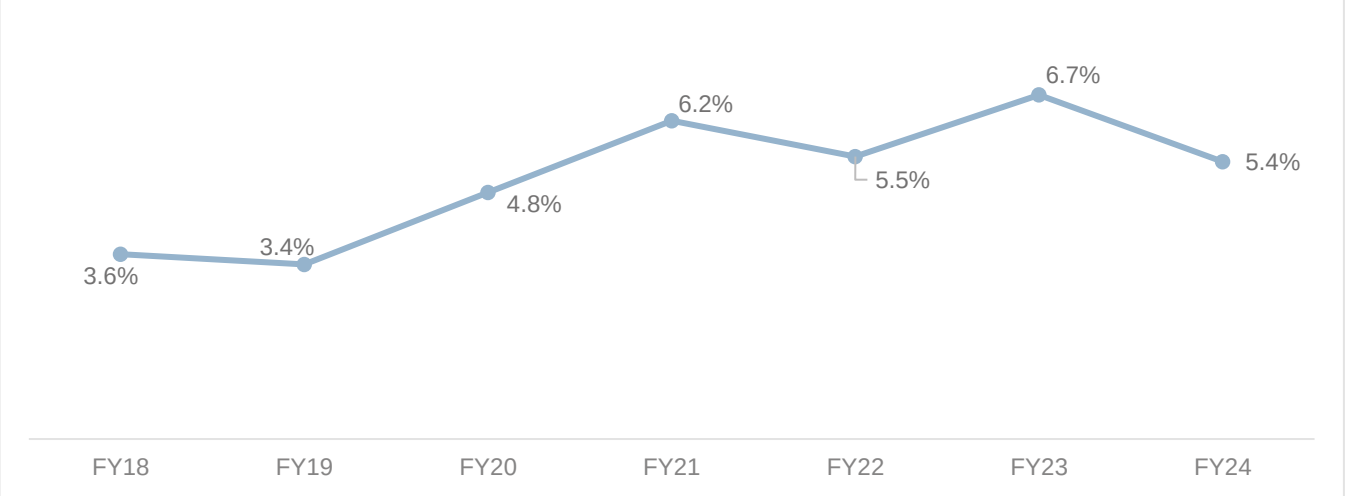
**Outlook on inflation**

While headline Consumer Price Inflation (CPI) eased to 5.4% year-on-year in fiscal 2024 from 6.7%, food inflation surged to 7.5% from a high of 6.6% in fiscal 2023. The March 2024 reading of 8.5% food inflation raises concerns, particularly with the prediction of higher-than-average temperatures in the coming months, which could strain vegetable production and some yet-to-be-harvested rabi crops. Looking ahead, we anticipate a slight easing in food inflation, driven by favorable monsoon predictions (above-normal rains according to the IMD), some relief from a high base of food inflation, and an expected seasonal decline in pulses inflation.

We anticipate non-food inflation to remain manageable, supported by subdued consumer demand, the impact of previous year's oil price declines on domestic fuel prices (petrol and LPG), and expectations of stable crude prices.

Based on these assumptions, we project CPI inflation to average 4.5% this fiscal year. However, intensification or persistence of geopolitical tensions and weather-related shocks pose an upside risk to this forecast. Moreover, with a leaner government budget, the fiscal impulse to growth is diminished, which could alleviate inflationary pressures. These factors create a conducive environment for potential rate cuts this fiscal year, unless challenges such as food inflation or geopolitical tensions intervene and delay such decisions. Hence, CRISIL expects CPI inflation to average 4.5% in fiscal 2025 against an estimated 5.4% in fiscal 2024.

**CPI trendline**




*Source: Ministry of Statistics and Programme Implementation (MOSPI), CRISIL MI&A Consulting*

Cooling domestic demand, assumption of a normal monsoon along with a high base for food inflation should help moderate inflation this fiscal. A non-inflationary Interim Budget 2024-25 that has focused on asset creation rather than direct cash support also bodes well for core inflation. However, an unusual weather event could reverse the easing. Similarly, recent geopolitical uncertainties in the Middle East and a fading low base effect for commodity prices could put some upside pressure on core inflation, and would, therefore, need monitoring.

Nevertheless, we believe slowing inflation, a smaller fiscal deficit and an imminent turn in the Fed's policy rates will lay the ground for the RBI's MPC to start cutting rates. However, we believe more clarity on the path of disinflation could push this decision at least to June 2024, if not later. While CPI inflation has remained in the RBI's tolerance band of 2-6% since August, it is still shy of the 4% target, thereby keeping the MPC on guard.

## Factors having direct bearing on auto demand

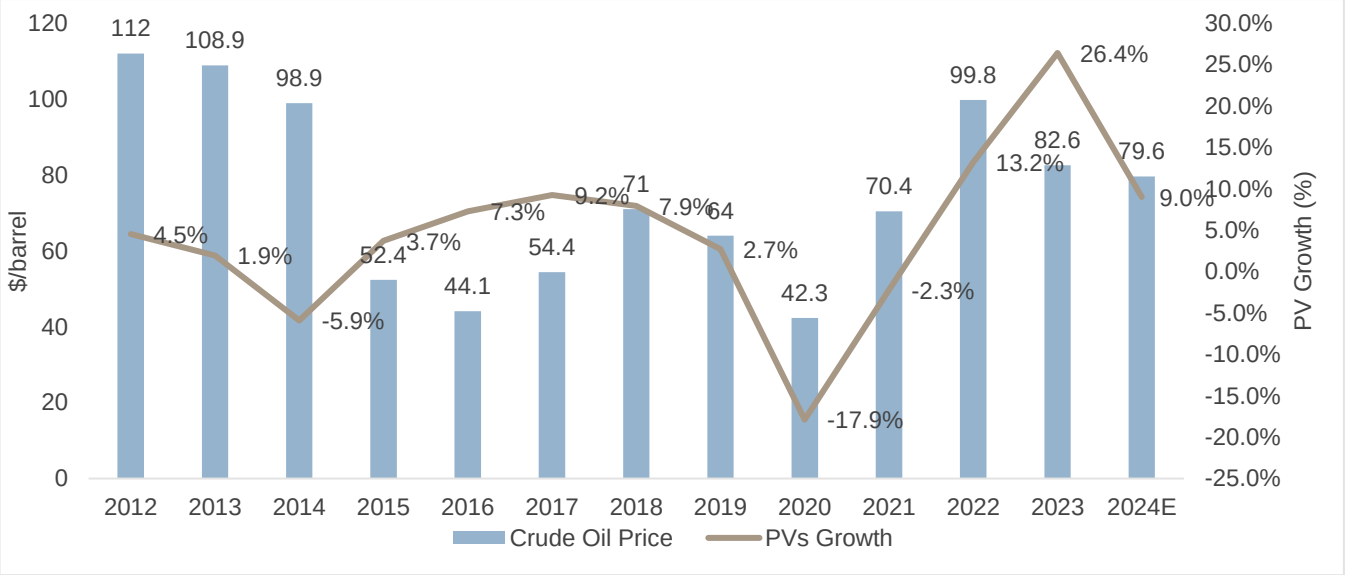
Fluctuations in crude oil prices and the rupee-dollar exchange rate directly affect automobile demand as these two factors increase fuel costs and import costs, respectively. Also, monsoons, which have a direct bearing on crop yields and food prices, in turn, impact auto demand as it shapes consumer spending behaviour and economic trajectory. Auto finance rates are pivotal in determining affordability. Moreover, private final consumption expenditure (PFCE) and per capita income provide a lens into consumer purchasing power, influencing affordability and, thereby, automobile demand.

### Elevated recessionary fears to impact crude oil prices

Crude oil prices have largely risen since end-2021 by ~24% till fiscal 2024. Prices rose further following geopolitical uncertainty in Europe, with prices averaging $100 per barrel (bbl) in 2022. In fact, prices rose to $106 per bbl in the first half of 2022 as the geopolitical uncertainty resulted in a significant shift in the crude oil supply chain. However, increasing recessionary fears stemming from elevated inflation, along with interest rate hikes globally, considerably affected consumption and economic growth, dragging crude oil prices towards $94 per bbl, or a decline of 11%, in the second half of 2022. In 2023, with the rebalancing in global crude oil trade, prices slipped to $82.6 per bbl.

In 2024, CRISIL MI&A Consulting expects prices to remain range-bound at $75-80 per bbl. However, any decision by OPEC to cut production as well as a further decision on a ban of Russian crude oil are key factors to be monitored.

**Crude oil price and passenger vehicle trend**




E – estimated

Notes:

1) Price data is for calendar yea

2) PVs Growth is for Financial Year and For FY24 the growth rate is based on actual number.

*Source: Industry, CRISIL MI&A Consulting*

In 2022, global crude oil supply rose a healthy 4 million barrels per day (mbpd), reaching 94 mbpd. Incremental growth in supply was driven by the US, Saudi Arabia, the UAE and Iraq, accounting for ~80% share. Crude oil supply, though, continued to be impacted in certain regions. Production-led challenges in Norway, Libya and Nigeria led to a 10% decline in output during the year. Supply chain and gas leak issues in Kazakhstan resulted in muted output from the country as well.

In 2023, ramping up of newer fields in Norway and increased production in North America led to healthy supply of crude oil. Higher drilling activities, along with lower logistical issues from the Permian Basin and Eagle Ford Basin, resulted in healthy supply growth in the US. However, incremental production cuts by OPEC and Russia continued to impact global crude oil supply during the year.

To be sure, rising crude oil prices typically lead to higher fuel costs, directing customer preference towards more fuel-effective vehicles. Increased production cost for automakers and potential shift in consumer spending due to inflation and economic conditions further influence automotive demand.

That said, certain factors will dictate long-term crude oil demand, such as slowing global GDP growth, structural changes, aggressive push towards electric vehicles (EVs), significant increase in vehicle efficiencies, and an ageing population, which has the propensity to consume less crude oil-based products and services, thereby translating into likely weakening in automobile demand.

**Rupee-dollar exchange rate in 2024**

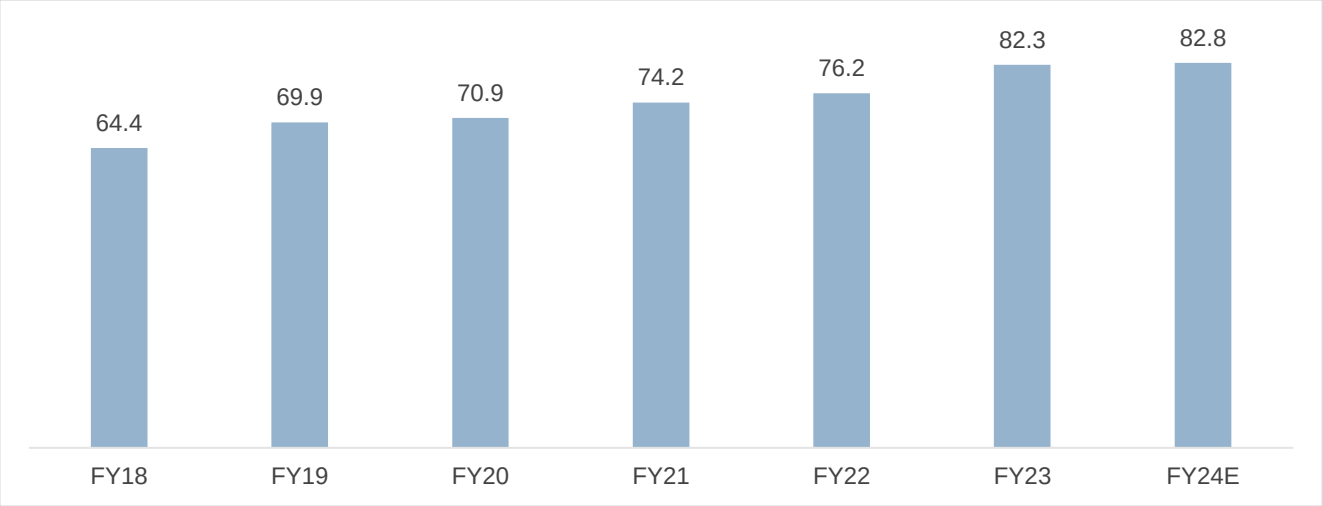
The rupee appreciated slightly against the dollar in February 2024, to Rs 82.96/$, from Rs 83.12/$ in January 2024 on strong capital inflows. This was despite the dollar index strengthening and India’s trade deficit widening. In fact, on a monthly average basis, the rupee appreciated 0.2% compared with January.

The rupee remained one of the better-performing emerging market currencies in the first two months of 2024. The on-year rate of depreciation was also lower at 0.4% on average during the two months.

CRISIL expects the rupee to average to Rs 83.5/$ by March 2025 compared with ~Rs 83/$ in fiscal 2024. While a narrower current account deficit is expected to support the local currency, volatile external financing conditions could exert some pressure.

As mentioned, the rupee-dollar exchange rate impacts auto demand as it affects import costs. A weaker rupee raises input costs and fuel prices, which reduces domestic demand while enhancing export competitiveness. While increase in fuel prices directly impacts the consumer demand, rise in input costs may not always have a direct impact, as original equipment manufacturers do not always pass these costs to consumers. Any price increase that is passed on by OEMs directly affects the consumer's purchasing decision, though.

**Rupee-dollar exchange rate**



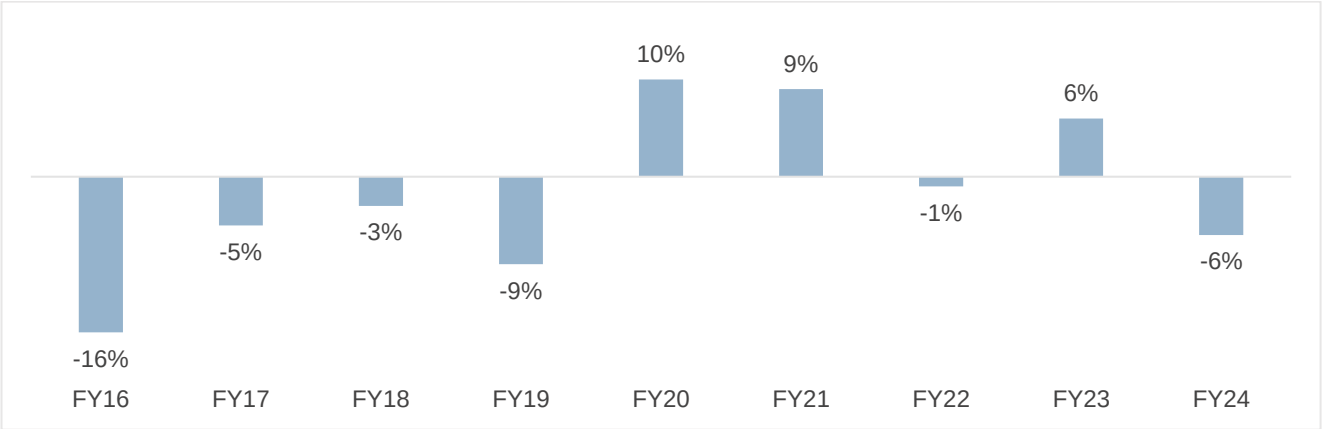

*E – estimated*
*Source: RBI, CRISIL MI&A Consulting*

**Agri variables**

Small and marginal farmers dominate the Indian agricultural landscape, comprising 86% share of land holdings. These farmers rely on the monsoon for irrigation; hence, its timely arrival and adequacy are needed for a good crop. Any negative impact on crop supply owing to low rainfall has a cascading effect on the Indian economy, as it leads to higher food prices and subsequently lower discretionary spending.

Monsoon has been favourable over the past few years with deviation in the acceptable range; As per the India Meteorological Department (IMD), monsoon deviation was 6% in fiscal 2023. However, fiscal 2024 witnessed an uneven spread of rainfall during the initial months. But rabi output was favourable, supporting farmer income during the early months of fiscal 2024. Also, while kharif sowing was initially delayed owing to a delay in arrival and spread of the monsoon, sowing picked up thereafter. Moreover, higher minimum support price (MSP) in the fiscal and good prices at the mandis maintained on-ground positivity.

**Rainfall deviation trend**



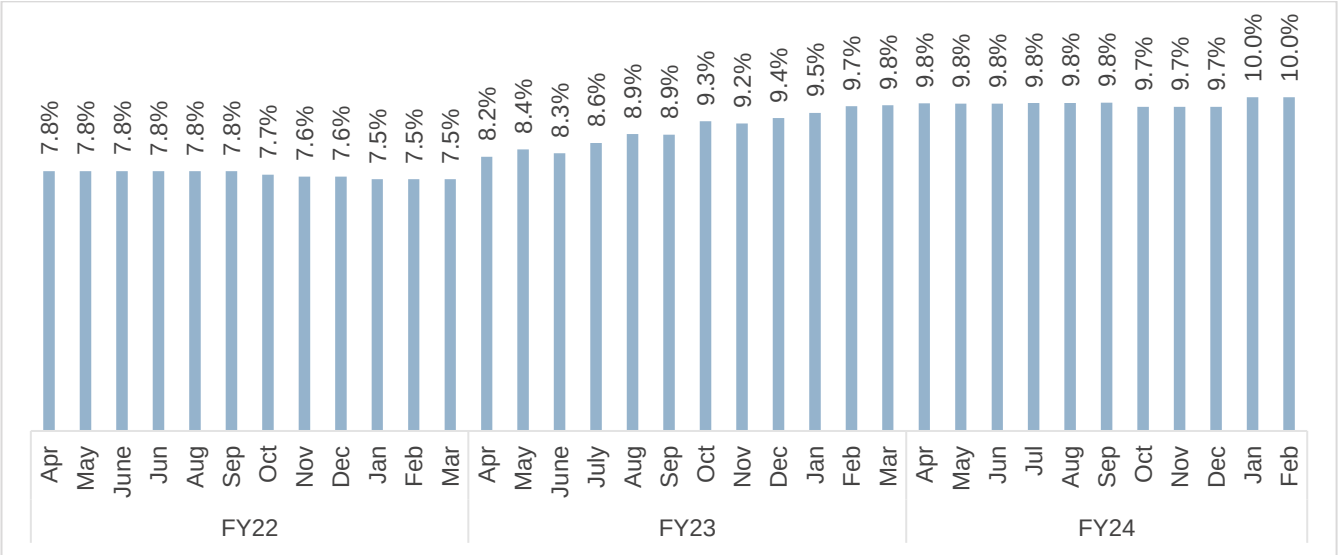

*Note: When rainfall average across the country is within ±10% from its long period average (LPA) or 90-110% of LPA, the rainfall is considered "normal". The LPA for June-September was 868.6mm.*

*Source: IMD, CRISIL MI&A Consulting*

**Steep hike in auto finance rates**

The sharp rise in repo rates has increased financing rates across automobile segments. Equated monthly installments in the passenger vehicle (PV) segment is currently witnessing interest rates of nearly 10%. Interest rates have reached the pre-pandemic levels and are expected to remain firm in the short term. Demand for cars- durable goods most often purchased on credit and higher interest rates makes auto loans more expensive, impacting the purchasing decisions of customers.

**Average auto finance rates offered by banks**



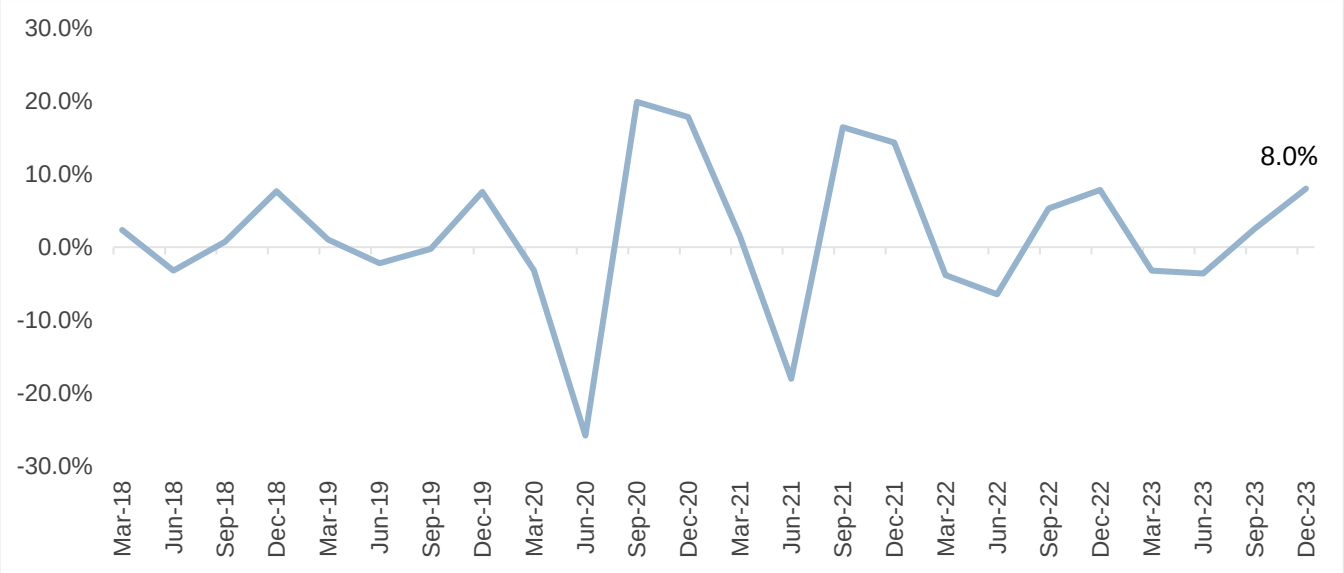

*Source: Industry, CRISIL MI&A*

**Private consumption remains tepid**

Private final consumption expenditure (PFCE) reflects overall consumption patterns and spending capacity of households within an economy. When PFCE increases, it often translates to higher demand for various goods and services.

PFCE remained sluggish, though rising to 3.5% on-year in the third quarter of fiscal 2024 compared with 2.4% in the previous quarter. Rural demand indicators were mixed, with demand for work under Mahatma Gandhi National Rural Employment Guarantee Act (NREGA) slowing in the quarter while sales of two-wheelers surged. However, growth in consumer non-durables, production slowed considerably in the third quarter. But urban demand appears to have sustained some momentum in the quarter, with pick-up in the growth of passenger vehicle sales and consumer durables production, as well as continued double-digit growth in retail credit (18.1% vs 18.3% in the previous quarter). The latter indicates that the impact of past rate hikes and regulations on unsecured lending are still pending.

**India's PFCE quarterly trend**




*Source: Industry, CRISIL MI&A Consulting*

**Per capita income**

Per capita income (per capita net national income) was estimated to have grown 6.8% in fiscal 2024 vs 5.7% in fiscal 2023. This is in contrast to fiscal 2021, wherein per capita income declined 8.9%, owing to GDP contraction amid the pandemic's impact. In fiscal 2022, per capita income rose 7.6% on a lower base of fiscal 2021.

According to the IMF's estimates, India's per capita income (at current prices) is expected to grow at 8.8% CAGR over 2023 to 2028.

Rising income levels signify economic growth, urbanisation and changing lifestyles. As per capita income increases so does the demand for cars in India increases. As per data from World Road Statistics 2023-International Road Federation, in fiscal 2022, there were 24 cars per 1,000 people in India and the per capita income was $2,390. In the case of China, cars per 1,000 people was 183 in in 2021 and the per capita was $11,930.

## Policies impacting automobile industry

### Improving infrastructure raises efficiencies in logistics

The government's capex push has been focused largely on transport-related sectors such as roads, railways and urban infrastructure. This is complemented with policies geared towards improving and integrating different segments of the logistics ecosystem. All these are expected to reduce bottlenecks and improve competitiveness of domestic production and trade via reduced logistics costs and improved connectivity.

**National Infrastructure Pipeline (NIP):** The government has set targets for infrastructure development between fiscals 2019 and 2025. CRISIL MI&A Consulting expects aggregate (government plus private) spending on infrastructure to double by 2030, i.e. from ~Rs 67 trillion over fiscals 2017-2023 to ~Rs 143 trillion during fiscals 2024-2030, driven by spends on core infrastructure, i.e. roads, railways, airports, ports, urban infrastructure, irrigation, warehouses and telecom.

**Vehicle Scrappage Policy:** The Vehicle Scrappage Policy 2021, is a government-funded programme to scrap old and unfit vehicles and replace them with modern and new vehicles on Indian roads. The primary goal of the policy is to create an ecosystem for phasing out unfit and polluting vehicles to achieve a lower carbon footprint in the country. It aims to de-register private cars over 20 years old and commercial vehicles over 15 years old.

Beginning April 1, 2023, fitness testing of Heavy Commercial Vehicles (HCVs) is conducted only through Automated Testing Stations (ATSs). For other types of Commercial Vehicles (CVs) and Private Vehicles (PVs), the fitness testing shall also be conducted through the ATS and begin on June 1, 2024. Commercial vehicles and private vehicles older than 15 and 20 years, respectively, shall be scrapped if they fail the fitness test. If a vehicle fails the fitness test, it shall be defined as an ELV (End-of-Life Vehicle)

The objective of the government-funded programme is to phase out old passenger and commercial vehicles and thereby reduce urban air pollution, increase passenger and road safety, and stimulate vehicle sales

**PM Gati Shakti - National Master Plan for Multi-modal Connectivity**: The multi-modal connectivity plan was unveiled in October 2021, with an objective of reducing logistics costs by coordinating the infrastructure creation activity of different government entities. The key characteristics of the scheme are:

- Digital platform for coordination across 16 ministries, including roadways and railways
- The Gati Shakti platform will subsume the infrastructure projects announced under NIP (valued at Rs 111 trillion)
- Existing infrastructure schemes across ministries such as Bharatmala (roads), Sagarmala (ports), UDAN (air), inland waterways, dry ports, etc will be incorporated in the platform
- The platform will also provide spatial data and implementation status for different projects
- Eleven industrial corridors and two defence corridors are also planned under the scheme, covering clusters for textile, pharmaceutical, fishing, electronics, agriculture, etc

Key targets set for different heads under the scheme are:

- Ports: Capacity of the major ports to be increased from 1,282 million tonne in fiscal 2020 to 1,759 million tonne in fiscal 2025
- National waterways: Cargo movement to be ramped from 74 million tonne in fiscal 2020 to 95 million tonne in fiscal 2025
- Railways: Target of 1,600 million tonne by fiscal 2025 vis-à-vis 1,210 million tonne in fiscal 2020
- MMLPs: The Indian Railways will set up 500 multimodal cargo terminals by fiscal 2025
- Others: Gas pipeline length to be doubled from 17,000 km to 34,500 km within the country, incremental renewable capacity of ~150 GW, power line capacity target of ~452,000 circuit km by fiscal 2025

An integrated platform to monitor the progress of projects and logistics initiatives by different ministries will aid in increasing coordination and planning infrastructure creation and connectivity.

**National Logistics Policy (NLP):** Launched in September 2022 to complement PM GatiShakti National Master Plan (NMP), NLP addresses the soft infrastructure and logistics sector development aspect, including process reforms, improvement in logistics services, digitisation, human resource development and skilling. NLP aims to: (i) reduce the

cost of logistics in India, (ii) improve the Logistics Performance Index ranking – to be among top 25 countries by 2030 (India was ranked 38 out of 139 countries in 2023), and (iii) create data-driven decision support mechanism for an efficient logistics ecosystem. A Unified Logistics Integrated Platform has been set up under this, which, as of September 2023, had integrated 34 logistics portals/digital systems across 33 ministries/ departments, and had over 600 industry players registered. Twenty-one states have also notified their own logistics policies, in line with the NLP.

The infrastructure policies will enhance the logistical efficiency, thereby strengthening the supply chain for automobiles and auto components. These initiatives will lower the logistical cost and the lead time in components/automobile transit. In the case of raw materials, this allows various stakeholders in the ecosystem to have a clear understanding of raw material availability and necessary logistics for the same. Thus, these policies augment efficiency in production and supply.

**Decoupling of global supply chains**

As traditional supply chains are threatened by large-scale global events, rising trend in protectionism and wage inflation, there is a greater need for rethinking supply chain models to remain competitive. In the wake of global disruptions such as Covid-19, geopolitical crises, environmental disruptions, etc, significant decoupling of supply chains is underway to bring key supply links closer home.

To establish collective supply chains that would improve their resilience in the long term, 18 economies, including India, the US and the EU unveiled a roadmap in July 2022, which included steps to counter supply chain dependencies and vulnerabilities. This was done as a part of the ongoing supply chain derisking strategy of global companies/multinationals, wherein global companies are diversifying their businesses away from their reliance on a single large supplier, to alternative destinations. Beijing's Zero-Covid policy and the resultant disruptions to global supply chains, container shortage and higher lead times have served as an impetus to this strategy.

This reorientation has benefitted other Asian economies in southeast Asia and India. India can take advantage of the same as the enormous quantum of Chinese exports coupled with India's cost advantage in manufacturing, would serve as a highly lucrative opportunity for Indian manufacturers. Realising this opportunity, the government has introduced many reforms and incentive schemes to increase domestic manufacturing and attract global manufacturing firms to India.

**Lowering supply chain dependency**

India and other countries are actively pursuing strategies to reduce supply chain dependency on a single country in the wake of the pandemic and growing geopolitical tensions.

This includes diversifying the supply chain by sourcing inputs from various countries to reduce the risk of over relying on a single country for sourcing and manufacturing. Furthermore, India is trying to strengthen the domestic manufacturing environment through various policy initiatives. Key strategies adopted by India to diversify the supply chain include:

Foreign investments: India is attracting multi-national companies that are actively seeking to diversify their manufacturing base. Government stimulus includes tax benefits and incentive schemes. India has also regulated the FDI to attract investments from various countries across sectors
Domestic manufacturing: The government is pushing domestic companies to develop products to reduce dependence on any one country. Booster initiatives include schemes such as Make in India, Atmanirbhar Bharat, China plus one, PMP and PLI.
Trade diversification: India is actively engaging in trade pacts and FTA to diversify its trade partners. Strengthening trade ties with developing and developed economies offers alternatives to sourcing of goods and technology

To reduce dependency on China and prepare for potential future supply chain challenges, 14 nations under the Indo-Pacific Economic Framework (IPEF) (including the US, Japan and India) have reached an agreement to augment supply chain resilience and diversification. The agreement involves sharing information with each other

and coordinating responses during the time of crises. Under the agreement, the participating countries would establish an IPEF supply chain council, supply chain crisis response network, and labour rights advisory network that will provide a framework to strengthen supply chains and prevent potential disruptions.

**Supply derisking**

Companies are encouraged to minimise their supply chain dependency on China by diversifying the sourcing of raw materials/inputs to other countries. The goal is to reduce the risk of over-relying on a single country for sourcing and manufacturing.

Many western countries, including the US, have heavily relied on China for outsourcing their manufacturing. Low labour and production costs are one of the major reasons for this, as well as factors like China's strong domestic market, supply chain, infrastructure, free trade and tax agreements, and high growth potential. Regardless of the reasoning behind the reliance, global dependency on China became a risk as early as 2008.

By establishing additional sourcing and manufacturing locations outside China, companies have found a way to mitigate business risks, access new consumer markets, and explore other innovation and technology, while keeping their operations cost-effective.

Today, geopolitical and economic factors drive much of the urgency behind businesses, implementing supply derisk approach. The approach gained traction due to the US-China trade war in 2018. As tensions escalated during Donald Trump's presidency, businesses became uncertain about how their supply chain and operations would be affected. Additionally, the Covid-19 pandemic exposed vulnerabilities in global supply chains, especially for those who relied on China alone. Other issues, such as rising labour costs in China and various Chinese political movements, have also contributed to the rise of supply derisking in recent years.

**Make in India**

The Make in India initiative was launched in September 2014 to boost manufacturing in India and encourage FDI in manufacturing and services. The key objective was to increase the share of manufacturing in GDP to 25% by 2020 by boosting investments, fostering innovation and intellectual property. The other objective was to build best-in-class infrastructure for manufacturing across sectors, including, but not limited to automobile, auto components, aviation, biotechnology, chemicals, construction, defence manufacturing, electrical machinery, electronic systems, food processing, mining, oil and gas, pharmaceuticals, renewable energy, thermal power, hospitality and wellness.

To achieve this objective, a dedicated Investor Facilitation Cell was set up to assist investors get regulatory approvals, offering hand-holding services through the pre-investment phase, execution and after-care support. Key facts and figures, policies and initiatives and relevant contact details were made available through print and online media. Indian embassies and consulates proactively disseminated information on the potential for investment in the identified sectors in foreign countries while domestically, regulations and policies were modified to make it easier to invest in India.

FDI inflows have received an impetus, as India jumped to the 8$^{th}$ rank in the list of the worlds' largest FDI recipients in 2020 from the 12$^{th}$ position in 2018, according to the World Investment Report 2022. FDI to India almost doubled to $ 83.6 billion in fiscal 2022 from $ 45.15 billion in fiscal 2015. However, in fiscal 2023, FDI inflow decreased to $ 71 billion (provisional figure). According to the Ministry of Commerce & Industry, FDI inflow in the past nine fiscals (2014-2023: $ 596 billion) has increased 100% over the fiscals 2005-2014 ($ 298 billion) and is nearly 65% of the total FDI reported in the past 23 years ($ 920 billion).

However, the share of manufacturing in GDP has not attained the intended levels of 25%. Hence, additional policies were announced, and targets rolled forward initially to 2022 and then to 2025. Domestically, multiple steps were taken to make sectors more attractive and to ease the investment processes. Some of the major steps taken included announcement of the NIP and reduction in corporate tax. Various sectors such as defence manufacturing,

railways, space and single brand retail have been opened for FDI. Measures to boost domestic manufacturing were also taken through Public Procurement Orders (PPO), Phased Manufacturing Programme (PMP) and PLI schemes. Many states launched their own initiatives along similar lines to boost manufacturing in their respective states.

**FDI**

FDI plays a pivotal role in economic growth, aiding development and shaping of the economic landscape. Through the FDI route, international corporations can invest in India, capitalising on the country's investment incentives such as tax incentives and relatively competitive labour costs. This fosters job creation and offers various additional advantages along with facilitating the acquisition of technological expertise from global peers. Government bodies such as Department for Promotion of Industry and Internal Trade (DPIIT), the Reserve Bank of India (RBI) and Securities and Exchange Board of India (SEBI) formulate the regulations and guidelines for FDI. DPIIT frames and implements policies to promote and regulate foreign investment in India across sectors. The RBI manages the monetary aspects of foreign investments and SEBI regulates FDI in the capital market.

India has opened two FDI routes: automatic and government. The automatic route allows foreign investors to invest in sectors without requiring prior approval from the Indian government. Under this route, investors are only required to notify the RBI within a specified time frame. In contrast, the government route mandates prior approval from the Indian government or relevant authorities for investments in India. In April 2020, the DPIIT amended the FDI Policy, that the countries which shares a land border with India (China, Bangladesh, Pakistan, Bhutan, Nepal, Myanmar and Afghanistan) can invest only under the government route. Shortly, it will be mandatory to obtain government approval for investments from these countries. FDI proposals from these countries must go through tight scrutiny and the government has set up an inter-ministerial panel to review these proposals. All ministries and departments have been recommended to have dedicated FDI cells to process these proposals quickly. This policy, thus, restricted entry and expansion of Chinese OEMs, including MG and Great Wall Motors, in India by restricting them to invest or raise funds from China.

**Summary of FDI in key Indian sectors**

| Sector | FDI Cap | Route |
|---|---|---|
| Automobile | 100% | Automatic |
| Airports - greenfield projects | 100% | Automatic |
| Satellites - establishment and operation, subject to the guidelines of Department of Space/ISRO | 74% | Government |
| Hospitals sector | 100% | Automatic |
| Defence | 49% + | Government up to 100% of local defence ventures after obtaining approval |

*Source: DPIIT, CRISIL MI&A Consulting*

**Atmanirbhar Bharat Campaign**

Atmanirbhar Bharat Abhiyan or the self-reliant India campaign was launched in May 2020 amid the Covid-19 pandemic, with a special and comprehensive economic package of Rs 20 trillion, equivalent to 10% of the country’s GDP.

The scheme was launched with the primary intent of fighting the pandemic and making the country self-reliant based on five pillars: economy, infrastructure, technology-driven system, demography and demand. The stimulus package announced by the government under the scheme consisted of five tranches, intended to boost businesses (including micro, small and medium enterprises or MSMEs), help the poor (including farmers), boost agriculture,

expand the horizons of industrial growth, and initiate governance reforms in the business, health and education sectors.

The mission emphasises the importance of encouraging local products and aims to reduce import dependence through substitution. It also aims to enhance compliance and quality requirements to meet international standards and gain global market share.

The government has also rolled out other reforms — supply chain reforms for agriculture, rational tax systems, simple and clear laws, capable human resources and a strong financial system — to further promote business, attract investments and strengthen the Make in India initiative.

**PLI scheme boosts industrial investments in the short to medium term**

The PLI scheme's primary objective is to make manufacturing in India globally competitive by removing sectoral obstacles, creating economies of scale and ensuring efficiency. It is designed to create a complete component ecosystem in India and make the country an integral part of the global supply chain. Furthermore, the government hopes to reduce India's dependence on raw materials imported from China. The scheme is expected to boost economic growth in the medium term and create more employment opportunities, as many of the sectors covered under the scheme are labour-intensive. It will be implemented over fiscals 2022 to 2029.

The PLI scheme is a time-bound incentive scheme by the government, which rewards companies in the 5-15% range of their annual revenue based on the companies meeting pre-decided targets for incremental production and/or exports and capex over a base year. The stronger-than-expected pick-up in demand and larger companies gaining share over smaller companies led to revival of capex in fiscal 2022. The rise in fiscal 2024 was on account of the expansion plans by India Inc.

Construction spends across industrial investments are seen rising 6-8% in fiscal 2024, driven by expansion in the oil and gas and metals segments. Growth is on a low base of fiscal 2023, when the sector faced a slight bump owing to geopolitical issues in the previous two fiscals. However, the PLI scheme is expected to provide the necessary boost to the sector.

Based on an analysis of eight key sectors, CRISIL MI&A Consulting projects construction investment in the industrial segment at Rs 4.0-4.1 lakh crore between fiscals 2023 and 2027, up 1.3 times over spends between fiscals 2018 and 2022. The rise in investments is projected on account of inclusion of the PLI scheme in the capex of the industrial sector.

**Budgeted incentives for each sector under the PLI scheme**

| Sector | Segment | Budgeted (Rs bn) * | |
|---|---|---|---|
| Automobile | Advance chemistry cell (ACC) battery | 181.0 | 751.4 |
| | Automobiles and auto components | 570.4 | |
| Electronics | Mobile manufacturing and specified electronic components | 409.5 | 545.15 |
| | Electronic/technology products/IT hardware | 73.25 | |
| | White goods (ACE and LED) | 62.4 | |
| Pharma and medical equipment | Critical key starting materials/drug intermediaries and active pharmaceutical ingredients | 69.4 | 253.6 |
| | Manufacturing of medical devices | 34.2 | |
| | Pharmaceutical drugs | 150.0 | |
| Telecom | Telecom and networking products | 122.0 | 122.0 |
| Food | Food products | 109.0 | 109.0 |

| Sector | Segment | Budgeted (Rs bn) * | |
|---|---|---|---|
| Textile | Textile products: man-made fibre (MMF) and technical textiles | 106.8 | 106.8 |
| Steel | Speciality steel | 63.2 | 63.2 |
| Energy | High-efficiency solar PV modules | 240.0 | 240 |
| Aviation | Drones and drone components | 1.2 | 1.2 |
| Total | | | **2,192** |

*Note: Approved financial outlay over a five-year period

ACE: Appliance and consumer electronics; LED: Light-emitting diode

*Source: Government websites, CRISIL MI&A*

The Union budget 2024-25 allocated Rs 751.4 billion for automobiles, auto components and ACC:

Rs 570.4 billion allotted for enhancing India's manufacturing capabilities or the automobile and auto component industry - Advanced Automotive Products (AAT). The scheme has two components: Champion OEM Incentive Scheme and Component Champion Incentive Scheme. A total of 95 applicants have been approved under this PLI scheme.

Rs 181 billion under the National Programme on Advanced Chemistry Cell (ACC) Battery Storage for achieving manufacturing capacity of 50 Giga Watt Hour (GWh) of ACC. Four companies have been selected till date for incentives under the PLI scheme for ACC battery storage.

**PLI scheme for the automotive industry:** The PLI scheme for the automotive industry intends to promote high-tech green manufacturing -- ATT vehicles such as electric and hydrogen fuel cell vehicles. This scheme excludes conventional petrol, diesel and CNG segments (internal combustion engines), as they have sufficient capacities in India. In the auto components category, more than 100 ATT components (including hydrogen fuel cells, hydrogen injection systems, EV motors and lightweight cryogenic cylinders) are eligible for PLI.

The PLI scheme for auto parts includes the following component schemes:

Champion OEM Scheme: It is a sales value-linked plan, applicable to battery electric and hydrogen fuel cell vehicles of all segments.
Component Champion Incentive Scheme: It is a sales value-linked plan for advanced technology components, complete- and semi-knocked down (CKD/SKD) kits, vehicle aggregates of two-wheelers, three-wheelers, passenger vehicles, commercial vehicles and tractors, including automobiles meant for military use and any other advanced automotive technology components prescribed by the Ministry of Heavy Industries – depending on technical developments

**PLI scheme for the automotive and ACC:** The policy on ACC battery storage was approved by the Government of India on May 2021 with budgetary outlay of Rs 18,100 crore for setting up manufacturing facilities with a total manufacturing capacity of 50 GWh. This policy will strengthen the ecosystem for EVs and battery storage in the country. The policy aims to enhance India's manufacturing capabilities of ACC by setting up Giga scale ACC battery manufacturing facilities in India with an emphasis on maximum domestic value addition.

Note: Please refer to module 3 for more details on the PLI scheme.

### GST structure for the industry

The two taxes charged to the end consumer on cars and bikes previously were excise and VAT, with an average combined rate of 26.50% to 44% which is higher than the GST rates of 18% and 28%. Therefore, there has been less burden of tax on the end consumer under GST since 2017. Importers/dealers can cheer as they would be able to claim the GST paid on goods imported/sold whereas previously, they were ineligible to claim the excise duty and VAT paid.

Excise paid on stock transfer would be covered by IGST under the GST law. Advance received for supply of goods is also taxed under GST. Manufacturers can procure auto parts at a cheaper cost due to an improved supply chain mechanism under GST. GST on cars and bikes is kept under the 28% bracket and a list of cesses to be levied on different kinds of automobiles has also been declared by the Indian government which is ranging from 1% to 22%.

**GST and cess rate on automobiles based on fuel type**

| Vehicle category | GST rate (%) | Compensation cess (%) |
|---|---|---|
| EVs | 5 | Nill |
| Hydrogen fuel cell vehicles | 12 | Nill |
| Passenger vehicles (petrol, CNG, LPG) up to 4m in length and up to 1200 cc engine | 28 | 1 |
| Passenger vehicles (diesel) up to 4m in length and up to 1500 cc engine | 28 | 3 |
| Passenger vehicles (up to 1500 cc engine) | 28 | 17 |
| Passenger vehicles (above 1500 cc engine) | 28 | 20 |
| Passenger vehicles popularly known as SUVs (above 4m in length, above >1500 cc engine and >170 mm ground clearance) | 28 | 22 |
| Hybrid passenger vehicles (up to 4m and up to 1200 cc engine petrol) or (up to 4m and up to 1500 cc engine diesel) | 28% | Nill |
| Hybrid passenger vehicles (Above 4m or above 1200 cc engine petrol or above 1500 cc engine diesel) | 28% | 15% |

*Source: SIAM, CRISIL MI&A*

**Import duty on cars**

Import duty (also known as import tax, import tariff or customs duty) is an indirect tax levied by Indian authorities on goods purchased from a foreign country. Through import taxes, the price of imported goods increases and demand decreases. This propels domestic market growth, demand for indigenous products and protects Indian OEMs from foreign competitors.

**Customs duty on automobiles based on fuel type**

| Criteria | Engine capacity | Fuel type | Import duty (%) |
|---|---|---|---|
| Used car import | Any | Any | 125 |
| Cars CBUs whose CIF value is more than $ 40,000 | >3000 cc | Petrol | 100 |
| | >2500 cc | Diesel | |
| Cars CBUs whose CIF value is less than $ 40,000 | <3000 cc | Petrol | 70 |
| | <2500 cc | Diesel | |
| ICE vehicle SKD: CKD containing engine or gearbox or transmission mechanism in a pre-assembled form but not mounted on a chassis or a body assembly | Any | Any | 35 |
| ICE vehicle CKD: CKD containing engine, gearbox and transmission mechanism not in a pre-assembled condition | Any | Any | 15 |

| Criteria | Engine capacity | Fuel type | Import duty (%) |
|---|---|---|---|
| EV SKD: Pre-assembled battery pack, motor, motor controller, charger, power control unit, energy monitor contractor, brake system, electric compressor not mounted on chassis | NA | Electric | 30% |
| EV CKD: Disassembled battery pack, motor, motor controller, charger, power control unit, energy monitor contractor, brake system, electric compressor not mounted on chassis | NA | Electric | 15% |

*Note: CIF: Cost, insurance and freight, CBU: Completely built-up, SKD: Semi-knocked down, CKD: Completely knocked down*
*Source: SIAM, CRISIL MI&A*

The government recently launched a scheme to promote electric passenger cars in India under which import duty concession is offered for OEMs who have set up domestic manufacturing facility in India with a minimum investment of $ 500 million. Under this scheme, the imported vehicles would attract a reduced customs duty of 15% with maximum CIF value of $ 35,000.

**Corporate Average Fuel Efficiency/Economy norms**

Corporate Average Fuel Economy (CAFÉ) norms aim to reduce fuel consumption by vehicles (or improve fuel efficiency) by lowering carbon dioxide ($CO_2$) emissions, hence reducing reliance on oil and regulating pollution. Implemented in India on April 1, 2017, CAFE norms apply to petrol, diesel, LPG and CNG fuelled vehicles. In phase 1 (2017-2022), CAFE norms required average corporate $CO_2$ emissions to be less than 130 g/km by fiscal 2022 and below 113 g/km thereafter (CAFE II), i.e. vehicles needed to be 10% more fuel-efficient by fiscal 2022. CAFE II norms came into effect on April 1, 2023. This is expected to incentivise the shift towards greener technologies such as hybrids and EVs. The Energy Conservation Bill requires carmakers to pay Rs 25,000 per unit if their fleet's $CO_2$ emissions exceed the intended CAFE score of 0-4.7 g/km, and Rs 50,000 per unit if they exceed by more than 4.7g/km.

**National Green Hydrogen Mission**

The National Green Hydrogen Mission is a comprehensive action plan for establishing a green hydrogen ecosystem in India. The policy is aimed at making India a leading producer and supplier of green hydrogen in the world, thereby creating export opportunities for green hydrogen and its derivatives. The policy, which promotes hydrogen as a clean energy source, was approved by the Indian government with an outlay of Rs 19,700 crore in January 2023. Of this, Rs 17,490 crore is allotted for the Strategic Interventions for Green Hydrogen Transition (SIGHT) programme, Rs1,466 crore for pilot projects, Rs 400 crore for research and development (R&D) and Rs 388 crore for other mission components. Under the SIGHT programme, the government offers incentives for manufacturing of electrolysers and production of green hydrogen. By 2030, the government wants to increase its annual hydrogen production capacity to 5 million tonne. The National Green Hydrogen Mission aims to reduce India's dependence on fossil fuels imports, lower greenhouse gas emissions, transition the economy to low carbon intensity and make the country a leader in this new industry. The government plans to achieve this by setting up green hydrogen plants and encouraging R&D in the sector. The government has also invested Rs 35,000 crore in the energy transition to attain the goal of net-zero carbon emissions by 2070.

As a part of this mission, development of hydrogen highways suited for heavy-duty, long-haul vehicles could be expected in the future. To strengthen the transport sector, necessary hydrogen production projects, distribution infrastructure and refuelling stations will be built along the highways. This will enable the development of hydrogen fuelled inter-state buses and commercial vehicles on such routes. Furthermore, in February 2024, the government issued Scheme Guidelines for Pilot Projects on the use of green hydrogen in the transport sector that will support pilot projects in buses, trucks and four-wheelers with green hydrogen as a fuel. The scheme will be implemented with a total budgetary outlay of Rs 496 crore till fiscal 2026 and will support the development of technologies based

on fuel cell (FCEV)/ICE-based propulsion technology. The scheme will also explore the possibility of blending green hydrogen-based methanol/ethanol and other synthetic fuels derived from green hydrogen in automobile fuels.

**PLI for green hydrogen under SIGHT programme**

SIGHT is a financial incentive mechanism to support domestic manufacturing of electrolysers and green hydrogen. The incentive scheme for electrolyser manufacturing was introduced with an outlay of Rs 4,440 crore aimed at maximising indigenous electrolysers manufacturing capacity, achieving levelised cost of hydrogen production and enhancing domestic value addition. The scheme would incentivise manufacturing of electrolysers in India and progressively indigenise the value chain. The incentive scheme for green hydrogen production was introduced in June 2023 with an initial outlay of Rs 13,050 crore aimed at maximising the production and enhance cost competitiveness of green hydrogen. The scheme offers support in terms of Rs/kg of green hydrogen production for 3 years from the date of commencement of production. The incentives will be capped at Rs 50/kg for the first year, Rs 40/kg for the second year and Rs 30/kg for the third year. Cost incentivisation along with the indigenous development of electrolyser technology will support demand growth and technology development in the transport sector as well.

**Ethanol blending in India**

The government is promoting the use of ethanol as a renewable and environment-friendly fuel in petrol. The ethanol blending programme is aimed at reducing the import dependence of fuels, savings in foreign exchange, boosting the domestic agriculture sector and associated environmental benefits. The Roadmap for Ethanol Blending in India 2020-25 lays out an annual plan to increase domestic ethanol production in line with the target of National Policy on Biofuels (2018) to reach a blending of 20% of ethanol in petrol (E20) by 2025-2026. The roadmap aims at phased rollout of ethanol blended fuels in India with E10 fuel by April 2022, and phased rollout of E20 from April 2023 to April 2025. Further the policy mandates the rollout of vehicles that are E20 material-compliant and E10 engine-tuned vehicles from April 2023. Further, it mandates the production of E20-tuned engine vehicles from April 2025. OMCs have already rolled out E20 fuel in a phased manner in April 2023 but are yet to achieve widespread availability. The government is ambitious of attaining 20% ethanol-blended petrol by fiscal 2025 and 30% by fiscal 2030.

**BS-IV to BS-VI transition**

Bharat Stage (BS) emission standards are issued by the central government to regulate the output of air pollutants from motor vehicles. In January 2016, the government decided to skip BS-V and instead implemented BS-VI norms directly after BS-IV. It fixed the deadline of April 1, 2020 for the introduction of BS-VI emission norms.

**BS-VI regulations demand major reduction in PM and NOx levels**

| Type of Vehicle | Unit | BS IV | BS VI | Change |
|---|---|---|---|---|
| **Diesel** | | | | |
| HC | gm/km | 0.3 | 0.17 | **-43%** |
| NOx | gm/km | 0.25 | 0.08 | **-68%** |
| PM | gm/km | 0.025 | 0.0045 | **-82%** |
| **Petrol** | | | | |
| NOx | gm/km | 0.08 | 0.06 | **-25%** |
| PM | gm/km | - | 0.0045 | **Newly added** |

*NOx: Nitrous oxide*
*Source: CRISIL MI&A*

Prices of BS-VI-compliant PVs increased 2-4% as devices and systems were added to reduce emission levels. The price hike was higher for diesel vehicles as these require additional exhaust parts.

**Addition of devices and sub-systems in BS-VI-compliant vehicles**

| Pollutant | Devices / Subsystems to be included to reduce the Pollutants |
|---|---|
| NOX- Nitrous oxide | ▪Exhaust Gas Recirculation<br>▪Selective Catalytic Reduction<br>▪3 way catalyst<br>▪Lean NOx Trap |
| HC- Hydrocarbons | ▪Secondary Air Injection<br>▪3 way catalyst<br>▪Diesel Oxidation Catalyst<br>▪Purge Control Valve<br>▪Canister |
| PM- Particulate matter | ▪Diesel Particulate Filter<br>▪Gasoline Particulate Filter |

*Source: CRISIL MI&A*

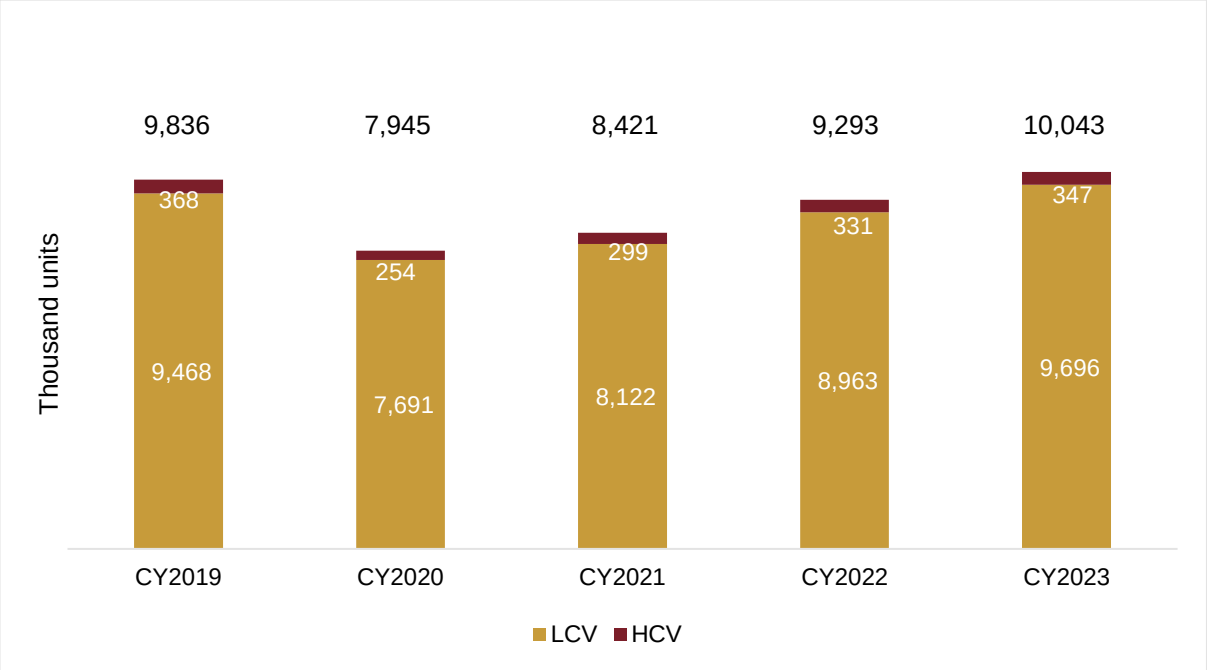
In November 2022, the European Commission presented a draft proposal on Euro 7 Emission Norm to the European Parliament. According to the same, Euro 7 pollution standards for new cars and vans will be implemented from July 2025, and for buses and lorries from 2027. India follows the matured European market for framing and implementation of policies and adapts it to suit Indian conditions. Provided Euro 7 comes into force from 2025, India is highly likely to propose BS-VII regulation by the end of this decade.

# 2. Review and Outlook on the Commercial Vehicle industry

## 2.1 Review of Global Commercial vehicle industry

### 2.1.1 Review of the North American CV industry (2019-23)

**Fig: CV production in North America**




*Note: LCV is Light Commercial Vehicle and HCV is Heavy Commercial Vehicle*
*Note: NA includes US and Canada*
*Source: OICA.NET, CRISIL MI&A*

North America is the largest producer of CVs across continents. In 2023, USA contributed to almost 90% of CV production in North America, and LCVs accounted for more than 96% of CV production in North America.

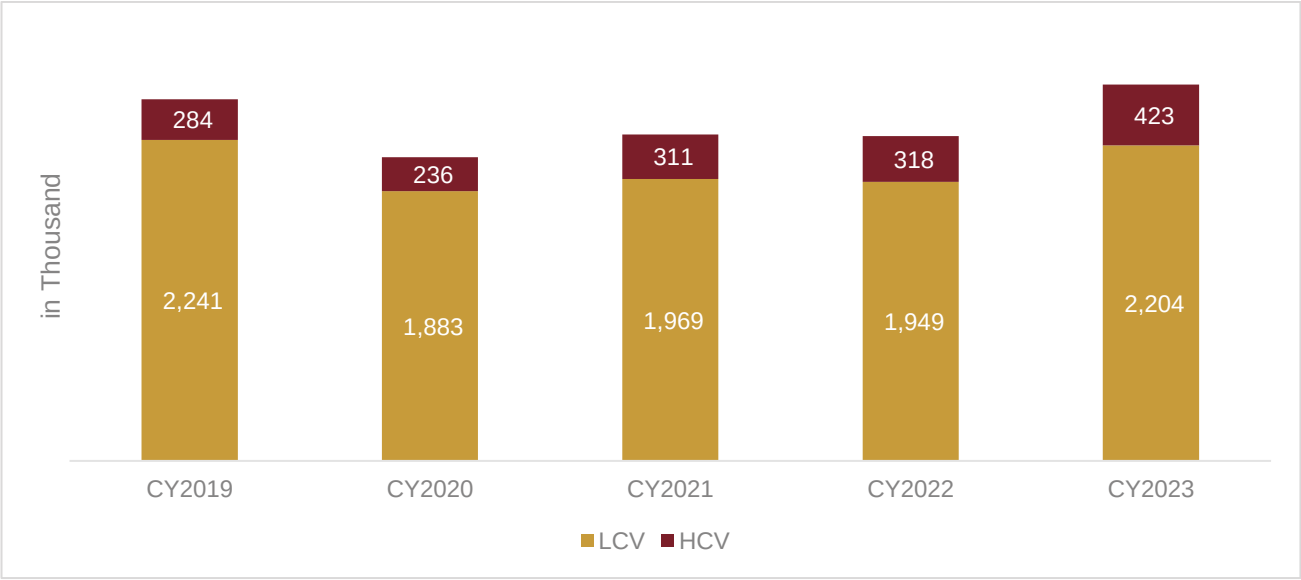
North America's highly unified supply-chain network connects manufacturers and consumers through multiple transportation modes, particularly truck transport, owing to which it has the highest production of CVs. The other modes include rail freight, air and express delivery services, and maritime transport.

The COVID-19 pandemic had led to declining CV sales due to low industrial activity. CV production in North America declined 19% on-year in fiscal 2020 because of an economic slump, combined with a decrease in new orders.

On this low base of 2020, CV production witnessed 6% in 2021 growth aided by waning of COVID impact as well as gradual improvement in economic activity. HCV clocked a faster growth of 18% in 2021 on a very low base of 2020 when the production dropped 31% on year. Further in 2023, production reached almost 90% of the pre-pandemic level (368 thousand unit in 2019 vs 346 thousand units in 2023).

### 2.1.2 Review of the European CV industry (2019-23)

**Fig: CV production in Europe**




*Source: OICA.NET, CRISIL MI&A*

CV production in Europe grew at a CAGR of 1% between 2019 to 2023 after it declined of 3.1% CAGR between 2019 and 2022. Indeed, in 2021-2022, supply chain disruptions caused by the Covid-19 pandemic led to shortages of raw materials and semiconductors that disrupted vehicle production. As a result, delivery lead times had been significantly lengthened and the situation only became normalised in 2023.

The top two markets, Spain and France, benefited from the overall rebound witnessing 12% and 23% growth respectively from 2020 levels and showed a significant increase in registrations

During the year, HCV segment clocked a minor growth of 2% while the primary LCV segment witnessed a decline of 2% with demand being impacted by high energy costs and recession fears.

### 2.1.3 Trends and growth drivers

- **In North America-**
  - Fueled by the resurgence of the rental and leasing industry, commercial vehicle registrations rose 14% in 2023 compared to 2022, with more than 1.6 million commercial vehicles registered in 2023
  - The lease and rental industry was the fastest-growing sector in 2023. Largest fleets experienced a 40-60% decrease in new registrations during the pandemic but have since recovered to pre-pandemic levels seen in 2019. Class 2 vehicles saw a 21% increase in registrations due to continued growth in construction and last-mile delivery services, with notable increases in pickup and cargo van registrations
  - Commercial truck OEMs were able to increase Class 8 builds in 2022 despite persistent supply chain issues resulting from the semiconductor microchip shortage and scarcity of other key inputs. Though the industry has not completely moved on from the chip shortage, the supply chain has improved compared to previous year.
  - As long-haul freight has gradually declined, trucking companies are opting for lower class trucks to get their goods delivered. With digitization of the supply chain, there has been a spurt in regionalisation of freight to fulfil orders in shorter times. Earlier, a truckload carrier would wait till the trailer reached its optimal capacity, now there is no time to wait. This is prompting small fleet operators, to opt for lower class trucks.
  - E-commerce activities gaining preference will lead to demand for light-duty trucks.

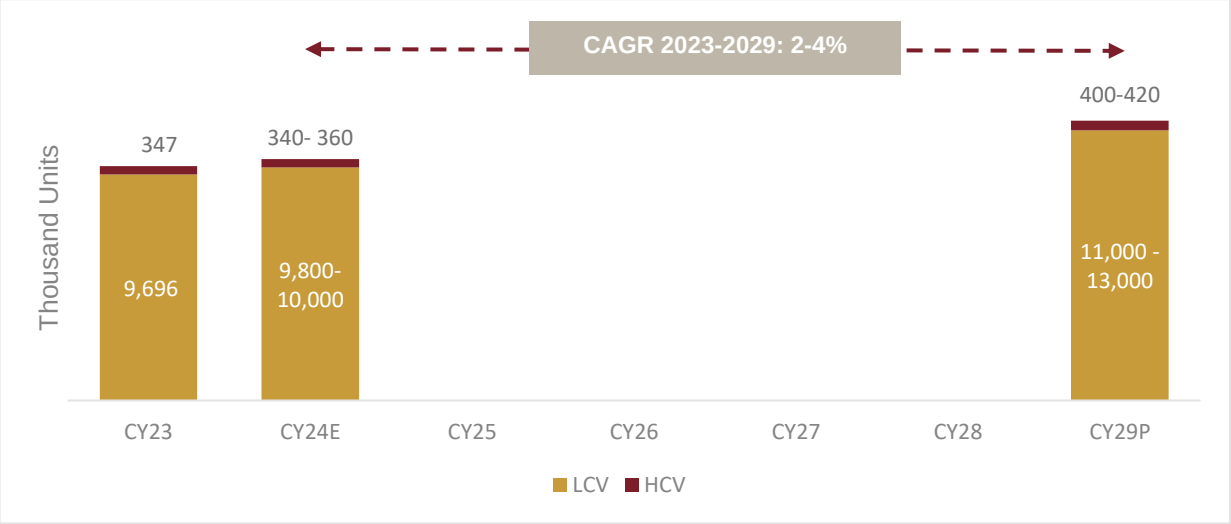
- **In Europe-**
  - Trucking industry plays an important role in the European economy with majority of the freight being moved around in the continent via roads. CRISIL expects this trend to continue over a long term.
  - During pandemic, the trucking sector was affected unevenly by different lockdown measures across countries but following a shift in consumption from services to goods, general volumes rebounded more quickly than many expected and surging e-commerce led to extra transport activity.
  - Increase in ecommerce activities is expected by CRISIL to continue in next 5 years as well.
  - Growth trend in vehicle registrations of +3.5 tonnes observed in 2022 was amplified in 2023, with an increase of 16.3% in the EU, compared to 3.5% the previous year. EU market has thus risen sharply above 300,000-registration mark, for the first time since 2019, and is even 5.1% above 2019

- **Electrification-**
  - The Paris Agreement, a legally binding international treaty on climate change, was formed in 2015. Under this agreement, representatives from 196 countries gathered for United Nations Framework Convention on Climate Change (UNFCCC) in Paris. According to the UNFCCC, the parties agreed to three objectives: limit the average global temperature increase to well below 2 degrees Celsius (3.6 degrees Fahrenheit) above pre-industrial levels, preferably below 1.5 C (2.7 F); build resilience to climate change impacts; and allocate money to these objectives. Each party created its own nationally determined contributions (NDCs) to these goals. In 2023, the first “global stocktake” of the world’s efforts under the Paris Agreement concluded at COP28 with a decision on how to accelerate action across all areas – mitigation, adaptation, and finance – by 2030, including a call on governments to speed up the transition away from fossil fuels to renewable energy such as wind and solar power in their next round of climate commitments.
  - Global economies and governments are increasingly moving towards cleaner fuel in view of growing concerns regarding environmental issues. Notably, the transportation sector is one of the largest contributors to greenhouse gas (GHG) emissions. Policymakers and OEMs are increasingly moving towards green mobility by developing new technologies, such as BEVs, hybrids, etc., and providing subsidies to promote green technology.
  - North America and Europe lead electrification globally.
  - Trucks, especially the heavy-duty ones, are the most polluting vehicles. Hence, a few cities, such as California in the USA, have announced a shift towards relatively clean fuel. Liquefied natural gas could also have a role to play.
  - California passed regulations in June 2020 requiring most heavy-duty trucks sold by 2035 to be zero-emission. The state also has an extensive voucher system to subsidise the cost of purchasing new EVs. Other US states are following California’s lead. A total of 15 states signed an agreement in July 2020, targeting all new medium- and heavy-duty vehicles to be zero-emission by 2050.
  - The US President announced in 2021 the ‘Build back better America’ with a greater focus on electric vehicles (EV). The programme envisages 50% share of electric mobility by investing close to $ 174 billion towards electric vehicles ecosystem by 2030. The programme aims to achieve a goal of 500,000 EV chargers and provides for consumer and tax incentives of $12,500 per vehicle.
  - European cities are restricting diesel vehicle access through the implementation of ultra-low emissions zones. Further, government grants, lower running and servicing costs and access to ultra-low emissions zones can make ECVs an attractive choice going ahead.

- In November 2020, the UK became one of Europe's biggest economies to set out its plans for a greener transport future, including a €2 billion investment in infrastructure and grants to increase access to zero-emission vehicles. Germany, as part of its €130 billion economic recovery plan, is obliging all petrol stations to offer electric charging to satisfy drivers' refuelling anxieties.
- In the bus and heavy-duty segments electric options are slowly gaining momentum as well. More electric models are becoming available, with 220 new bus and truck models entering the market in 2022. Most heavy-duty vehicle deployment is currently happening in China, with over 80% of all sales located there, however sales in Europe and North America in this segment more than doubled in 2022 compared to 2021.

## Outlook on North American CV industry (2024-2029P)

**CV production**




*Source: OICA.NET, CRISIL MI&A*

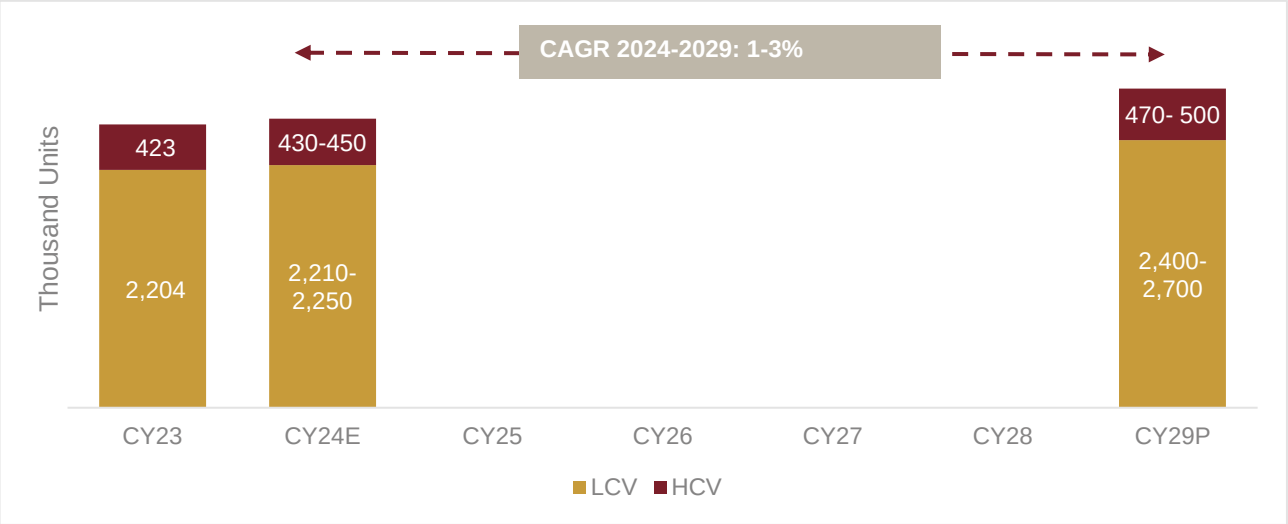
On the supply side, meanwhile, the sector continues to recover from the profound disruption that resulted from shortages of semiconductors, wiring harnesses and other parts, as well as spiking raw materials prices, which hit in 2021-2022. Disruption from this source is not completely resolved even now, but both sales and production have been rebounding in the affected region in recent months. However, the ongoing global uncertainty and supply chain disruptions remain key monitorable.

CRISIL MI&A expects the CV production as well as sales in North America to increase in 2024 amidst growth as economy proved to be more resilient than anticipated to rising monetary policy rates, high inflation, and the uncertain economic backdrop. However, on a long-term horizon, production in North America is expected to increase at 2-4% CAGR, largely led by growing demand from logistics and e-commerce. Over the long term, implementation of EPA's Multi-Pollutant Emissions Standards for model years 2027 for light and medium duty vehicles would remain a key factor impacting the production. In its most recent update, the EPA has opted to move straight to the 2031 standard in 2027.

CRISIL MI&A forecasts the major LCV market to grow 2-4% over 2024-2029 whereas HCV market is expected to grow at 0.5%-2% during the same period.

## Outlook on European CV industry (2024-2029P)

### CV production




*Source: OICA.NET, CRISIL MI&A*

CRISIL MI&A forecasts CV production in Europe to grow at a CAGR of 1-3% over 2024-2029, largely led by a rise in logistics due to e-commerce on a healthy base of 2023 after the impact of Russia-Ukraine conflict and the rise in energy cost impacted the CV production in 2022

Europe has a significant dependence on Russia for energy supply. Retaliatory measures to Europe's sanctions further exerted pressure on Europe manufacturing and in turn the overall economy in Europe.

European truck production has increased as supply-side constraints eased in 2023; high pent-up demand and long order books is expected to support positively. The European Commission's recently announced Euro 7/VII proposals which are planned to be implemented from mid-2027 for trucks and buses. The regulation aims to make stricter rules for emission of CO2, carbon monoxide and nitrous oxide, as well as particulates from brakes and tyres. OEMs are currently lobbying to delay the proposal, which, if implemented as proposed, would create additional volatility over the 2026-2029 period.

CRISIL MI&A forecasts the major LCV market to grow 1-3% over 2024-2029. Online retail sales and e-commerce have been rising due to the increased penetration of internet connectivity and smartphones, aiding LCV purchases for facilitating the timely delivery of items to buyers. Similarly HCV market will also grow at ~2% between 2024-2029 aided by increase in investments in electric vehicle technology and the need for sustainable logistics solution.

## 2.2 Review of Indian Commercial vehicle industry

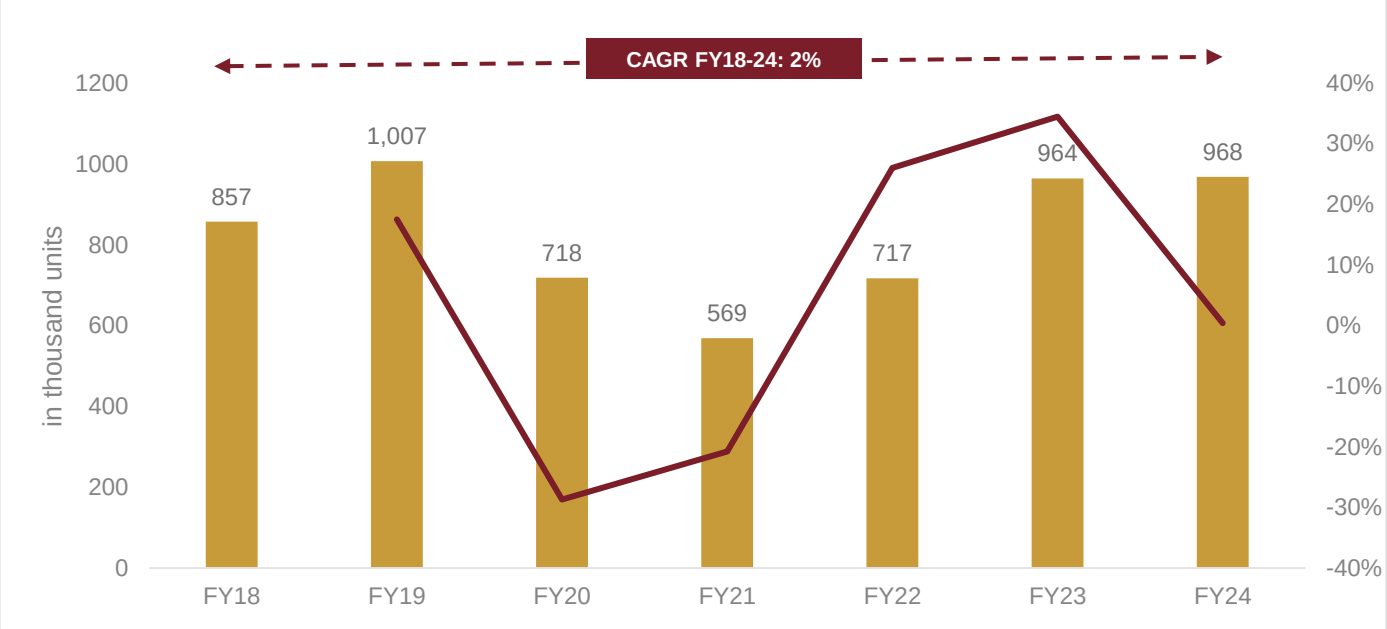
### 2.2.1 Historic domestic commercial vehicle industry

Between fiscals 2018 and 2024, domestic CV sales logged a CAGR of 2%. The CV industry exhibited a noteworthy recovery in fiscal year 2023, achieving a remarkable growth rate of 35% over fiscal 2022, albeit on a low base, and reaching 96% of the pre-pandemic levels observed in fiscal year 2019. This resurgence can be attributed to pent-up replacement demand, improved transporter profitability, and the pick-up in capex that had been hampered during the preceding 2-3 years due to economic stagnation and the disruptive impact of the pandemic.

In fiscals 2018 and 2019 witnessed strong recovery as compared to 2016-17 and a healthy 18-20% growth, supported by the government's focus on road and housing infrastructure development. In fiscal 2020, the industry witnessed a sharp de-growth of 28% on a high base of fiscal 2019, due to inventory adjustment on account of the transition to BS-VI emission norms. In fiscal 2020, demand for buses was impacted due to safety regulations (emergency exit doors, fire detection and suppression, escape hatches and emergency lighting).

The pandemic brought the entire economy to a grinding halt when a nationwide lockdown was declared to contain its spread, thus affecting the profitability and sustainability of transporters due to lack of availability of freight demand. The industry, however, gained momentum afterwards as consumption demand and industry activity started gaining pace.

**Figure 1: Review of domestic commercial vehicle industry (in volume terms of sales)**




*Source: SIAM, CRISIL MI&A*

### 2.2.2 Segmental Trends

The commercial vehicle (CV) sales for fiscal year 2024 witnessed almost flat industry over fiscal 2023. This trajectory is underpinned by increased government spending and replacement demand. In FY2023, the CV industry exhibited remarkable recovery with a growth rate of 35% over fiscal 2022, reaching 96% of pre-pandemic levels

The Light Commercial Vehicle (LCV) witnessed a decrease of (3)% in fiscal year 2024, after an all-time high in sales in the previous fiscal. The lower utilization of vehicles coupled with the increase in asset costs led to a decline in sales. The Medium and Heavy Commercial Vehicle (MHCV) segment witnessed a stable outlook in the fiscal year

2024. In the fiscal year 2024, the bus sales sector witnessed substantial growth to 27% over fiscal 2023. This growth is anticipated to be bolstered by robust replacement demand; wherein older buses will be replaced with newer ones. In fiscal 2025, we expect CV sales to grow at a moderate rate of (2)-0% due to the impact of the upcoming union elections and the cyclical nature of the industry.

The demand from the key end-user segments coupled with the pent-up replacement demand helped the industry to mark the growth. The CV industry exhibited a strong recovery in the fiscal year 2023, achieving a remarkable growth rate of 35%, albeit on a low base, and reaching 96% of the pre-pandemic levels observed in the fiscal year 2019. This resurgence can be attributed to pent-up replacement demand, improved transporter profitability, and pick-up in capex that had been hampered during the preceding 2-3 years due to economic stagnation and the disruptive impact of the pandemic.

In the first half of fiscal 2024 the CNG prices dropped by ~4% and the diesel prices by ~3% respectively on-year. Consequently, in the LCV segment and the MHCV segment, the proportion of CNG vehicles decreased marginally by 1%. The CNG model availability was one of the major factors that lead to the drop as there were supply side constraints caused by OEMs transitioning to BS VI stage II emission standards leading to the unavailability of the LCV CNG models.

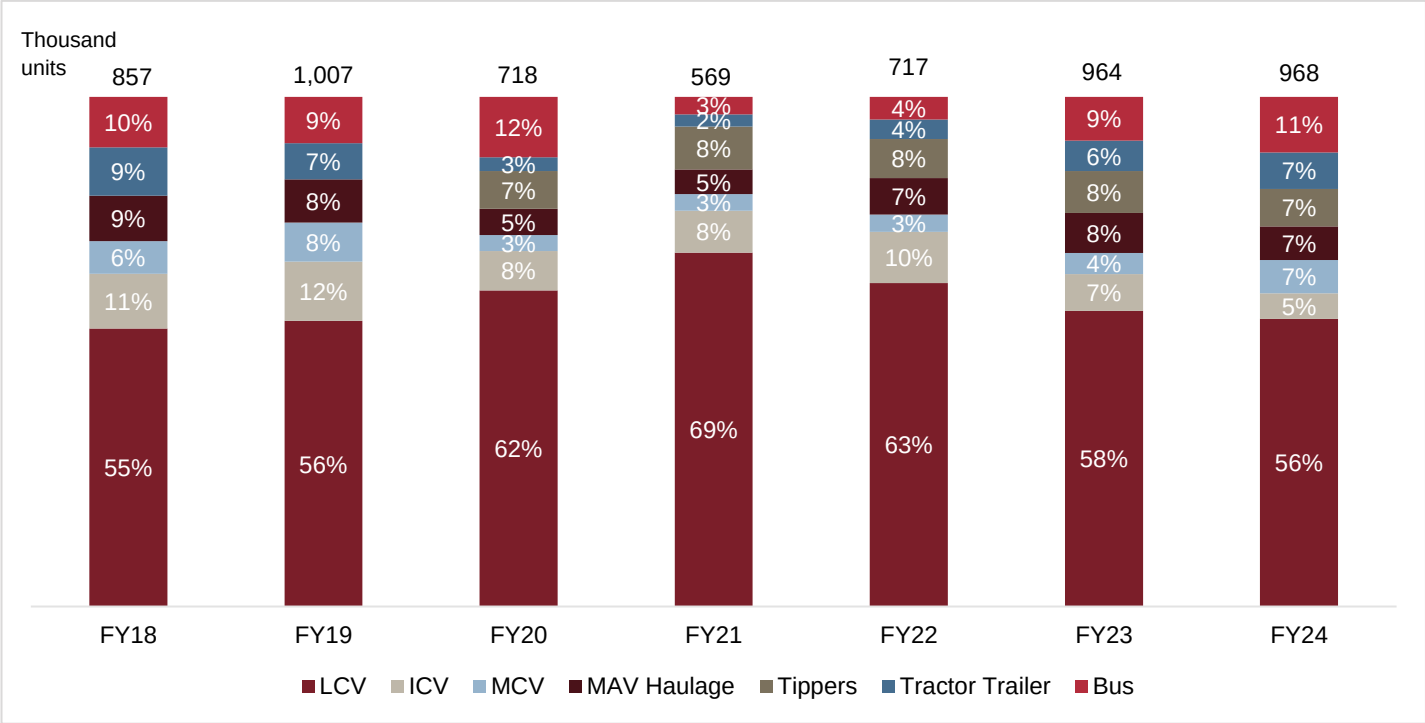
The adoption of Compressed Natural Gas (CNG) in the Light Commercial Vehicle (LCV) segment faced challenges in fiscal year 2023 due to a significant 57% increase in CNG prices relative to a minor 2% rise in diesel prices. As a result, the gap between CNG and diesel prices narrowed, leading to a reduction in the Total Cost of Ownership (TCO) benefits of CNG models. Consequently, the LCV segment observed a marginal decline in the share of CNG vehicles, indicating possible shifts in consumer preferences.

In fiscal 2024, the CNG penetration in LCV was 11% and in the Intermediate Medium and Heavy Goods Vehicle Category (IMHGV) increased to 11%. In FY 2023, the share of CNG models in the LCV market dropped from 15% in the previous fiscal year to 12%. Similarly, in the Intermediate Medium and Heavy Goods Vehicle (IMHGV) category, the share of CNG MHGV vehicles sold reduced from 11% in fiscal year 2022 to approximately 5% of total sales in FY 2023. The increased cost of CNG compared to diesel impacted demand, prompting consumers to opt for diesel-powered vehicles instead.

Despite these challenges, the long-term prospects for CNG adoption remain promising. Fluctuating fuel prices and potential government incentives for eco-friendly alternatives could potentially reignite demand for CNG-powered vehicles. Moreover, advancements in CNG technology and the expansion of refueling infrastructure may enhance the appeal of CNG models, offering a greener and more sustainable solution for the transportation sector.

In fiscal 2024, domestic CV industry is dominated by the LCV goods segment contributing to more than half of the vehicle sales. The larger M&HCV segment which includes ICV, MCV, MAV Haulage, Tractor trailers and Tippers contributes to 33%. The rest is contributed by buses in the CV segment accounting for 11%.

**Figure 2: Segment-wise share in domestic wholesale industry**




*Source: SIAM, CRISIL MI&A*

*Note: All percentages have been rounded off.*

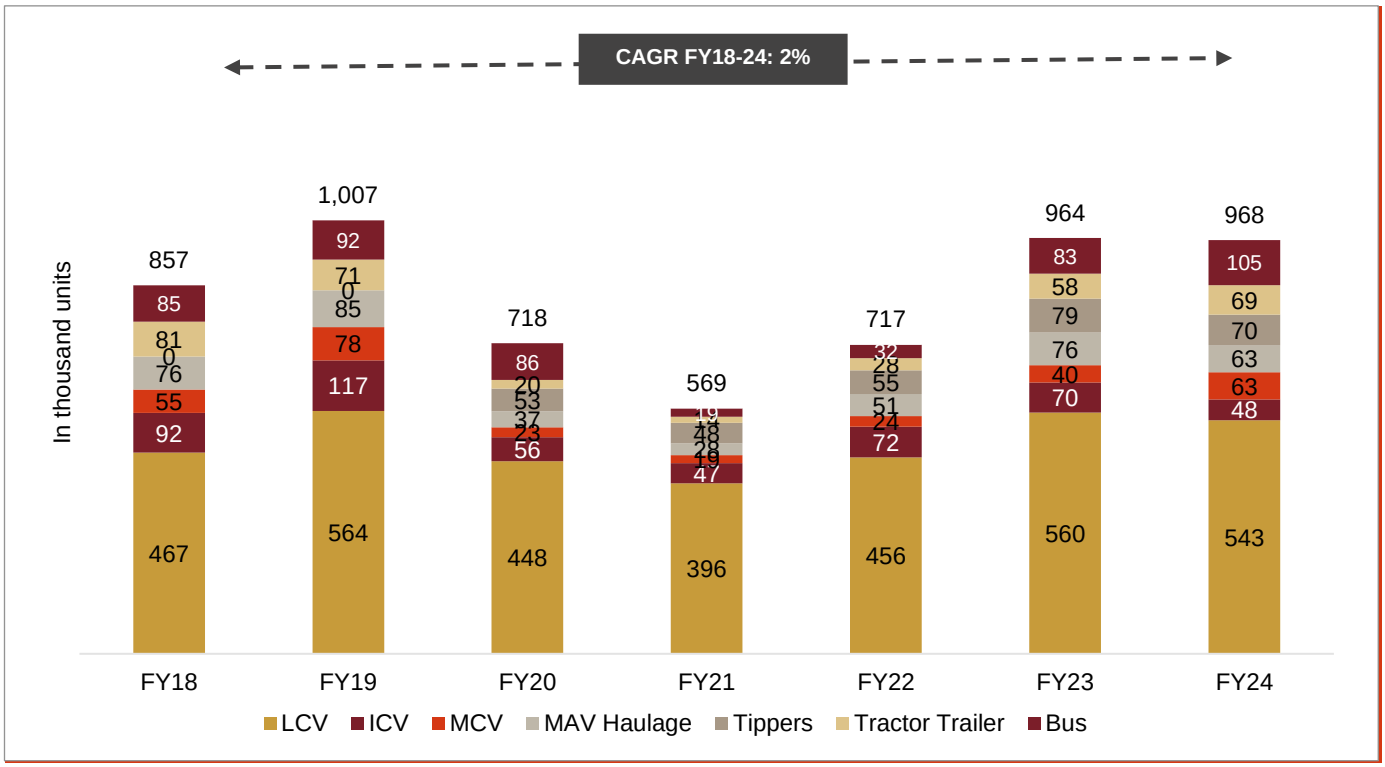
In fiscal 2024 the LCV sales declined by 3% after an all-time high in sales in the previous fiscal. The lower utilization of vehicles coupled with the increase in asset costs led to a decline in sales. In fiscal year 2023, LCV sales recorded a growth of 23%, rebounding to 99% of pre-COVID heights. The surge in sales was attributed to robust replacement demand, particularly in the sub-one-ton category, which was deferred due to economic challenges and the pandemic.

In fiscal year 2024, the MHCV segment exhibited a de-growth of 3% over the fiscal year 2023. In fiscal year 2023, MHCV sales recorded a growth of 40%, this recovery brought MHCV sales to approximately 90% of the level recorded in fiscal year 2019, a notable milestone. The resurgence in economic activities across various sectors played a pivotal role in driving this recovery.

The bus sales sector witnessed an extraordinary CAGR of 75% during fiscal 2021-2024 period and in fiscal 2024, it witnessed a growth of 27% over fiscal 2023. However, it is essential to contextualize this growth as it was achieved on a low base, indicating a significant decline in bus sales during the previous fiscal year (fiscal 2023). The sharp growth in fiscal 2024 was primarily propelled by the resumption of schools and offices, along with a robust recovery in the tourism sector, contributing to a strong rebound in bus sales.

While bus sales more than doubled every fiscal off a very low base fuelled by robust replacement demand and urbanization trends. There has been unprecedented demand for buses. Buses are sold primarily to schools, corporates which use it to ferry staff and for tours & travel companies who use it for intercity and interstate travel. School demand has picked up after the pandemic. Schools have been apprehensive these last few years due to Covid and lockdowns, however now there seems to be no fears in this regard and schools are preponing purchases, there seems to be a lot of pent-up demand from schools. Corporates have also started to operate in full swing work from office mode with a few IT giants making work from office mandatory this has led to considerable demand for staff service buses as well.

**Figure 3: Segmental sales trend**




*Note: Domestic sales are exclusive of Bharat Benz sales as the same are not reported by SIAM*

*Source: SIAM, CRISIL MI&A*

### 2.2.3 Production split by OEMs

Over fiscals 2018 to 2019, production grew at 24%, driven by pick-up in rural and industrial activity, and the government's focus on infrastructure investment. A large portion of the production increase was on robust demand for goods carriers, which clocked 19.4%. Passenger carrier production, though, declined 0.3%

In fiscal 2020, production fell by 32% compared to fiscal 2019 on account of inventory correction as the industry transitioned from BS-IV to BS-VI and a tepid demand for CVs owing to slowdown of the economy and lower government infrastructure spending post the general election.

In FY2023, the CV industry exhibited remarkable recovery with a growth rate of 35% over FY2022, reaching 96% of pre-pandemic levels. This resurgence can be attributed to pent-up replacement demand, improved transporter profitability, pick up in capex that had been hampered during the preceding 2-3 years due to economic stagnation and the disruptive impact of the pandemic.

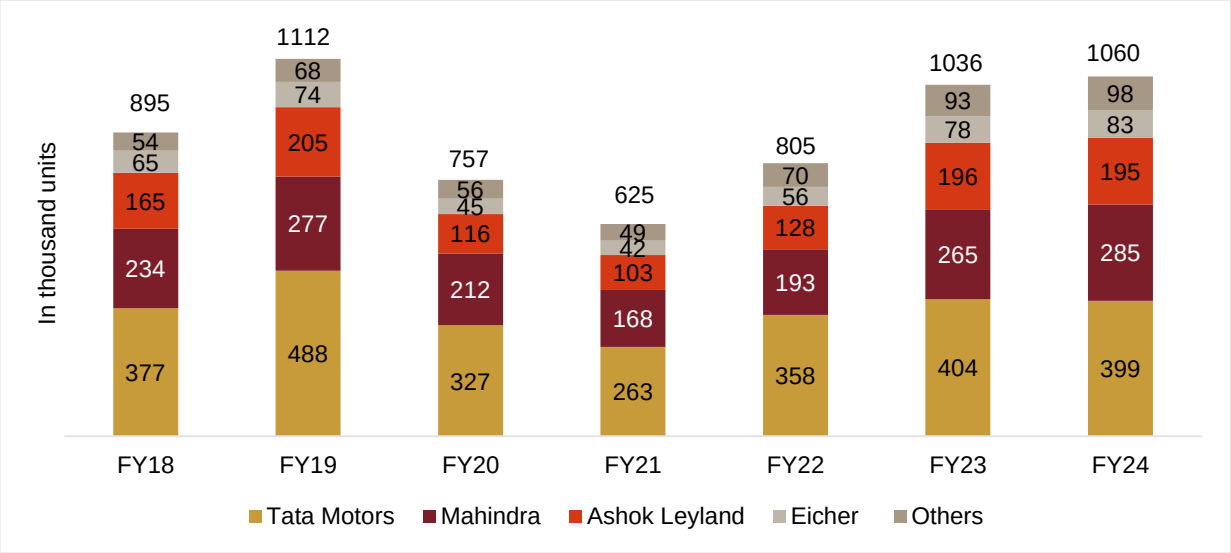
- LCV sales declined slightly from 560 thousand units in fiscal 2023 to 543 thousand units in 2024 primarily due to the high base effect and slowdown in e-commerce demand along with some cannibalisation from electric three-wheelers (e3Ws)
- In fiscal year 2023, the MHCV segment exhibited significant growth, expanding at a rate of 40%, although this was compared against a low base in fiscal year 2022. This recovery brought MHCV sales to approximately 92% of the level recorded in fiscal year 2019, a notable milestone. The resurgence in economic activities across various sectors played a pivotal role in driving this recovery.

- Bus sales witnessed growth rate of 27% in 2024 over the fiscal 2023 supported by the low base and increased demand from the State Road Transport Undertakings (SRTUs), schools & colleges and office segment. The mandatory scrappage of older Government vehicles is expected to drive replacement demand from SRTUs (with EVs gaining traction) over the near term

Overall, CV production have shown a growth of 3.0% CAGR over fiscals 2018 to 2024. Within the space, medium and heavy commercial vehicle (MHCV) production marginally increase 1.6% CAGR whereas LCV improved by 5.6%. Tata Motors is the leading producer followed by Mahindra, Ashok Leyland and Eicher.

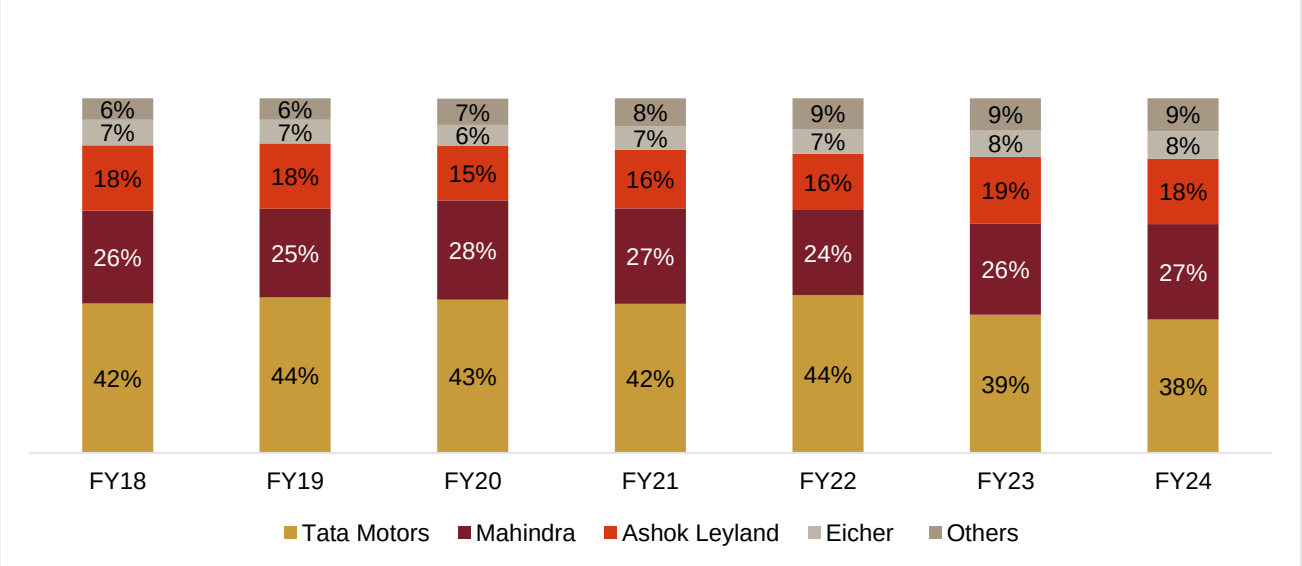
Faster growth in LCV production was on account of strong domestic demand, supported by high replacement demand over fiscals 2018 to 2020, improved rural sentiment, and growing e-commerce penetration. Even during the pandemic, improved rural sentiment and less impact of the pandemic in rural areas resulted in LCVs outperforming MHCVs.

**Figure 6: CV production split by OEMs**




*Source: SIAM and CRISIL MI&A*

**Figure 6: CV production share by OEMs**



*Source: SIAM and CRISIL MI&A*

Tata Motors leads in the CVs segment in terms of market share, followed by Mahindra & Mahindra and Ashok Leyland (ALL). Over the years, from a high base, Tata Motors has lost some ground to Mahindra and VE Commercial Vehicles Ltd.

Mahindra lost some share during fiscal 2021 and fiscal 2022 amidst the supply constraints, semiconductor shortage faced by the company. However, in fiscal 2024, Mahindra regained some ground with some easement in supply as well as with the launch of new Bolero City Pik-Up, an addition to its existing Pik-Up range as well as Furio range boosting its share. Since the launch of Boss, Ashok Leyland has rapidly gained market share in the ICV segment. In FY24, there is some pressure seen in the sub-one category that is impacting Tata Motors' share, whose Tata Ace has been a dominant one in the same category. Also, Mahindra has been benefitted due to a potential trend shift happening from sub-one tonne to pik-up category where they have strong market hold.

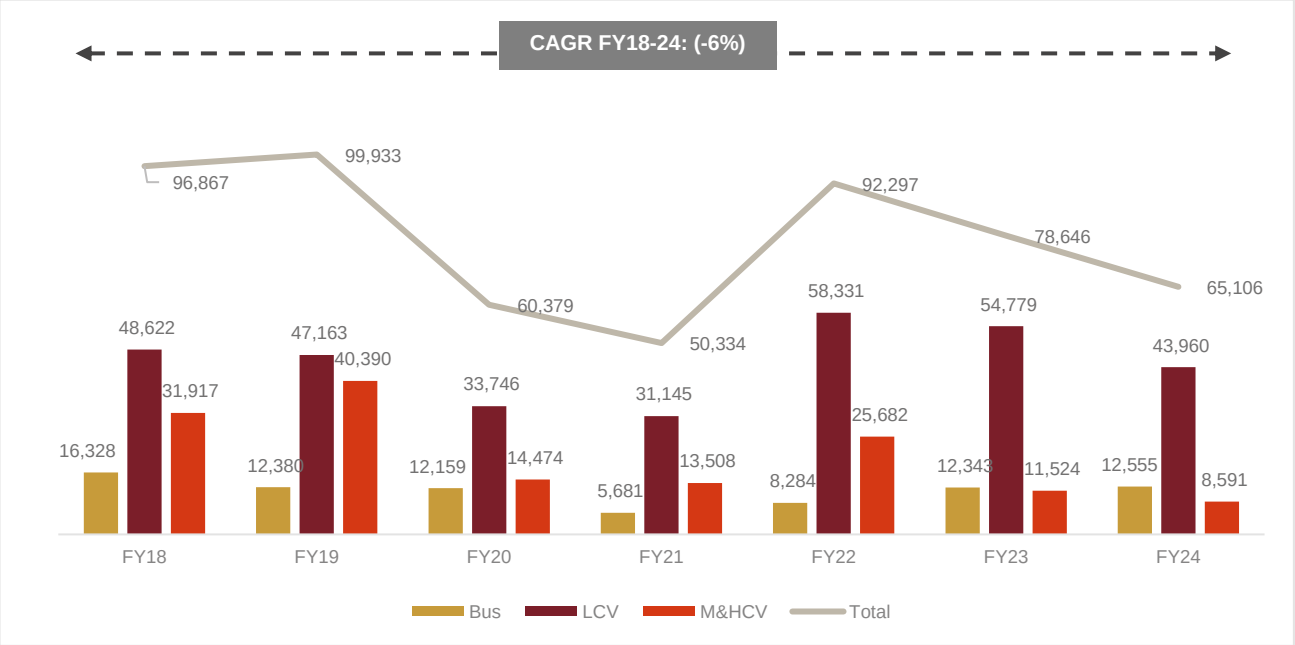
### 2.2.4 Export Trends and key export destinations

During pandemic, CV exports had fallen by 17% on year in fiscal 2021 led by drop in exports of buses by 53% on year. Push for infrastructural activities, freight availability of essential commodity cushioned CV exports in fiscal 2021. During fiscal 2022, on a low base of fiscal 2021, CV exports clocked 83% on year growth in exports with goods segment providing the thrust with 88% growth.

CV exports decreased from 14.8% in fiscal 2023 to 17.2% in fiscal 2024 on a higher base due to 25.5% decrease in MHCV and also LCV segment decreased by 19.8%. Exports in the goods segment fell by 21.1% in fiscal 2023, led by sharp decrease in the MHCV and LCV goods segment by 55.1% and 6.1% on year respectively; however, the passenger (bus) segment increased by 49% in fiscal 2023.

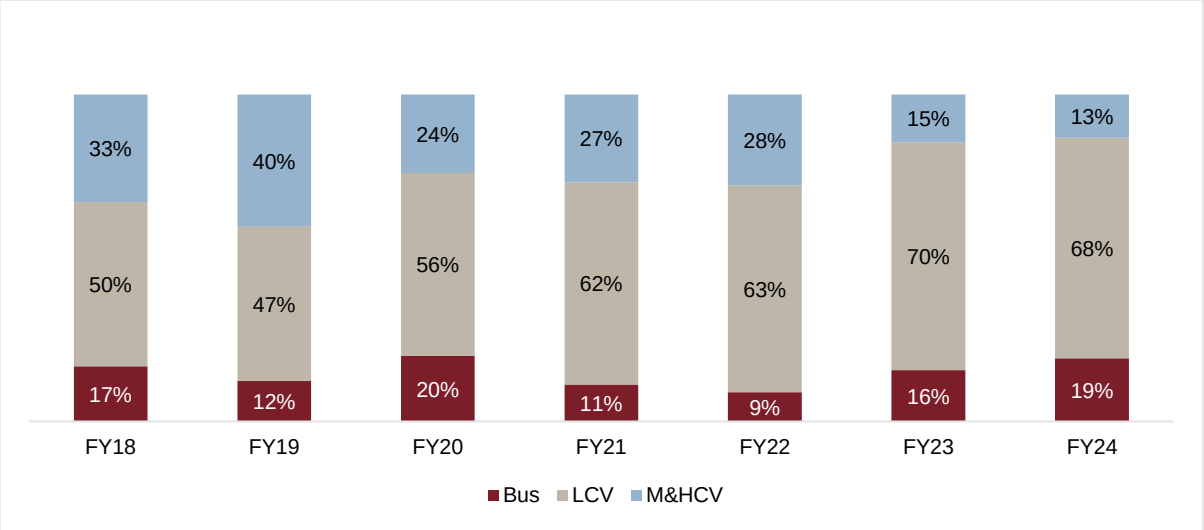
Market share of Mahindra & Mahindra grew to 32% in FY24 as against 26% in FY23 and became the largest CV exporter. Tata Motor's market share - declined to 38% in fiscal 2024 from 40% in fiscal 2023. Tata Motors and Ashok Leyland, led by their new truck range, aim to double their volumes and expect export contribution in total production to jump 15-20% in next three-five years. Tata Motors have started exporting Prima trucks to emerging markets such as Vietnam, South Africa, Malaysia and Kenya, besides other ASEAN (Association of Southeast Asian Nations), Arab and African countries.

**Figure 4: Segmental exports trend**



*Source: SIAM, CRISIL MI&A*

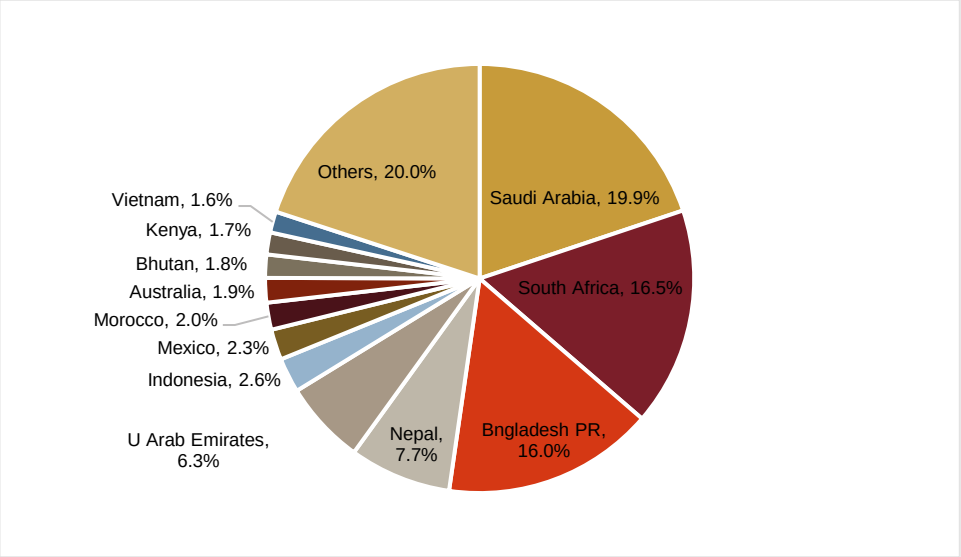
**Figure 5: Segment-wise exports share**




*Source: SIAM, CRISIL MI&A*

From an exceptionally low base of fiscal 2021, exports recorded a faster growth (83% on year) in fiscal 2022 however growth declined in fiscal 2024 by 17%.

**Figure 5: Key exports destinations in FY23**




*Source: DGFT, CRISIL MI&A*

12 countries constitute 80% of the total exports of commercial vehicles from India with Saudi Arabia being the largest importer followed by, South Africa, Bangladesh, Nepal, etc.

## 2.2.5 Growth Drivers for Commercial Vehicles in India

**Increasing freight rates to aid in materialization of deferred demand**

In fiscal year 2024, fuel prices constituted approximately 55% of transporter costs, exerting a considerable influence on their overall profitability. During this period, diesel prices experienced a modest increase of around 2%. Concurrently, freight rates also rose by an estimated 6%, signalling improved transporter profitability and heightened demand for freight services. These favourable factors are expected to boost Commercial Vehicle (CV) sales, as the industry capitalizes on the increased demand in the transportation sector

**Shift in fuel types of CVs to CNG**

The adoption of Compressed Natural Gas (CNG) in the Light Commercial Vehicle (LCV) segment faced challenges in fiscal year 2024 due to a significant 57% increase in CNG prices relative to a minor 2% rise in diesel prices. As a result, the gap between CNG and diesel prices narrowed, leading to a reduction in the Total Cost of Ownership (TCO) benefits of CNG models. Consequently, the LCV segment observed a marginal decline in the share of CNG vehicles, indicating possible shifts in consumer preferences.

In fiscal 2023, the share of CNG models in the LCV market dropped from 15% in the previous fiscal year to 12%. Similarly, in the Medium and Heavy Goods Vehicle (MHGV) category, the share of CNG MHGV vehicles sold reduced from 11% in fiscal year 2022 to approximately 5% of total sales in fiscal 2023. The increased cost of CNG compared to diesel impacted demand, prompting consumers to opt for diesel-powered vehicles instead.

In fiscal 2023, with the Kirit Parikh committee recommendations on CNG pricing, CNG prices have declined by 4% to Rs 74/kg. This decline in prices will open the difference in total cost of ownership between Diesel and CNG favouring CNG transition.

In the first half of fiscal 2024 the CNG prices dropped by ~4% and the diesel prices by ~3% respectively on-year. In the LCV segment and the MHCV segment, the proportion of CNG vehicles decreased marginally by 1%. The CNG model availability was one of the major factors that lead to the drop as there were supply side constraints caused by OEMs transitioning to BS VI stage II emission standards leading to the unavailability of the LCV CNG models.

Despite these challenges, the long-term prospects for CNG adoption remain promising. Fluctuating fuel prices and potential government incentives for eco-friendly alternatives could potentially reignite demand for CNG-powered vehicles. Moreover, advancements in CNG technology and the expansion of refuelling infrastructure may enhance the appeal of CNG models, offering a greener and more sustainable solution for the transportation sector.

**Stable agricultural output**

Over fiscal 2024 to 2029, CRISIL projects 3-4% gross value added (GVA) growth in agriculture. In fiscal 2024, Agri GVA grew at 2% over last year and expected to remain steady in coming years.

In the current fiscal, kharif sowing was initially delayed due to the delayed monsoon. However, sowing has picked up in recent months. Moreover, higher MSP allocation for fiscal 2024 and good prices in mandis have maintained the positivity on-ground. Going ahead, the rainfall progress and spread to play a key role for the current kharif cycle. The progress of the monsoon and its impact on rural demand especially for two wheelers and tractors, remain as key monitorable.

**Healthy industrial growth**

The Indian industry's GVA grew at a tepid pace of 3.7% between fiscals 2019-2024 After ~5% growth in fiscal 2019, industrial GVA witnessed contraction in the next two years amidst the unfavourable macroeconomic scenario and the Covid pandemic.

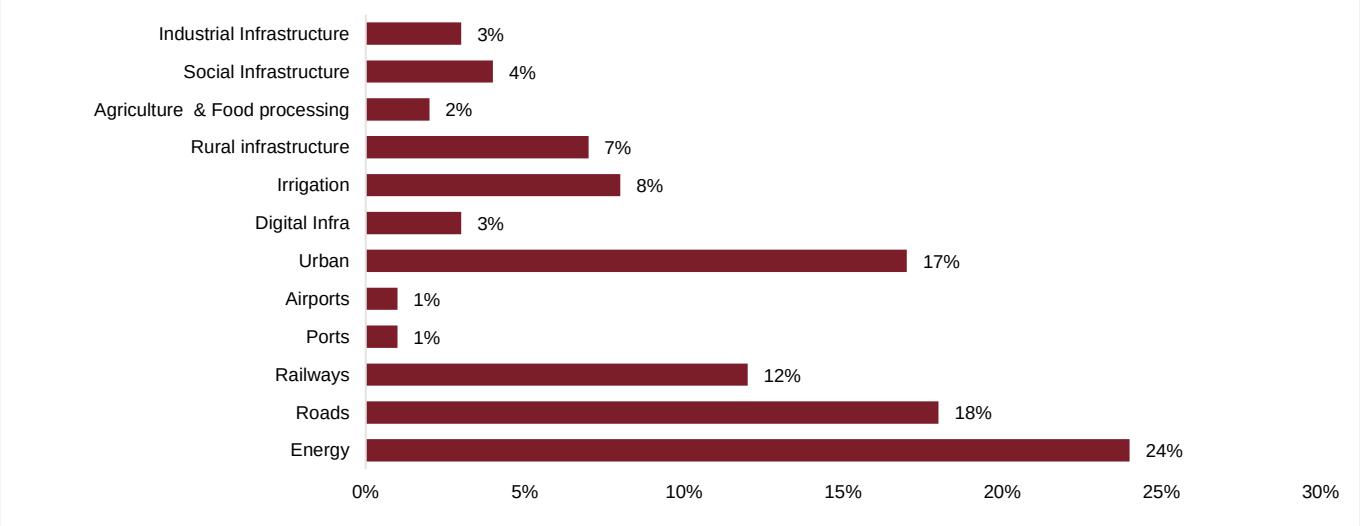
From the low base of fiscal 2021, industrial GVA bounced back rapidly in fiscal 2022 and grew at ~11.5%. Gradual improvement continued in fiscal 2023 at 4.4% and ~3% in 2024. Over the next five-year period (fiscal 2024-2029), industry GVA is expected to be robust driven by the government's focus on 'Make in India'. Moreover, improvement

in infrastructure and higher expected corporate expenditure is likely to support the capex cycle going forward post fiscal 2024.

### Government's focus on infrastructure

The National Infrastructure Pipeline (NIP) for fiscal 2019-2025 is a government initiative to develop infrastructure across the country and provide world class services to its citizens. The total capital expenditure in infrastructure sectors in India during fiscal 2020 to 2025 is projected at Rs 111 lakh crore.

**Figure 7: Sectoral break-up of NIP amounting to Rs 111 lakh crore at launch**




*Source: Department of Economic Affairs - NIP Volume I, CRISIL MI&A*

The NIP plan aims to double infrastructure investment per year from the current average of Rs 10 lakh crore per year to Rs 22 lakh crore per year. Of the total NIP investment of Rs 111 lakh crore, Rs 44 lakh crore (40%) worth of projects are under implementation, Rs 34 lakh crore (30%) worth of projects are at the conceptualisation stage, and Rs 22 lakh crore (20%) worth of projects are under development. Almost 83% of project allocation indirectly benefits the CV sector in India, and this push for infrastructure is a major driver of growth.

### Focus on infrastructure and higher mining production to bolster tipper demand

The budgeted capex allocation for infrastructure ministries for fiscal 2024 has shown a 28% increase over fiscal 2023 RE (revised estimates) to Rs. 18.6 lakh crore. Execution by the National Highways Authority of India (NHAI) will reach up to ~14-15 km/day in fiscal 2027, as against ~11 km/day in fiscal 2021, aided by the Bharatmala project. Projects such as Sagarmala and investments in various irrigation projects will further drive MHCV demand. We expect coal production to expand at ~4.5-5.5% CAGR between fiscals 2024 and 2029, while iron ore mining will also likely grow at ~3.5-4.5% CAGR during this period, aiding tipper demand.

### Capacity utilization and profitability of transporters

Utilization of transporters depends on:

- Availability of freight - driven by growth in industrial and agricultural production and port traffic
- Regulations on vehicle age, weight, permit and tax norms
- Improvements in road infrastructure, which improve the turnaround time

A rise in utilization translates into better cash flow for transporters and, hence, augurs well for CV sales.

Factors influencing transporter profitability are:

- Freight rates and capacity utilization
- Bargaining power
- Fuel cost and fuel efficiency
- Capital cost
- Agency commission and wage cost
- Operating and maintenance costs, such as tyre prices and toll rates

The dynamics of the domestic freight transport industry (DFTS) play an important role in determining demand for CVs.

**Replacement demand**

LCVs are typically replaced every 6-8 years, and vehicles purchased between fiscal years 2011 and 2013 were due for replacement in fiscal year 2019.. This strategic replacement cycle contributed to stable sales in fiscal year 2019 and prevented a major decline in LCV sales in fiscal year 2020 after robust sales in fiscal years 2018 and 2019. The postponement of replacement volumes since fiscal year 2020 has further supported LCV demand volumes in fiscal year 2024 and is expected to sustain growth in fiscal year 2025.

JNNURM – I (Jawaharlal Nehru National Urban Renewal Mission) buses, sold during the peak seasons of fiscals 2011 and 2012, are expected to be replaced once funds are released by the central and state governments for purchase. This replacement is expected to gain pace now, aiding long-term MCV bus growth. The government's mandate to replace private vehicles (such as vans) with school buses in some cities, is also expected to augur well.

Also, the centre’s scrappage policy is likely to attract 6,00,000-6,50,000 MHCV vehicles for scrapping there by driving the replacement demand.

**Scrappage policy**

MoRTH, in August 2018, considered incentivizing the scrapping of vehicles sold before April 2005 (15 years old). After deliberations on the modalities on implementation of the norm, the government currently aims to promote vehicle scrapping by exempting registration charges for truck purchases made after scrapping older trucks. To incentivize scrappage of older vehicles, the government has increased the registration charges for older vehicles and increased stringency of fitness tests. These will entail higher costs for owners of older vehicles. Hence, by disincentivizing the ownership of older vehicles, the government expects the scrappage of older vehicles to increase. We expect the impact of the norms to be limited on additional scrappage (apart from vehicles scrapped in the normal course of business). If, through higher incentives from the government and OEMs, transporters are able to be incentivized to scrap vehicles older than 15 years, we expect 6,00,000-6,50,000 MHCVs to be available for scrapping. Although translation of the same into demand for new CVs will be a monitorable based on implementation and incentivization levels.

**Commissioning of dedicated freight corridors (DFCs) to put brakes on road freight and hence CV sales**

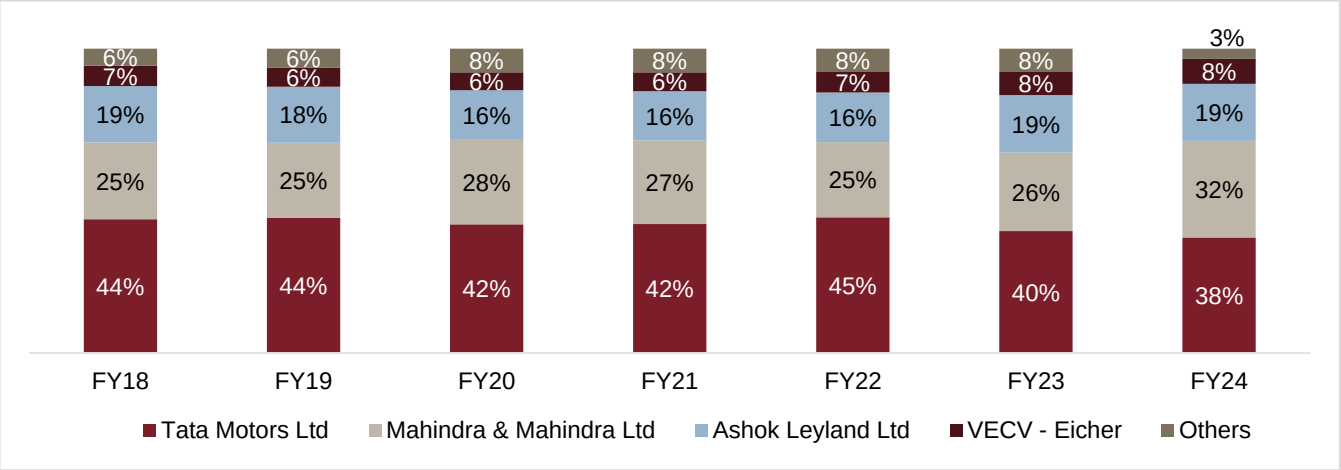
The DFCs are expected to help the Indian Railways regain its lost freight share, by reducing turnaround times between the importing and consuming destinations. Not only will the DFC induce faster freight movement, but it will also allow for faster evacuation of cargo from the ports, thereby improving efficiency. In fact, the DFCs and the associated logistics parks are likely to help industries significantly reduce their plant-level inventory as well, enabling savings in working capital. Moreover, the shifting of freight to rail will aid the economy by decongesting major highways.

Thus, the roads segment, which has outperformed rail over the past decade, could lose some share once the DFCs are commissioned.

### 2.2.6 Macroeconomic trends - Competitive Scenario

Tata Motors leads in the CVs segment in terms of market share, followed by Mahindra & Mahindra and Ashok Leyland (ALL). Over the years, from a high base, Tata Motors has lost some ground to Mahindra & VECV

**Figure 8: Overall CV industry split by market share across OEMs**

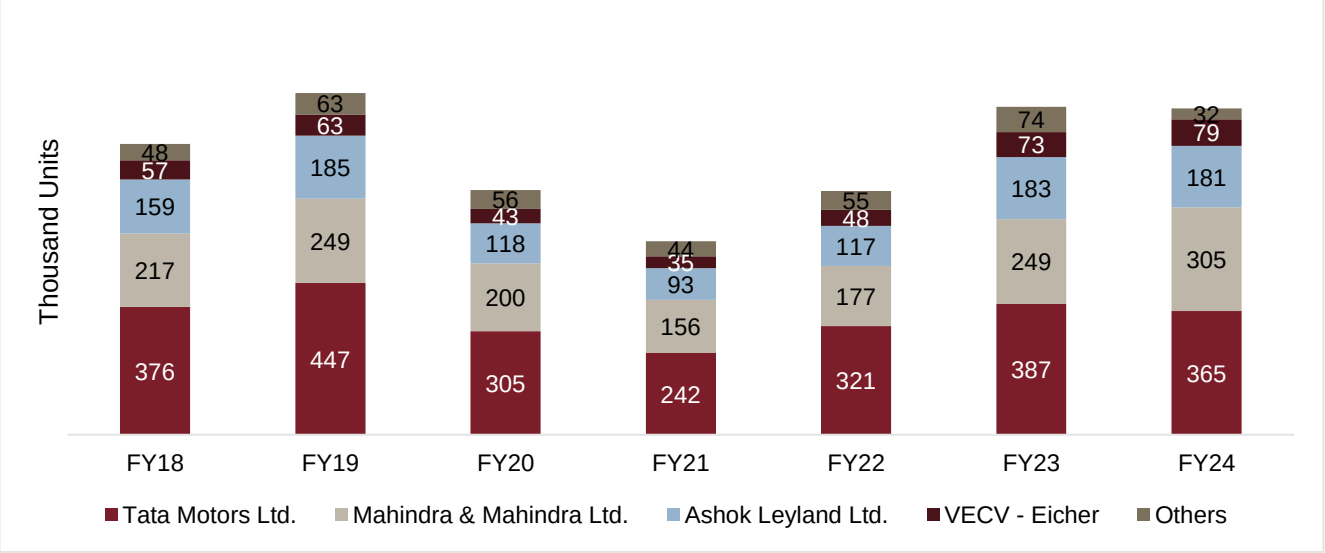



*Note - Other players are Force Motors Ltd., Isuzu, JBM auto ltd, Maruti Suzuki Ltd, Olectra Greentech Limited, Piaggio Vehicles Pvt. Ltd., SML Isuzu Ltd., Swaraj Mazda Ltd., Toyota Kirloskar Motor Pvt Ltd., VECVs – Volvo and Volvo Group India Pvt Ltd.*

*Note: All percentages have been rounded off.*

*Source: SIAM, CRISIL MI&A*

**Figure 9: CV industry split by OEM Wholesale Volumes**




*Note - Other players are Force Motors Ltd., Isuzu, JBM auto ltd, Maruti Suzuki Ltd, Olectra Greentech Limited, Piaggio Vehicles Pvt. Ltd., SML Isuzu Ltd., Swaraj Mazda Ltd., Toyota Kirloskar Motor Pvt Ltd., VECVs – Volvo and Volvo Group India Pvt Ltd.*

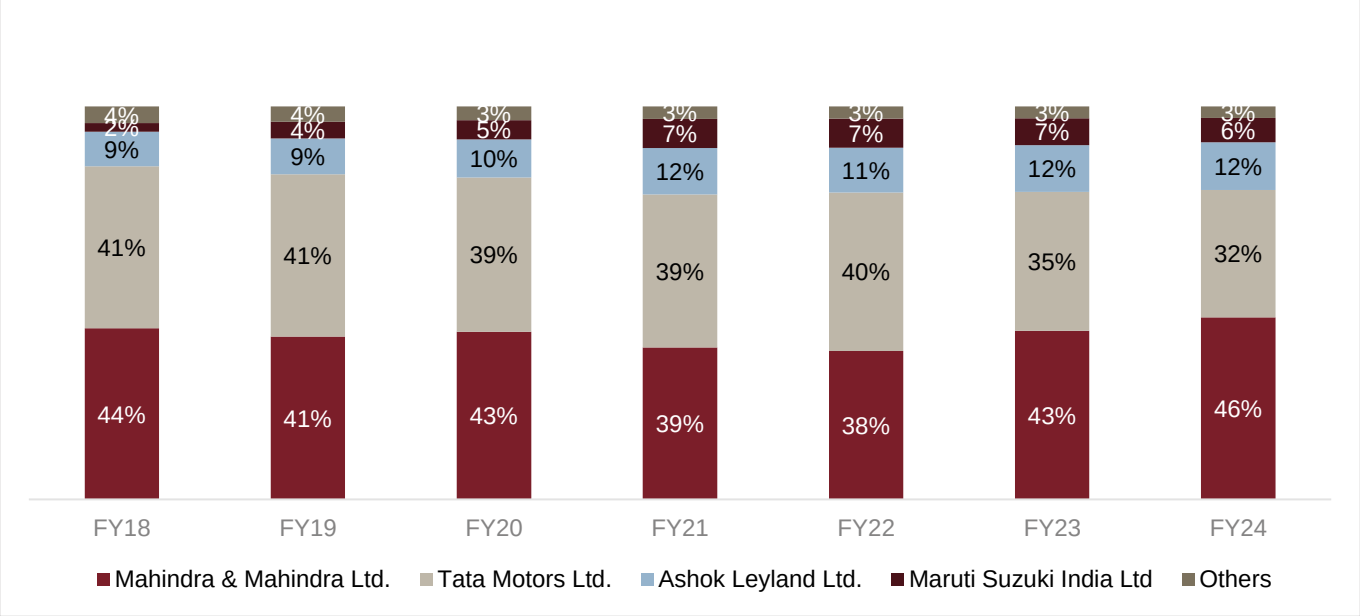
*Note: All percentages have been rounded off.*

*Source: SIAM, CRISIL MI&A*

Mahindra lost some share during fiscal 2021 and fiscal 2022 amidst the supply constraints, semiconductor shortage faced by the company. However, in fiscal 2023, Mahindra regained some ground with some easement in supply as

well as with the launch of new Bolero City Pik-Up, an addition to its existing Pik-Up range as well as Furio range boosting its share. Since the launch of Boss, Ashok Leyland has rapidly gained market share in the ICV segment. In FY24, there is some pressure seen in the sub-one category that is impacting Tata Motors' share, whose Tata Ace has been a dominant one in the same category. Also, Mahindra has been benefitted due to a potential trend shift happening from sub-one tonne to pik-up category where they have strong market hold.

**Figure 10: LCV Goods Segment split by market share across OEMs**

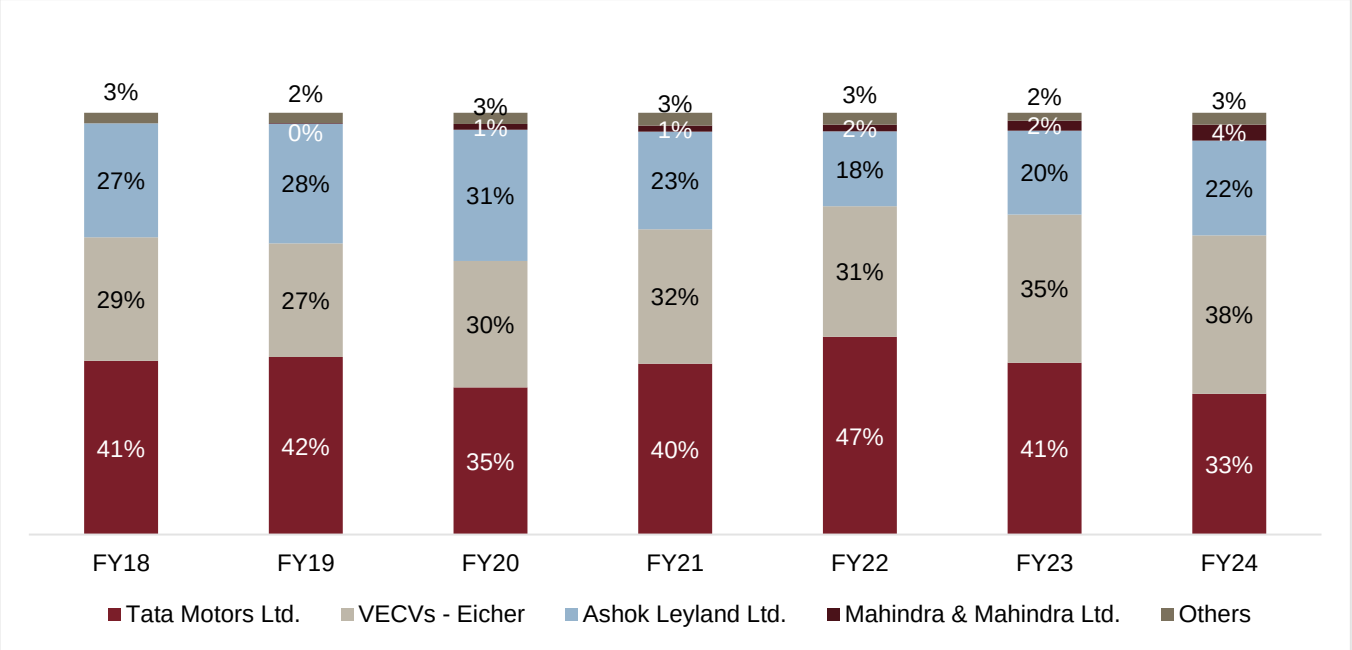



*Note: Others include VECVs Eicher, Swaraj Mazda Ltd, Tata Motors, Force Motors Ltd, Isuzu, Toyota Kirloskar Motor Pvt Ltd and Piaggio Vehicles Pvt Ltd*

*Note: All percentages have been rounded off.*

*Source: SIAM, CRISIL MI&A*

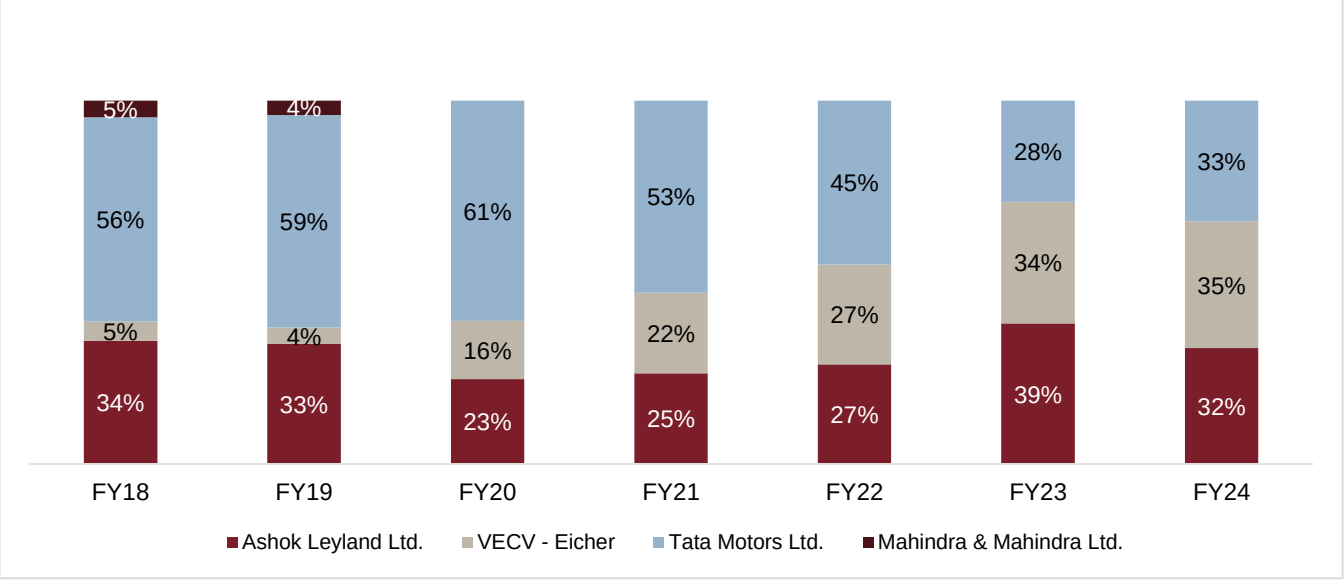
**Figure 11: ICV Goods segment split by market share across OEMs**




*Note: Others include Swaraj Mazda Ltd and SML Isuzu Ltd*

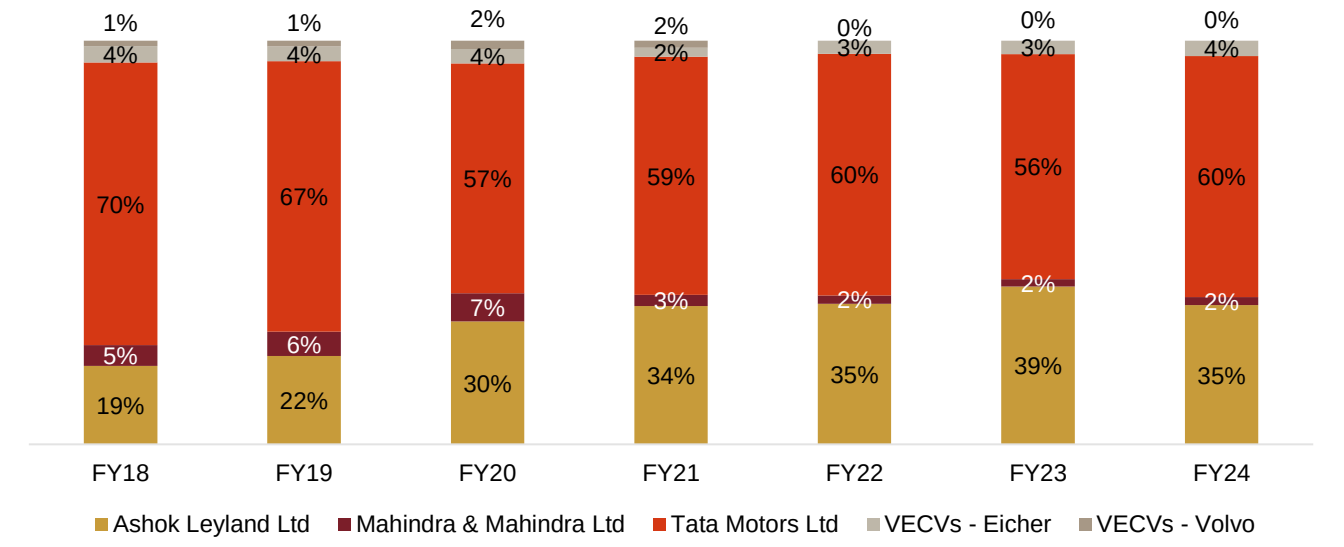
*Note: All percentages have been rounded off.*
*Source: SIAM, CRISIL MI&A*

**Figure 12: MCV Goods segment split by market share across OEMs**



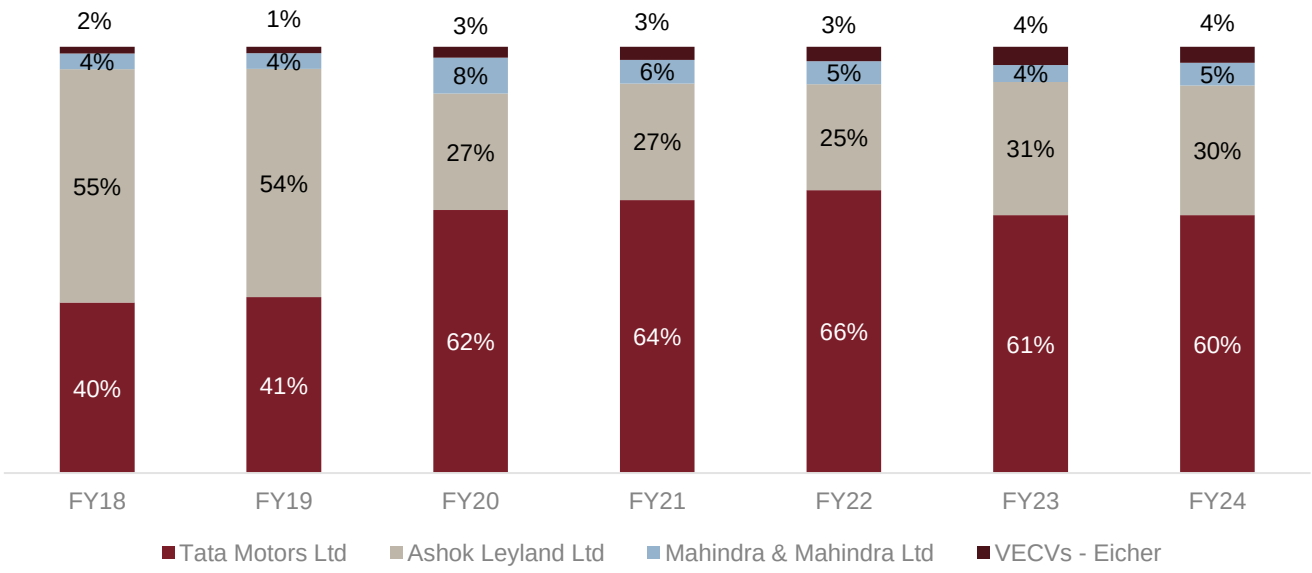

*Source: SIAM, CRISIL MI&A*

**Figure 13: MAV Haulage and Tipper Goods segment split by market share across OEMs**




*Note: Combined number of MAV Haulage and Tipper*
*Note: All percentages have been rounded off.*
*Source: SIAM, CRISIL MI&A*

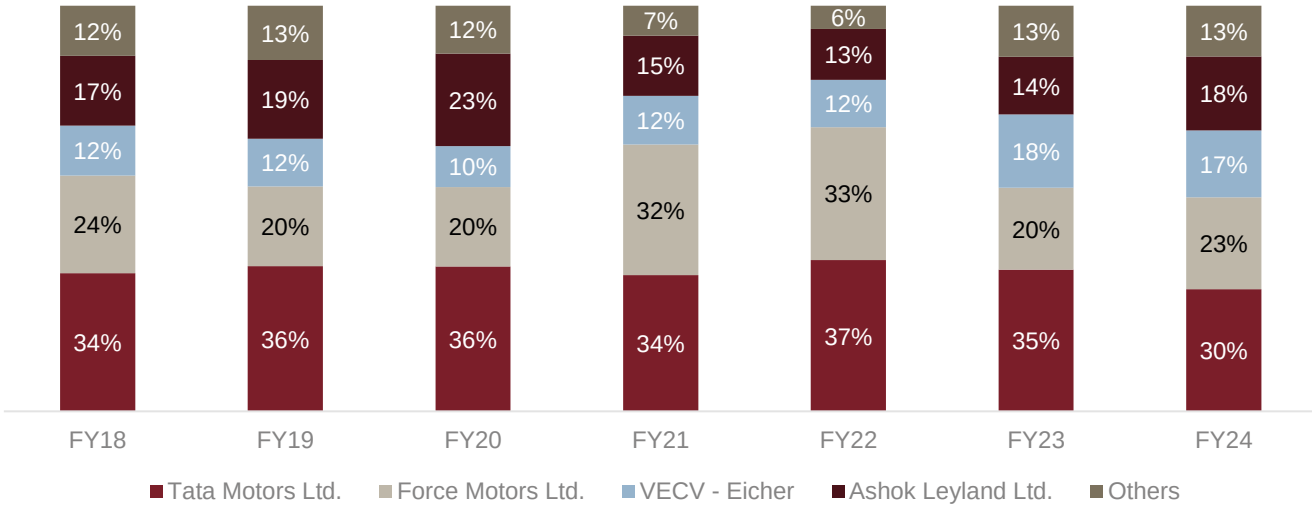
**Figure 15: Tractor Trailer segment split by market share across OEMs**




*Note: All percentages have been rounded off.*

*Source: SIAM, CRISIL MI&A*

**Figure 16: Bus segment split by market share across OEMs**




*Note: All percentages have been rounded off.*

*Source: SIAM, CRISIL MI&A*

### 2.2.7 Macroeconomic trend - CV Finance Industry

CV financing saw a de-growth in fiscal 2021 as the pandemic had a severe impact on demand amid nationwide lockdowns. This was in addition to the challenges that the industry was facing on account of price hikes post BS-VI implementation. Disbursements were further impacted in the first quarter of fiscal 2022 due to the second pandemic

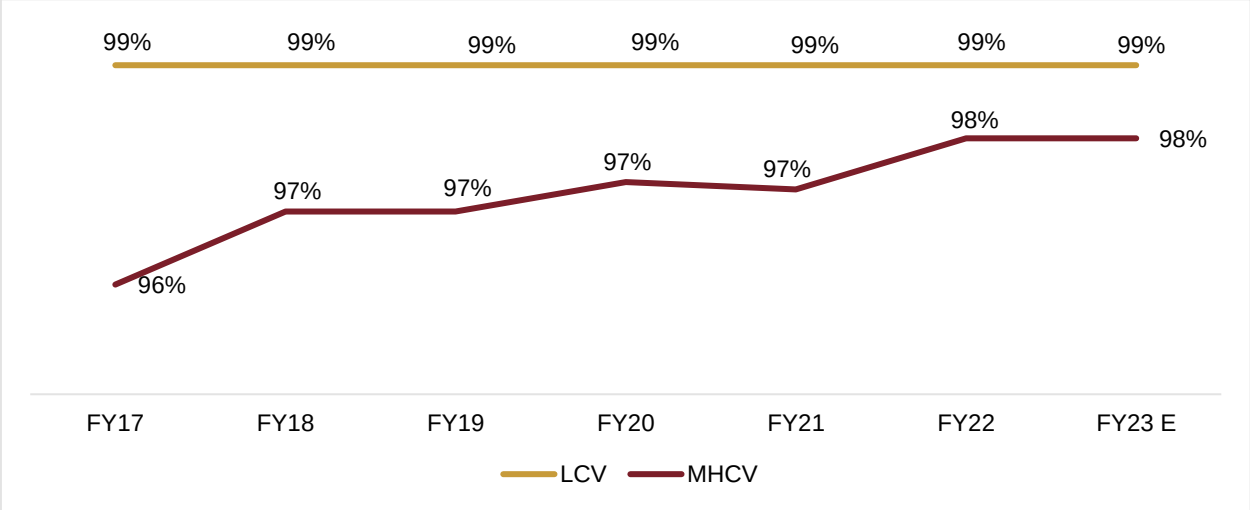
wave, though most players saw their disbursements pick up from the second and third quarters of fiscal 2022, both on-month and on-year. Overall, in fiscal 2022, disbursement demand picked up for most players due to increase in private consumption and freight demand, leading to 46% growth. HCVs saw higher growth in disbursements compared with LCVs.

Disbursements in fiscals 2024 showed an uptick over a high base as wholesale sales are expected to pick up, aided by higher replacement volume, economic recovery and higher government spend on infrastructure. Prices for OEMs showed a slower rise of 3-4% in fiscals 2024, due to heavy cash discounting expected at dealer levels, which would push up sales and further support volume. Financing penetration is expected to remain high and LTVs are expected to inch up.

The top 20 cities account for 40-45% of the total outstanding CV financing portfolio. These cities account for a greater share of MHCV loans, which have an average ticket size of about Rs 1.2 - 1.3 million compared with ticket sizes of about Rs 0.35 - 0.45 million for LCVs. The proportion of LCV sales is higher in regions outside the top 20 cities.

**Figure 17: Finance penetration for LCV and MHCV segment**

The CV finance industry is already highly penetrated. Typically, around 97% of the vehicles purchased are funded externally. Within segments, LCVs have marginally higher finance penetration compared to MHCVs owing to the lower vehicle price and the better credit profile of the customers.




*Source: CRISIL MI&A*

## 2.2.8 Key regulatory changes

Recent regulations on new commercial vehicles (CVs) such as the axle norm, bus body code, mandatory anti-lock braking system, speed governors, BS-VI norm enforcement, and mandatory cabin ventilation system have already had an impact on the industry. We anticipate that the effects of newer fuel-efficiency standards, BS-VI phase 2 norms, truck body code, and new scrappage policy will be felt in the long run.

**Axle load norms**

In the second half of fiscal 2019, the MoRTH had notified new axle load norms for CVs, which allow for an increase in the load-bearing capacity of trucks. The new norms were applicable to the entire fleet of freight-moving trucks – called the 'population parc'.

**Table 1: New payloads stipulated for M&HCVs**

| (in Tonnes) | MCV | | MAV | | | T-Trailer | |
|---|---|---|---|---|---|---|---|
| Previous GVW | 16 | 25 | 31 | 37 | 35 | 40 | 49 |
| Previous Payload | 9 | 16.5 | 21 | 26 | 23 | 27 | 35 |
| Kerb weight | 7 | 8.5 | 10 | 11 | 12 | 13 | 14 |
| GVW as per new norm | 18.5 | 28 | 35 | 42 | 39.5 | 45.5 | 55 |
| New Payload | 11.5 | 19.5 | 25 | 31 | 27.5 | 32.5 | 41 |
| % increase in rated payload | 28% | 18% | 19% | 19% | 20% | 20% | 17% |

*Source: CRISIL MI&A*

Although the new axle load norms increased freight-carrying capacity of trucks by ~20%, the benefit was availed by transporters ferrying bulk goods, which constitute 35-40% of the truck movement. The movement of bulk goods in billion tonne-kilometre (BTKM) terms via road fell marginally in fiscal 2020 amid the ~20% rise in capacity for bulk goods transporters. Therefore, bulk goods transportation via roads largely continued to face overcapacity, limiting new truck purchases.

The only saving grace would be transportation of voluminous non-bulk goods (60-65% of truck movement), which, while being unaffected by the axle norms, were impacted by slowing consumption in fiscal 2020. Moreover, as some bulk transporters were already overloading near or moderately above the new payload levels, the impact of the axle norms for such transporters would be less.

Post implementation of the axle norms, the payload of the erstwhile 5 Axle truck (e.g. old 37T) can now be carried by a 4 axle truck ( e.g. new 35T) . Also, the erstwhile 49T T-trailer's payload has now increased from 35T to almost 40T.

**Truck body code**

All goods vehicles (>3.5T GVW), manufactured either by a vehicle manufacturer or a body builder on drive-way chassis vehicles, had to comply with the provisions of AIS-093 (Revision 1) in two stages — the first stage of compliance in October 2018 and the second stage in October 2019. We believe compliance with this code led to a cumulative price rise of ~5%.

With standardization in truck body building, there was consolidation among truck body builders as small players found it difficult to meet the testing requirements. With standardization, financiers are believed to have been more willing to fund the generally unsupported body building cost. This is estimated to have reduced the initial down payment, minimizing the impact of the 5% rise in the cost of ownership.

**Fuel efficiency norms**

To make heavy-duty trucks and buses more fuel efficient, the Ministry of Petroleum and Natural Gas, MoRTH, and the Ministry of Heavy Industries are in talks to notify fuel efficiency norms. Based on talks with various stakeholders, BS-IV compliant diesel vehicles of categories M3 and N3, with GVW of 12T and above, will have to comply with these norms. Vehicles are expected to meet the 'target diesel fuel consumption' value for a specific set of speeds, which is dependent on the vehicle's GVW, axle configuration, and category (N3/M3). Fiscal

**Emission norms**

Bharat Stage (BS) emission standards are issued by the government to regulate the output of air pollutants from motor vehicles. In January 2016, the central government decided to skip BS-V and transition directly to BS-VI norms, fixing April 1, 2020 as the deadline for introduction of BS-VI emission norms.

BS-VI phase 2 implemented from April 2023, entailed an addition of on-board self-diagnostic device (OBD2) to monitor real time emissions. The addition of OBD2 will also require upgrades to hardware and software of the vehicles to comply with the new norms which resulted in a price hike of 2-4%.

**Higher safety measures for buses**

Safety regulations regarding vehicle tracking and panic buttons were introduced in January 2019. Later, regulations related to fire detection system, escape hatches, emergency lighting, and emergency doors were implemented in April 2019. These regulations resulted in bus prices increasing by Rs 65,000, in addition to regular price increases.

**Air-conditioned driver Cabins**

The Indian government's approval of mandatory air-conditioning (AC) systems in truck cabins for categories N2 and N3, effective from January 2025, is set to improve working conditions for truck drivers and address driver fatigue concerns, ultimately enhancing road safety. The new regulation will require truck manufacturers to sell vehicles with pre-fitted AC cabins, incurring an extra cost. Despite the initial financial impact, the long-term advantages in terms of driver well-being and overall efficiency are likely to outweigh the costs.

### 2.2.9 Historic growth drivers for Indian CV exports

More than 90% of the commercial vehicle exports are to Asia, Africa, and Middle East regions.

In Asia, demand from Bangladesh, Sri Lanka and Nepal drives the CV exports. Since, all the major markets are developing nations, increase in infrastructure activities has been the major drivers in CV exports from India. Geopolitical issues (border tensions) create challenges in exports.

During pandemic, CV exports had fallen by 17% on year in fiscal 2021 led by drop in exports of buses by 53% on year, largely on account of restricted passenger mobility across export markets. Push for infrastructural activities, freight availability of essential commodity cushioned CV exports on the goods side in fiscal 2021.During fiscal 2022, on a low base of fiscal 2021, CV exports clocked 83% on year growth in exports with goods segment providing the thrust with 88% growth.

However, in fiscal 2023 exports growth declined by 15% from a high base of fiscal 2022 owing to weak demand from countries such as Sri Lanka, Nepal, and Bangladesh due to economic strain in these countries. Further devaluation of currencies in export destinations including Africa and other developing nations limited the export growth.

### 2.2.10 Current EV penetration in CVs

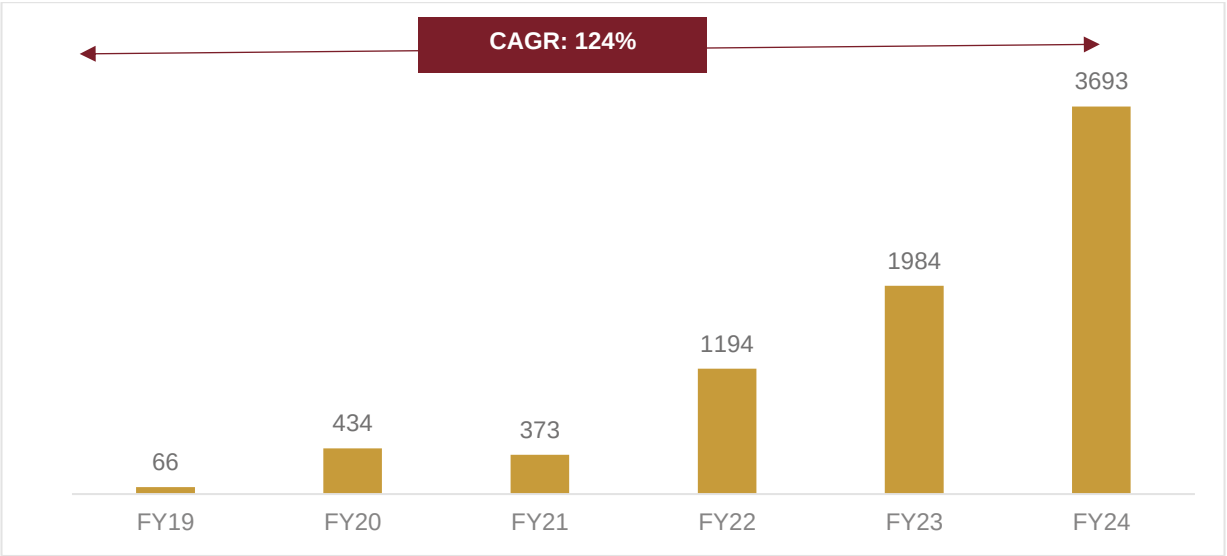
The Government of India has undertaken several steps to ensure proliferation of electric vehicles, such as FAME I &II, Phased Manufacturing Program and PLI to name a few. The same has been supported by lucrative state EV policies, which a few progressive states have released.

Electric vehicles share of various vehicles segments such as two wheelers, three wheelers, passenger vehicles and buses are still in single digits despite multiple measure by the Government to support electric vehicle sales. EV penetration is low currently due to many issues such as limited presence of mainstream OEMs, model availability in certain segments like motorcycles, lack of charging infrastructure, financing availability etc.

Currently, most EVs used in the commercial segment as goods carries are three-wheelers and LCVs are picking pace. However, as the cost differential between electric and diesel vehicles start reducing, CRISIL expects new models to be launched, which will drive sales in the segment as the third-mile logistics and local distribution of goods are well suited applications for electric vehicles.

Due to the Government support through FAME and then followed by EMPS and focus on quicker adoption of EVs in public transport, there has been significant increase in electric bus sales in the last couple of years. Operational profile of buses with fixed routes and regular stops makes them suitable for charging at pre-determined intervals and specific locations.

**Figure 18: EV registration trend in buses (no. of units)**

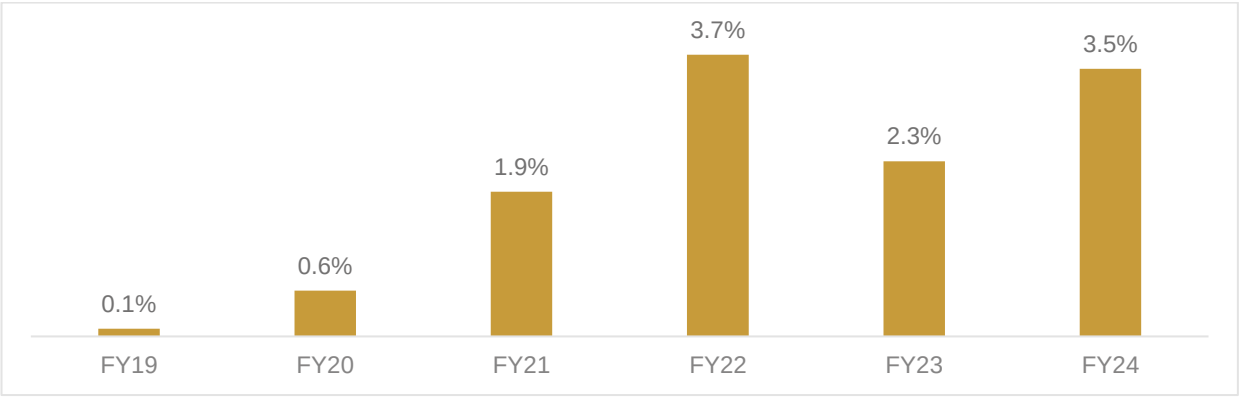



*Source: VAHAN, CRISIL MI&A*

However, EV bus registrations skyrocketed in the last 3 years backed by adoption by State Transport Undertaking (STU) as aided by government incentives. During fiscal 2019-2024 period, EV bus registration increased at a rapid pace of 124% CAGR

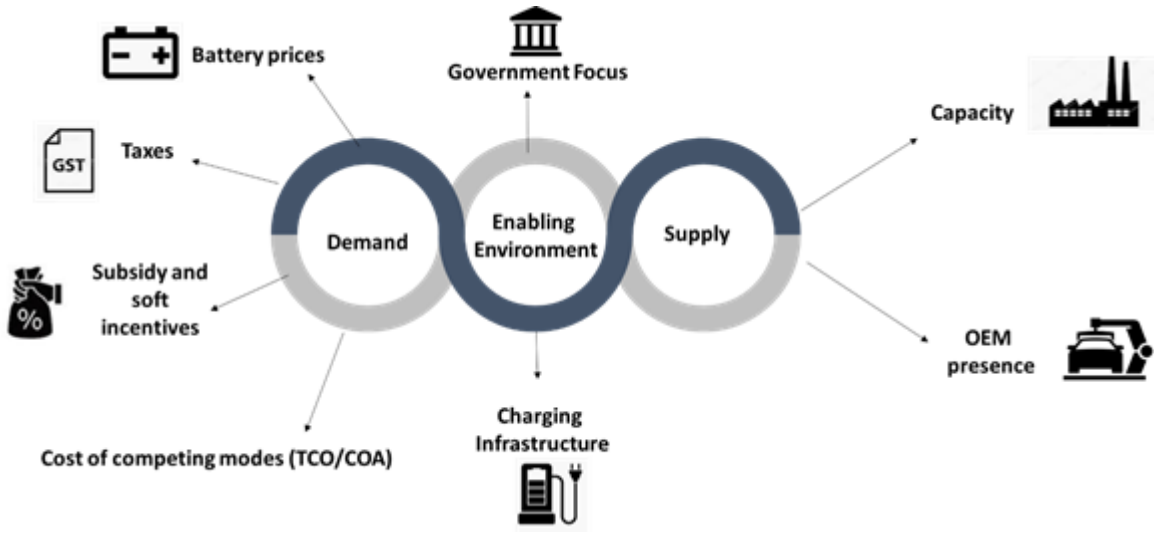
EV penetration was insignificant till fiscal 2019, it gained some pace during fiscal 2020 reaching about 0.6%. Following which, in FY21 and FY22 we saw penetration of 3.7% and 2.3% on a account of low base effect as the overall buses Industry was subdued on account of COVID. Growth momentum continued in fiscal 2024 with y-o-y growth of 86% reaching more than 3,600units.

**Figure 19: EV penetration in buses**




*Source: VAHAN, CRISIL MI&A*
*Note: FY21 and FY22 were COVID impacted years and hence the overall sales of buses were low which leads to low base effect in FY21 and FY22*

## EV demand drivers




*Source: CRISIL MI&A*

- **Lesser environmental impact:** Compared to ICE vehicles, limited impact of EVs on the environment is the primary reason for increasing focus on electric vehicles globally. It is expected to drive the demand going ahead.

- **Government Focus:** Central as well as state government are focussing on promoting electric vehicles to the consumers. Governments are incentivising customers in the form of subsidies, tax breaks, waiver on registration certificates (RC) and renewal of RC for EVs etc. The Government incentives will remain the major driving force for the EV adoption. For commercial vehicle segment, government is also supporting EV usage through STUs by committing to convert a significant portion of the public transport infrastructure fully electric in the next few years.

- **Lower operating costs:** One of the primary advantages of an EV for the customer is its lower operating cost. The recent rise in fuel costs has provided an added impetus to the EV adoption. Although the cost of acquisition is still one of the major hurdles for EVs, lower operating cost is expected to remain a significant incentive for customers. The lower battery cost, reduced GST rate of 5% and FAME-II demand incentive are expected to improve the cost of ownership and hence viability of EVs.

- **Charging infrastructure:** Availability of charging infrastructure remains a key determinant in EV adoption. Government, power distribution companies, OEMs are focussing on expanding the supplementary infrastructure including the charging infrastructure which will surely aid the EV adoption in the longer run. For instance, The Ministry of Road Transport and Highways announced plans to set up EV charging kiosk at each of India's 69,000 petrol pumps across the country. State government of Andhra Pradesh has decided to set up ~400 EV charging stations along the National and State Highways. Delhi government has announced to set up charging stations within every 3 kms distance in the city. Besides, large corporate such as MG Motor and Tata Motors installed 60 kW Super-fast EV charging station in Mangalore.

- **Increased OEM presence:** Most of the mainstream players are planning to launch an electric vehicle offering which is expected to boost the sales in the longer horizon.

- **Capacity expansion:** Most OEMs are expanding EV capacity to address the expected rise in electric vehicles. Moreover, government push in the form of mandatory localisation, PLI schemes will also provide an additional support to the capacity expansion.

- **Competitive pricing:** Battery is the primary contributor to the high electric vehicle prices. Through R&D, manufacturers are trying to lower the battery pricing while increasing the vehicle range. Companies are trying to achieve a golden mean between pricing and the range. This improvement in the customer offering will provide an impetus to the EV demand.

Batteries account for ~40-50% of the total EV cost. Prices of batteries have been falling moderately. The fall is expected to continue over the next five years. India is highly dependent on imports of batteries due to lack of manufacturing facilities for battery cells (ACC). However, the Government announced initiatives for reducing battery prices further by localization of electric vehicle battery manufacturing. As part of the production-linked incentive scheme, the Union Cabinet earmarked ~Rs. 18,100 crores for setting up 50 giga watt hour (GWh) of advanced chemistry cell (ACC) manufacturing facility and 5 GWh of niche ACC capacity.

## 2.5 Outlook of the Indian Commercial Vehicle industry

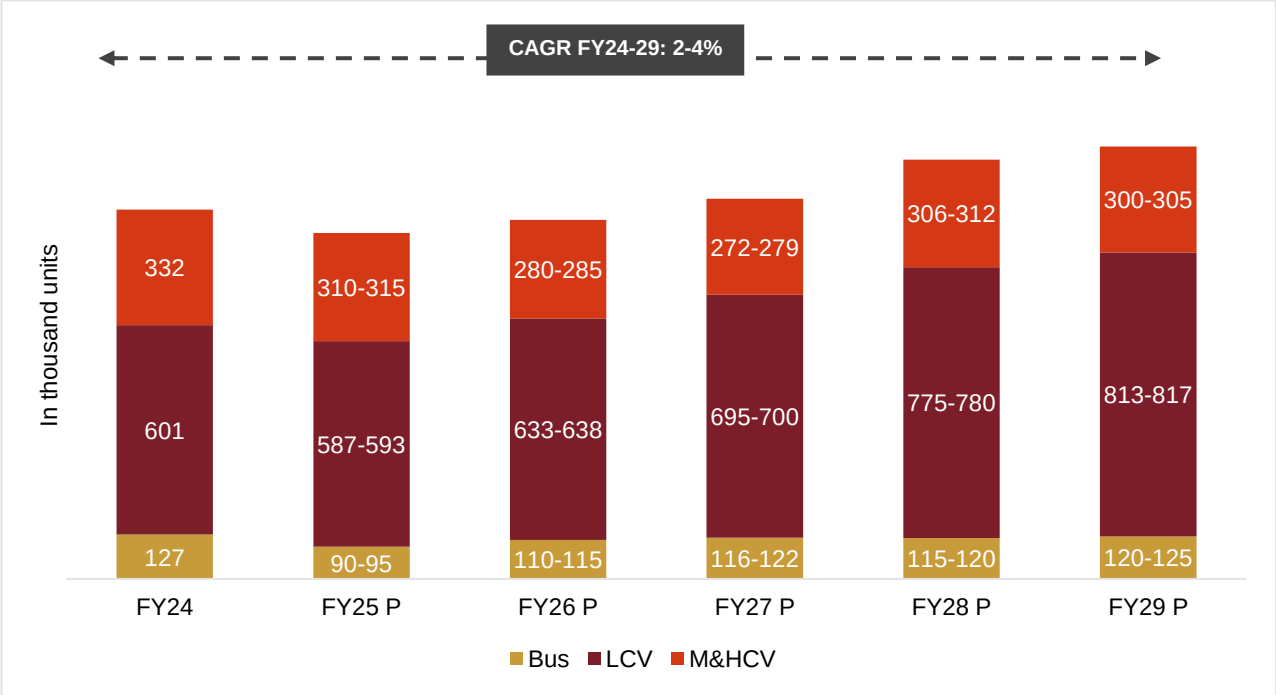
### 2.5.1 Production Outlook

Production of CVs in India is expected to increase at 2-4% CAGR between fiscals 2024 and 2029 as sales are expected to improve on the back of improving industrial activity, steady agricultural output, and the government's increasing focus on infrastructure, MHCV goods production is expected to de-grow at 1-3% between fiscals 2024-2029. LCV goods production is expected to grow at a 5-7% CAGR over the same period to cater to demand driven by higher private consumption, lower penetration, greater availability of redistribution freight and improved finance.

The bus segment which contracted at ~18% CAGR over fiscal 2017-fiscal 2022 period, has largely recovered now and is expected to see a stable trajectory of (2)-0% CAGR till fiscal 2029. Overall goods vehicles production which increased at 2% CAGR during fiscal 2017-22 period, is expected to witness a slower growth pace of 3-5% in the next five years till fiscal 2029.

The dominant domestic market growth will be aided by improving industrial activity in the country, steady agricultural output, and the Government's focus on infrastructure. Moreover, higher private consumption, lower penetration, greater availability of redistribution freight and improved finance will thrust LCV demand. Bus sales demand growth to be supported by increasing demand for inter-city/state travel, aided by better road infrastructure, and higher personal disposable incomes.

**Figure 20: CV production outlook**




*E- Expected, P – Projected*

*Source: SIAM, CRISIL MI&A*

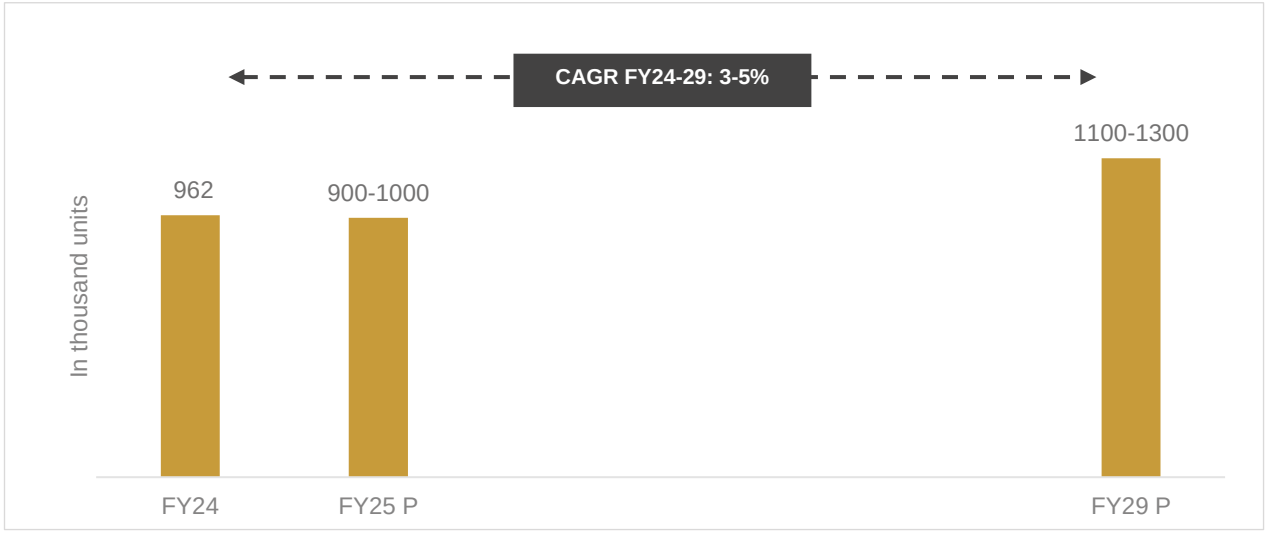
### 2.5.2 Split by domestic sales and exports

The Indian CV industry is expected to remain domestic-focused, with domestic sales comprising ~93% share of production even in fiscal 2029. However, with exports projected to grow at 5-7% CAGR between the fiscal periods 2024 to 2029, their contribution to overall production is likely to remain flat.

The second Covid-19 wave resulting in lockdowns in key affected areas in the first quarter of fiscal 2022 impacted domestic sales across segments, posting a healthy fourth quarter in fiscal 2021. Consequently, LCV and MHCV volumes declined ~42% and ~63% sequentially (on-quarter) and overall CV volumes by ~50%. Also, with a significant share of loans under moratorium amid low fleet utilization and freight rates, risk-averse financiers limited wholesale offtake. In FY22, LCV and MHCV sales improved by ~17% and 50% and on-year respectively over a low base of FY21. As mobility restrictions were relaxed and economic activities started picking up after the second wave abated in Q1 FY22, CV sales have picked up. This resurgence can be attributed to pent-up replacement demand that had been hampered during the preceding 2-3 years due to economic stagnation and the disruptive impact of the pandemic.

On the exports front, manufacturers are directing their investments into expanding presence to other Asian countries from neighboring countries such as Bangladesh, Nepal, and Sri Lanka to Africa and the Middle East. Domestic players are also considering setting up assembly operations across multiple markets. Also, going forward, new product line-ups and technology upgradation will allow domestic players to enter relatively advanced markets of south-east Asia. The economic slowdown is anticipated to lead to reduced consumer spending and investment in various regions, subsequently impacting merchandise trade volumes and posing significant challenges for India's export prospects.

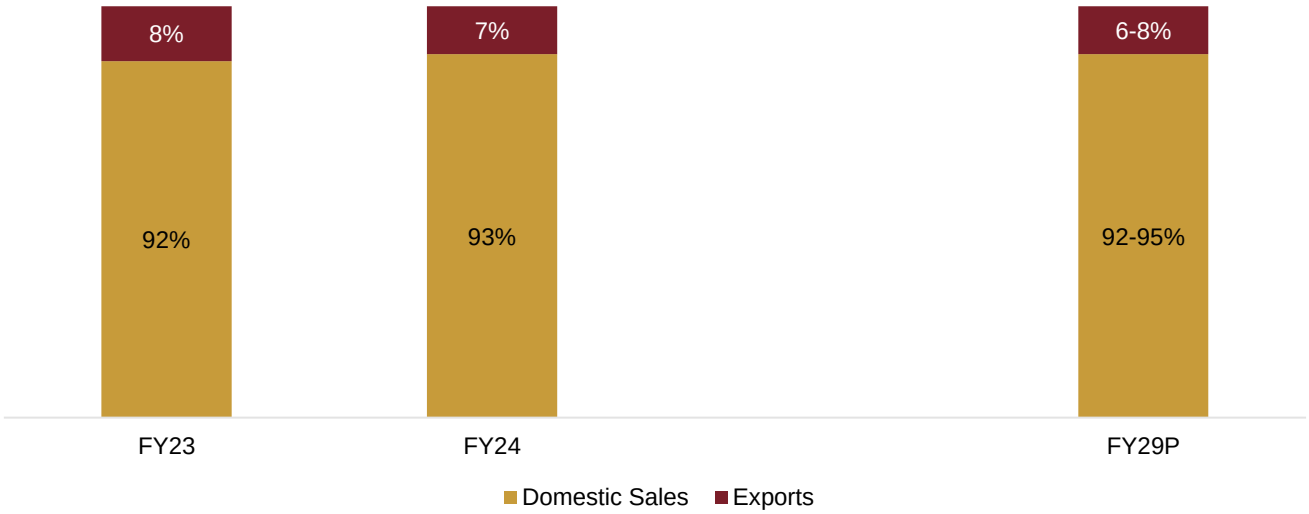
**Figure 21: Domestic sales outlook**




*P – Projected*

*Source: CRISIL MI&A*

**Figure 22: CV industry split into domestic sales and exports**




*E- Expected, P – Projected*

*Source: CRISIL MI&A*

CRISIL MI&A expects sales of commercial vehicles to grow at a CAGR of 3-5% between fiscals 2024 and 2029 aided by healthy industrial growth, focus on infrastructure and higher mining production. CV sales has plummeted ~28% 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. In the last three years (FY2020-FY2023), the industry demonstrated a strong CAGR of 10%. The rise in tonnage addition is expected to be driven by an improved product mix, with a notable surge in demand for Multi-Axle Vehicles (MAV) and T-Trailer despite a shift to lower tonnage vehicles due to axle norm regulations

### 2.5.3 Segment-wise domestic sales outlook

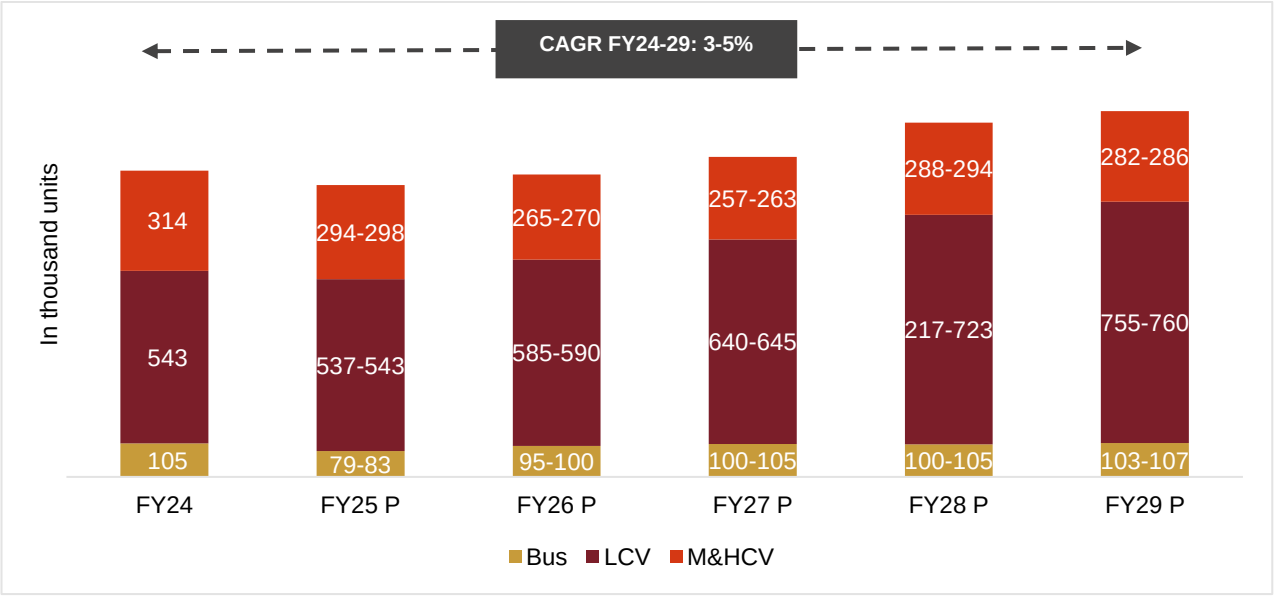
The CV industry recovered in fiscal 2023, with a 34% year on year growth rate, reaching ~96% of pre-pandemic wholesale levels. The commercial vehicle (CV) industry in India has grown steadily in fiscal year 2024, reaching pre-pandemic levels. Increased government spending, robust replacement demand, and strong end-user sectors such as construction and mining all are expected to contribute to growth.

The Light Commercial Vehicle (LCV) sales are projected to grow at a moderate rate of (2)-0% in fiscal year 2025, supported by sustained replacement demand with rising competition from electric three wheelers especially for the sub one tonne segment restricting further expansion. In fiscal year 2023, the LCV sales recorded an impressive growth of 23%, rebounding to 99% of pre-COVID levels. The surge in sales can be attributed to robust replacement demand, particularly in the sub-one-tonne category, which was deferred due to economic challenges and the pandemic.

However, in the first quarter of fiscal year 2024, LCV sales experienced a decline of 9% due to supply side constraints on account of OEMs transitioning to BS VI stage II emission standards. Despite this setback, the industry saw a revival in sales in the following quarters as supply scenario improved and demand kept pace with supply.

Over the long-term horizon, domestic CV sales are projected to record a 3-5% CAGR between fiscals 2024 and 2029, led by a 5-7% CAGR in the LCV segment, 2-4% CAGR in the M&HCV segment and 1-3% CAGR in the Bus segment.

**Figure 23: Commercial vehicle domestic sales outlook**




*P: Projected; E: Estimated,*

*Source: SIAM, CRISIL MI&A estimates*

In comparison to the same period in the prior year, overall CV sales in the first quarter of fiscal 2024 saw a slight decline of 3%. The fourth quarter of the previous fiscal year's prebuying activity, which took place before the implementation of BS VI stage II, which resulted in a price increase of 3-5%, had an impact on this downturn. Additionally, because Original Equipment Manufacturers (OEMs) made the technological transition necessary to meet the new standards, supply-related constraints came into being.

**Table 2: End-use sector outlook (between fiscals 2024 and 2029P)**

| Key end-use segments and outlook | | |
|---|---|---|
| **Sectors** | **Growth outlook (FY24-FY29)** | **Key aspects** |
| **Coal** | 5-6% | Growth in coal-based power generation<br>Demand from allied sectors such as cement and sponge iron |
| **Steel** | 6-7% | Building and construction, the major demand creator in this segment<br>Demand to be driven by rural housing / affordable housing and commercialization of Tier III/IV cities. |
| **Cement** | 5-6% | Infrastructure demand also plays an important factor according to National Infrastructure Pipeline (NIP) |
| **Port movement** | 2-5% | Iron ore exports to support growth, as global demand for steel improves. POL trade (imports) particularly in LPG poised to go up |
| **Road investment** | 8-12% | NIP to drive infrastructure investments on roads and highways. CRISIL MI&A expects the Govt. of India (GoI) to be able to achieve 80-85% of its targeted investments |
| **E-commerce** | 20-25% | Food, fashion and grocery segments to grow at a faster rate as penetration improves. E-retailers to focus on expansion in Tier I/II cities over this period |

*Source: CRISIL MI&A*

**Medium & Heavy Commercial Vehicles Set to Thrive in the Coming Five Years**

The MHCV industry is expected to grow significantly, with a compound annual growth rate (CAGR) of approximately 2-4% projected from fiscal year 2024 to fiscal year 2029.

Long-term MHCV sales are likely to be driven by several factors, including the country's improving industrial activity, consistent agricultural output, and the government's continued emphasis on infrastructure development. However, volume growth may be limited due to efficiencies gained from the implementation of the Goods and Services Tax (GST), the development of improved road infrastructure, and the commissioning of the dedicated goods corridor (DFC). Nonetheless, the industry remains on a promising growth trajectory in the coming years.

Over the next five years (fiscal 2024-2029), industry GVA is expected to be robust, driven by the government's emphasis on "Make in India." Furthermore, infrastructure improvements and higher-than-expected corporate spending are expected to support the capex cycle after fiscal 2024.

**LCV sales to grow at a modest pace in the long run**

Light commercial vehicle (LCV) demand is expected to grow at a 5-7% CAGR from fiscal 2024 to fiscal 2029, owing to increased private consumption, lower penetration, increased availability of redistribution goods, and improved financing. The industry grew at a 4% CAGR between fiscal 2018 and 2024.

Upper-end light commercial vehicles (ULCVs) provide lower returns to the transporter than ICVs and are best suited for captive use. Entry restrictions on ICV trucks and higher tonnage MHCVs are expected to keep demand from this segment buoyant. However, the higher toll on ULCV trucks versus pickups will limit segment growth.

SCV segment now offers a diverse range of products in various tonnages that cater to the needs of all types of customers. To fill tonnage gaps, players have launched a slew of new products, particularly in the last five years. In addition, the availability of CNG options is expected to keep volumes in this segment stable.

**Bus demand to witness strong growth over the next five years**

Domestic bus sales are expected to grow at a CAGR of 1-3% between fiscal years 2024 and 2029. Increased demand for inter-city/state travel, aided by improved road infrastructure, and higher personal disposable incomes will drive growth. The unregulated segment, which primarily serves demand from schools, businesses, and intercity travel by private operators, will continue to be the largest end-user. However, the implementation of metro-rail and monorail in several cities would have an impact on future bus sales growth. In terms of penetration (buses per 1,000 people), India ranks last among the countries studied, with 1 bus per 1,000 people and a 35% urbanization rate. These calls may have an upside if the scrappage policy is enforced, as well as increased urbanization and replacement of JNURM buses purchased between FY10 and FY13.

## 2.5.4 Key growth drivers for domestic sales and exports

***Factors driving MHCV growth***

**Healthy industrial growth to aid revival**

The overall Indian industry’s gross value add (GVA) had been growing tepidly, averaging ~3-4% between fiscals 2017 and 2022. After consecutive weak fiscals of 2020 and 2021 due to the COVID-19 outbreak, industrial GVA is estimated to have grown by ~20-25% in fiscal 2022 and is up by ~7% on-year in fiscal 2023. Over the fiscal 2024-2029, industry GVA is expected to be robust driven by the government's focus on 'Make in India'. Moreover, improvement in infrastructure and higher expected corporate expenditure is likely to support the capex cycle going forward post fiscal 2023.

**Government’s focus on infrastructure**

The National Infrastructure Pipeline (NIP) proposes to spend Rs 111 trillion of capital expenditure in infrastructure sectors in India over fiscals 2020 to 2025.

Infrastructure investment from fiscal 2013 to 2019 was Rs 57 trillion. Power, roads and bridges, urban, digital infrastructure and railways together constituted over 85% of the total infrastructure investment. The centre and states were the major funding sources for sectors such as power and roads and bridges, with moderate participation from the private sector. Digital sector investments were largely driven by the private sector, while investments in the irrigation sector were predominantly made by the state governments.

The NIP thus aims to double infrastructure investment annually from the current average of Rs 10 trillion per year to Rs 22 trillion. Of the total NIP investments of Rs 111 trillion, 40% worth of projects are under implementation, 30% at the conceptualisation stage, and 20% under development. Almost 83% of project allocation indirectly benefits the commercial vehicle sector in India, and this push for infrastructure is a major driver of growth.

**Focus on infrastructure and higher mining production to bolster tipper demand**

The budgeted capex allocation for infrastructure ministries for fiscal 2024 has shown a 28% increase over fiscal 2023 RE (revised estimates) to Rs. 18.6 lakh crore.

Execution by the National Highways Authority of India (NHAI) will reach up to ~14-15 km/day in fiscal 2027, as against ~11 km/day in fiscal 2021, aided by the Bharatmala project.

Projects such as Sagarmala and investments in various irrigation projects will further drive MHCV demand.

CRISIL MI&A also expects coal production to expand at ~4.5-5.5% CAGR between fiscals 2024 and 2029, driven by rising demand for electricity and the onset of commercial mining, while iron ore mining will also likely grow at a healthy pace 3.5-4.5% CAGR during this period, aiding tipper demand.

### *Factors arresting MHCV growth*

**Commissioning of DFC to restrict road freight growth and hence CV sales**

The dedicated freight corridor (DFC) is intended to help the Indian Railways regain lost freight share by cutting turnaround times between importing and consuming destinations, compelling several industries to realign their logistics strategies. The DFC and associated logistics parks can significantly reduce plant-level inventory, enabling huge savings in working capital.

Not only will the DFC bring about faster freight movement, but it will also aid the economy by decongesting major highways due to the increased shifting of freight to rail. It will also allow for faster evacuation of cargo from ports, improving efficiency. Thus, roads, which have outperformed rail over the past decade, will lose some share to rail once the DFC is commissioned.

Tractor trailers will be the most vulnerable to competition from the railways, following completion of the eastern and western DFCs. These routes account for more than 20% of pan-India primary freight in billion tonne kilometre (BTKM) terms. Container traffic (~65% of the western corridor) and bulk commodities (~89% of the eastern corridor), which dominate the freight carried on these routes, are expected to shift to railways, thus impacting sales of MHCVs, especially T-Trailers.

**Enhanced operations due to better road infrastructure to lower truck demand**

CRISIL MI&A expects improvement in road infrastructure to increase the average speed of trucks, leading to efficiency gain of ~10%. Hence, fewer trucks will be required to move the same quantity of goods, lowering truck demand. On the other hand, increased running of trucks will help improve the competitiveness of the road transportation industry, helping attract more freight.

## 2.5.5 Key trends among LCVs

**Wide array of products in SCVs to attract volume:** The SCV segment now offers a wide range of products, covering various tonnages that cater to the needs of all types of customers. Players have launched numerous products, especially over the past five years, to plug gaps in tonnages. Also, availability of CNG options is expected to sustain volumes in this segment.

**Pick-up sales to outpace sub-one tonne vehicles:** smaller pick-ups have the combined features of mini-trucks and large pick-ups. With their compact size, smaller pick-ups provide the last-mile support of mini-trucks and, owing to their power, can ply on inter-city routes like large pick-ups. They are better suited for niche applications (e.g., pick-ups are more suitable to transport produce that requires cold storage). Furthermore, small pick-ups have superior cost economics over mini-trucks as they can carry nearly 1.5 times the load of a mini-truck when overloaded, while costing only 25% more.

**Increasing demand for school buses to aid bus sales**

CRISIL MI&A forecasts LCV domestic bus sales to grow by ~10-14% CAGR between fiscals 2024 and 2029. Schools will constitute 37-43% demand, while the staff segment will account for 10-15% share. The increasing number of educational institutions opening across India is driving the need for school buses. The government's mandate to replace private vehicles (such as vans) with school buses in some cities, is also expected to augur well.

**MHCV bus demand to be primarily influenced by intercity segment**

An increase in inter-city travel posts the COVID-19 is expected to propel MCV bus sales over the next five years. Bulk of the new demand is expected to arise from private operators, as STUs are financially constrained, and customers prefer private buses for their improved quality of service. Demand from private bus operators too has been growing, given the rise in inter-city travel through intercity buses.

Growth in long distance passenger movement via railways is constrained by network congestion and insufficient capacity of the current railway network. As a result, further higher investments in roads and highways will enable private operators to cover greater distances within a day, leading to a shift of passenger movement from railways to roads, boosting demand for MCV buses.

### 2.5.6 Impact of regulatory changes on domestic CV sales

**Modalities of scrappage policy and timeline of implementation is not known yet**

The Centre’s scrappage policy is unlikely to have freight transporters queuing up to replace old vehicles with new ones. The scrappage volume of buses, passenger vehicles (PVs) and two-wheelers will be limited as well, CRISIL MI&A analysis shows.

#### Fuel efficiency norms

To make heavy-duty trucks and buses more fuel efficient, the Ministry of Petroleum and Natural Gas, MoRTH, and the Ministry of Heavy Industries are in talks to notify fuel efficiency norms. Based on talks with various stakeholders, BS-IV compliant diesel vehicles of categories M3 and N3, with GVW of 12T and above, will have to comply with these norms. Vehicles are expected to meet the 'target diesel fuel consumption' value for a specific set of speeds, which is dependent on the vehicle’s GVW, axle configuration, and category (N3/M3).

#### Air-conditioned driver Cabins

The Indian government's approval of mandatory air-conditioning (AC) systems in truck cabins for categories N2 and N3, effective from January 2025, is set to improve working conditions for truck drivers and address driver fatigue concerns, ultimately enhancing road safety. The new regulation will require truck manufacturers to sell vehicles with pre-fitted AC cabins, incurring an extra cost. Despite the initial financial impact, the long-term advantages in terms of driver well-being and overall efficiency are likely to outweigh the costs

### 2.5.7 Emerging Trends in CV ecosystem

**Alternate fuels**

The adoption of alternate fuels in commercial vehicles has gained significant momentum in recent years, driven by the need for low emission transportation solutions to address environmental concerns, reduce dependency on fossil fuels and achieve zero emission transportation. Three prominent alternatives that have garnered attention are Electric Vehicles (EVs), natural gas, and hydrogen-powered vehicles.

EV adoption in the commercial vehicle segment is gradually picking up pace in the LCV and bus segment due to advancements in battery technology, declining battery costs, and favourable government policies. While the entry of electric vehicles and hybrid engines in India has increased, these advancements have primarily been concentrated in the light motor vehicle segment and overall the commercial vehicle segment has yet to experience a significant impact. The government has been stepping up efforts in promoting electric mobility through FAME-II scheme. It has identified STU buses as a one of the key vehicle segments that should adopt electrification and availability of incentives are driving adoption of EV fleets by STU buses. These vehicles offer several advantages, including lower operating costs, reduced emissions, and quieter operation. However, challenges such as limited charging infrastructure and concerns over range and load capacity hamper the adoption of EVs in haulage and heavy vehicles segment.

Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) are being considered as cleaner alternatives to traditional diesel and petrol in commercial vehicles. CNG is particularly popular for buses, LCVs and ICVs. It produces fewer emissions of pollutants like particulate matter and nitrogen oxides compared to conventional fuels. With increasing gas network coverage across different Indian states due to city gas distribution (CGD) bidding rounds 9, 10, 11 and 11A, reach of gas pipelines would not be a problem, resulting in a swifter shift from diesel to CNG. Also, in FY2023 an incremental ~1,134 new stations were added respectively, taking the total number of CNG stations to 5,665 in March 2023. With a clear increase in the number of stations, the number of CNG vehicles launched by OEMs would see an increase. The advancements in CNG technology and the expansion of refuelling infrastructure may enhance the appeal of CNG models, offering a greener and more sustainable solution for the transportation sector.

Hydrogen is also being explored as an alternate fuel for commercial vehicles through fuel cell and hydrogen ICE powertrains. Hydrogen-powered trucks and buses offer long ranges and faster refuelling times compared to EVs. They emit only water vapor as a by-product, making them attractive from an emissions standpoint. However, challenges such as the high cost of production, transportation, and infrastructure development hinder widespread adoption. Furthermore, MoRTH have framed draft rules for type approval of hydrogen ICE vehicles under M and N category and MNRE have introduced National Green Hydrogen mission to incentivise the commercial production of green hydrogen and make India a net exporter of the fuel. However, these initiatives are yet to see a fruitful outcome since this technology is still in early stages.

**Truck Aggregation**

The truck aggregation trend has witnessed significant growth over the past few years. This model involves online platforms that connect truck owners and transporters with businesses requiring freight services. It has transformed the traditional trucking industry by enhancing efficiency, reducing empty miles, and providing better load utilization. Truck aggregation platforms like BlackBuck, Rivigo, and TruckSuvidha have gained prominence, streamlining logistics through digital solutions. These platforms offer benefits such as real-time tracking, transparent pricing, and improved fleet management. Government initiatives like GST implementation, Logistic Efficient Enhancement Program (LEEP) and improved road infrastructure have further bolstered the growth of truck aggregation

**Telematics and connectivity**

Telematics involves the integration of telecommunications and informatics to enable real-time communication and data exchange between vehicles, fleet managers, and centralized systems.. Commercial vehicles are equipped with GPS, sensors, and communication devices, enabling fleet operators to monitor real time parameters like location, fuel consumption, speed, and driver behaviour. This data-driven approach optimizes routes, reduces idle time, and enhances fuel efficiency, resulting in cost savings and reduced carbon emissions. Connectivity solutions also improve vehicle maintenance as real-time diagnostics allow predictive maintenance by minimizing breakdowns and downtime. Also, monitoring of driving behaviour promotes responsible practices, minimizing rash driving and emergency alerts for assistance in case of accidents. Government regulations, such as AIS-140 norms mandating vehicle tracking systems, further catalyse the adoption of telematics. Established players like Tata, Ashok Leyland and startups in India offer customizable solutions, fostering healthy competition and technological advancements.

### 2.5.8 Electrification in CVs

#### TCO assessment

A comparison of TCO of various CV types will provide a view as to how much a vehicle costs to own and operate over a period. Commercial operation of any vehicle will be viable only if the cost of operating it is below the revenue earned. A vehicle with a significantly higher cost of operation will not be viable due to competition from other vehicle categories and varying powertrains.

**TCO between fiscals 2024 and 2029P for sub-segments LCV and Bus:**

**LCV (Sub 1 ton category)**

CNG is the cheapest alternative powertrain, in the current scenario, due to the excessively high initial cost of electric LCVs. In the case of LCVs (at Delhi prices), the operating cost of an EV is 5% higher than that of a comparable diesel vehicle.

However, the operating cost of an EV is 14% higher than that of a comparable CNG vehicle, due to which the break-even period of an EV compared with a CNG vehicle is relatively higher.

As regards the cost of ownership, while EVs may be able to match the cost of diesel LCVs by fiscal 2032, they will still be considerably costlier than CNG LCVs.

**Table 3: TCO analysis for LCV – without subsidy**

| FY24 | | | | FY29 | | | |
|---|---|---|---|---|---|---|---|
| **TCO period (years)** | **4 years** | **6 years** | **8 years** | **TCO period (years)** | **4 years** | **6 years** | **8 years** |
| **Diesel** | 23.1 | 22.5 | 22.1 | **Diesel** | 28.3 | 27.5 | 27.1 |
| **CNG** | 21.2 | 20.5 | 20.1 | **CNG** | 26.4 | 25.6 | 25.1 |
| **Electric** | 24.2 | 23.0 | 22.3 | **Electric** | 27.9 | 26.7 | 26.0 |

*Note: Numbers denote TCO in Rs per km, TCO period units in years, this is for Mahindra Pickup vehicle without subsidy*

**Bus**

The cost of ownership of an electric bus is in the range of a standard diesel bus over the long term. Commercial operation of any vehicle will be viable only if the cost of operating it is below the revenue earned. A vehicle with a

significantly higher cost of operation will not be viable due to competition from other vehicle categories and varying powertrains.

The cost of ownership of an electric bus is like that of a standard diesel bus. In the bus segment, owing to the excessively high battery cost, there is a 4-5x difference in the initial purchase cost of a diesel/CNG bus and an electric bus. Because of this large differential, the gap in the break-even period between electric and diesel powertrains is more than 20 years despite a 30-35% lower operating cost for EVs. Hence, we believe capital subsidy would be needed to make electric buses viable by fiscal 2029, which, in turn, may limit their penetration to the public transport (STU) segment.

**Table 4: TCO analysis for MCV buses – without subsidy**

| FY24 | | | | FY29 | | | |
|---|---|---|---|---|---|---|---|
| **TCO period (years)** | **8 years** | **10 years** | **12 years** | **TCO period (years)** | **8 years** | **10 years** | **12 years** |
| **Diesel** | 43.0 | 41.9 | 41.0 | **Diesel** | 47.4 | 46.0 | 45.0 |
| **CNG** | 36.2 | 34.9 | 34.0 | **CNG** | 40.7 | 39.2 | 38.0 |
| **Electric** | 48.6 | 46.2 | 44.3 | **Electric** | 46.3 | 44.0 | 42.3 |

*Note: Numbers denote TCO in Rs per km, TCO period units in years, For 12m bus without subsidy*

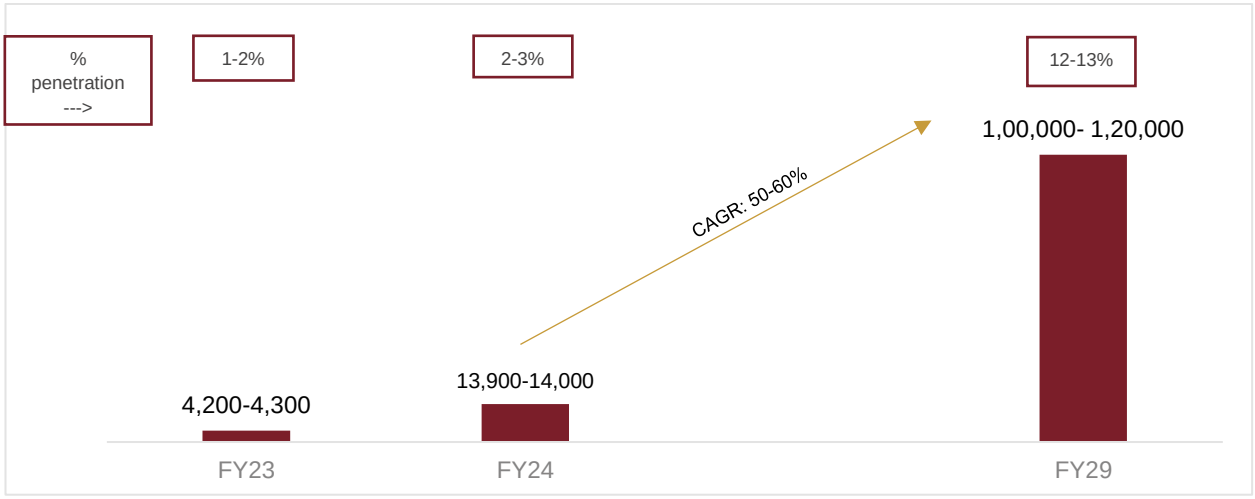
## Electrification outlook across vehicle segments

### Electrification in LCV goods vehicles

Currently, most of the EVs used in the commercial segment as goods carries are three-wheelers. However, as the cost differential between electric and diesel vehicles start reducing, we expect new models to be launched. This will drive sales in the segment as the third-mile logistics and local distribution of goods are well suited applications for EVs. Tata Ace EV is the only e-SCV currently in the market.

Consequently, as depicted in the chart above, EV sales in the LCV goods segment can rise to 81,000-82,000 vehicles by fiscal 2028. This would be about 12-13% of the total LCV goods vehicle market, as CNG offers better TCO in near future and will be preferred over electric variants. Further EV penetration is expected to grow and reach 12-16% by fiscal 2029.

**Figure 24: EV LCV goods vehicles' domestic sales outlook**




*Source: CRISIL MI&A*

Consequently, as depicted in the chart above, EV sales in the LCV goods segment can rise to 1,00,000- 1,20,000 vehicles by fiscal 2029. This would be about 12-13% of the total LCV goods vehicle market, as CNG offers better TCO in near future and will be preferred over electric variants.

**Electrification in HCV goods vehicles**

EV adoption in the HCV segment is expected to be miniscule in the near future as operational profile makes them highly expensive. Further, the current charging infrastructure is not suitable for larger HCV batteries, which will make electric adoption unviable for some time.

**Electrification in passenger vehicles (buses)**

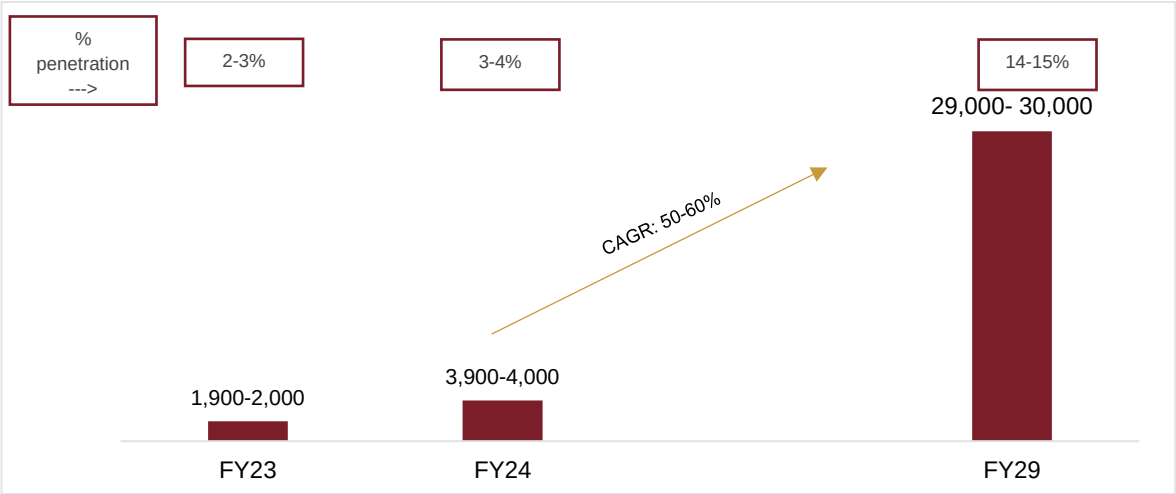
EV bus registrations skyrocketed in the last 3 years backed by adoption by STU as well as government incentives. During fiscal 2019-2024 period, EV bus registration increased at a breakneck pace of 124% CAGR with more than 600% on year growth clocked in fiscal 2020. EV penetration was insignificant till fiscal 2019, it gained some pace during fiscal 2020 and received a real boost during fiscal 2022 to reach more than 1,194 units and reached 3.7% of overall registrations. Growth momentum continued in fiscal 2024 with y-o-y growth of 86% reaching more than 3,693 units.

Due to the government support through FAME and focus on quicker adoption of EVs in public transport, there has been a significant increase in electric bus sales in the last couple of years. Operational profiles of buses with fixed routes and regular stops make them suitable for charging at pre-determined intervals and specific locations. However, sales of electric buses are unlikely to meet the target in fiscal 2021 due to the pandemic and hence we expect the subsidy amount to get carried over to the coming years.

The price of an electric bus is electric bus is considerably higher than the cost of a bus running on diesel. Thus, subsidy would be a key driving factor that would drive EV adoption in STU buses. We expect a large part of the STU intra city buses to be electric by fiscal 2029. However other segments are unlikely to see a meaningful penetration of electric buses owing to their high cost of acquisition and limited range limiting their ability for intercity travel.

CRISIL expects FAME subsidies to be extended for buses as the policy period ends in fiscal 2024. With other incentives from the central and state governments, the sales of electric bus penetration is expected to reach 18%-22% by fiscal 2029.

**Figure 25: EV buses' domestic sales outlook**




*Source: CRISIL MI&A*

There could be some minor penetration in ICVs going forward; however, for MCVs and MAVs, we expect the dominance of diesel fuel to continue with LNG making some inroads.

## Policies driving the adoption of EVs

The Government of India and several state governments together has introduced a set of fiscal and non-fiscal incentives to support the adoption of electric mobility. These incentives include tax breaks, subsidies, and lower registration chargers through multiple policies to promote demand. To strengthen the manufacturing ecosystem, various policies have been launched to strengthen the component and charging infrastructure

### Government subsidies to drive Electric Vehicle (EV) adoption by STU buses

The Government has been stepping up efforts in promoting electric mass mobility through FAME-II scheme. It has identified STU buses as one of the key vehicle segments that should adopt electrification. Further policies like PM eBus Sewa schemes aims to further incentivize the electrification of public transport.

**FAME I & FAME II**

As part of the National Electric Mobility Mission Plan (NEMMP) 2020, the Department of Heavy Industry (DHI) introduced the FAME scheme in 2015. The FAME scheme aims to promote the manufacturing of electric vehicle technology and ensure the sustainable growth of the ecosystem.

During Phase-I, it focused on creating demand for electric vehicles through incentives and grants for various vehicle segments, resulting in about 2.78 lakh supported EVs via demand incentives. FAME II scheme, approved with an outlay of INR 10,000 Crore, aims to support demand for EVs by supporting 7,000 e-Buses, 5 lakh e-3 Wheelers, 55,000 e-4 Wheeler (Commercial purposes) and 10 lakh e-2 Wheelers (including commercial & private).

**FAME-II subsidy for buses and LCV dependent on battery size**

Under the FAME-II incentive, the Government will provide subsidy amounting to Rs. 20,000 per kWh of battery used in an electric bus. The batteries used in such buses needs to be ‘advanced batteries’ with specific energy density of at least 70Wh/kg and cycle life of at least 1000 cycles. The total demand subsidy under FAME-II scheme is Rs. ~9000 crore, a portion of which would go to buses.

For electric SCVs, government will provide subsidy amounting to Rs. 10,000 per kWh of battery used in a commercial vehicle. It also mandates a minimum range of ~140 km and maximum ex-factory price of ~Rs. 15 lakhs.

**FAME-II demand incentive only via OPEX model**

Demand incentive would be provided to buses only sold under Public Private Partnership in Operation and Maintenance of Electric Buses (OPEX) model. In the OPEX model, the OEM takes the risk of operating the electric bus and gets a pre-decided revenue per km running of the bus. The benefit of this model is that there is no upfront cost to the STU as bus is owned by the OEM or generally an OEM backed transport firm. This also reduces the risk of technology obsolescence for the STU.

Many state governments are providing incentives to purchase an electric vehicle where the benefit provided is in addition to FAME-2 policy benefits.

- Maharashtra's EV policy aims to achieve at least BEVs to contribute to 10% of new vehicle registrations by 2025, 10% electric 2-wheelers by 2025, 20% electric 3-wheelers by 2025, 5% electric 4-wheelers by 2025, 15% electric buses by 2025, 25% electric fleet operators by 2025. Maharashtra provides strong demand incentives of INR 5,000/kWh up to INR 1,50,000 for the first 10,000 electric 4-wheelers cars, INR 5,000/kWh up to INR 1,00,000 for the first 10,000 electric 4-wheelers goods carrier and 10% of the ex-factory cost up to INR 20,00,000 for the first 1000 e-buses.
- Gujarat has announced an EV policy that would provide purchase incentives of Rs. 10,000/kwh subject to a maximum of up to Rs 6 lakh/vehicle for the first 20,000 electric four wheelers. The policy will remain valid till 2025.
- Odisha has announced a subsidy of 10% up to INR 20 lakhs for e-buses and incentive of Rs. 30,000 for the first 5000 electric goods carriers.
- Delhi has announced an EV policy that would provide purchase incentives of purchase incentive of Rs. 30,000 for the first 10,000 e-carriers and interest subvention of 5% on loans and/or hire purchase scheme for the purchase.

Manipur is providing an incentive of Rs. 4,000/kwh for the first 30 electric buses. The policy also provides 100% exemption on road tax till 2026.

# 3. Review and outlook on the Tractors Industry

## 3.1. Review of Global Tractor industry (CY18 – CY23)

### 3.1.1 Historic Tractor sales development (CY18-CY23) for US market

In the US, the market for agricultural tractors is extremely concentrated, with a few numbers of companies controlling the majority of the market share. The primary tactics used by the top businesses in the nation's market include collaborations, acquisitions, and the introduction of new products. In the years to come, investing in R&D and creating innovative product ranges will probably be important tactics in addition to innovations and expansions.

In the United States, agriculture is a significant industry, and mechanisation of farming is credited with helping to boost production, exports, and sales. Additionally, the industry is driven by the need for new tractors due to developed nations' shorter replacement cycles of 9 years such as the US.

Furthermore, the nation's farmers have had access to timely subsidies for the purchase of agricultural tractors. As a result, even small-scale farmers have been able to purchase tractors and other agricultural equipment across the nation.

Data from the Quarterly Census of Employment and Wages (QCEW) show that wage and salary employment in agriculture, which includes support industries like farm labour contracting, stabilised in the 2000s and has been gradually increasing since 2010. The annual average number of full- and part-time jobs in agriculture increased from 1.07 million in 2010 to 1.16 million in 2020, a 9 percent increase. Therefore, the increasing pay for farm labour is encouraging farmers to purchase agricultural machinery, such as tractors, and driving the market's expansion.

A number of the nation's leading companies are engaged in R&D and the introduction of cutting-edge tractors to the market. In 2021, for example, the players focused on manufacturing tractors in the nation that were driver-optioned and entirely electric. Through the Conservation Innovation Grant programme of the United States Department of Agriculture (USDA), these tractors are being supported in order to automate some field maintenance chores related to blueberries, thereby decreasing the consumption of diesel fuel, and increasing farming output.

**Market Trends:**

Across the country, ranchers, farmers, and growers have voiced concerns in recent years about finding enough skilled labourers to hire at a price that is profitable for them. The labour-intensive sectors of American agriculture face severe challenges in this regard.

However, during the last five years, real agricultural wages have increased at a rate of 2.9 percent annually, which is in line with producers' comments that labour was more difficult to come by in the nation. In the last 20 years, this rise in the real wage for farm labour is the fastest to occur over a four-year period.

In order to operate their farms more cheaply, conveniently, and effectively, farmers are turning more and more to agricultural mechanisation in place of physical labour. Thus, during the research period, tractors—the main source of power for operating agricultural machinery—saw a remarkable increase in sales in these countries. The cost of farm labour is rising as a result of a decline in agricultural labour. As a result, it is anticipated that during the forecast period, the country's need for agricultural tractors will rise.

USDA distinguishes between family farms—operations where the majority of the business is owned by an operator and individuals related to the operator—and nonfamily farms where an operator and persons related to the operator do not own a majority of the business. Family farms account for more than 97% of all U.S. farms. These farms have been driving the market for below 40 HP segment. In contrast, the large-farm owners are involved in the cultivation of commodity crops. These farmers are mainly buyers of above-100 HP tractors and 4WD tractors.

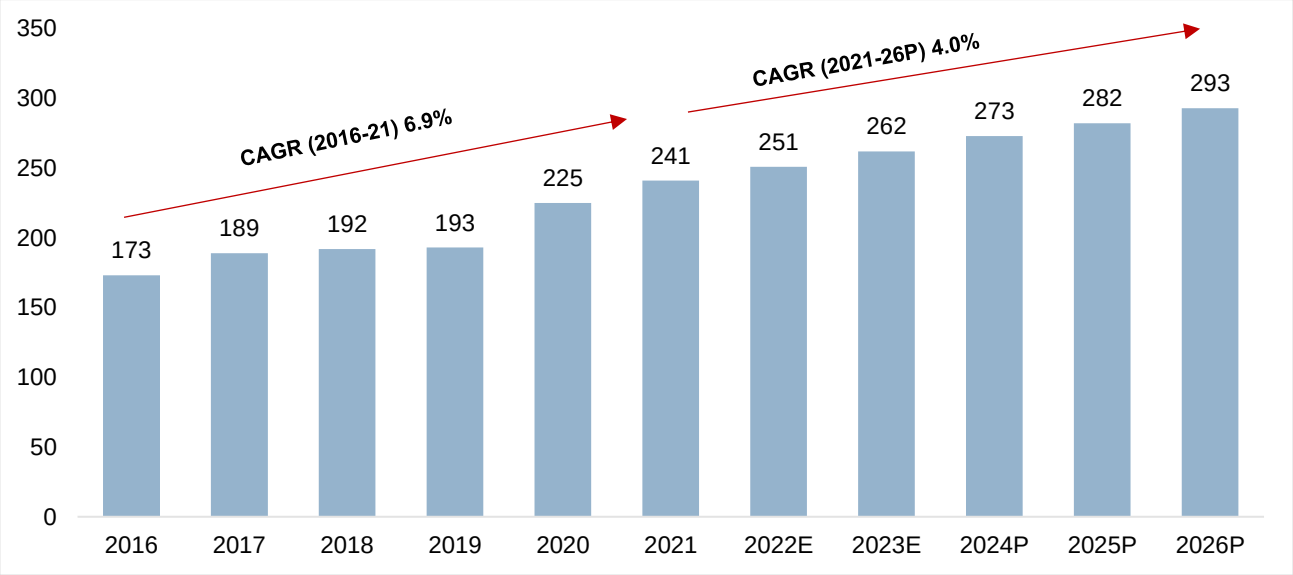
US agriculture equipment is a consolidated market, where - John Deere, New Holland, Kubota, CASE IH, and AGCO – are top five players. Alamo Group and Autonomous Tractor Corporation are some of the other regional players in

the US market. Autonomous tractors are gaining popularity in the US with John Deere taking the lead. According to a study, autonomy has already made its way in America on more than 70% of the farms through automated guidance.

## Demand Review

Tractor production in North America is expected to grow at CAGR ~4% till 2026P with 273 thousand units in fiscal 2024. Over 2016-2021, tractor production in North America recorded a CAGR of 6.9%. Tractor production in 2021 was dominated by less than 70 HP category. It accounted for approx. 75% of the 2021 total production. Further, over 70 HP tractors and 4WD tractors accounted for 23% and 2%, respectively of 2021 total production.

**North America Tractor Production Volumes ('000 units)**




*Source: Off-highway, CRISIL Consulting*

In May 2024, Total U.S. agriculture tractor sales dropped 11.5% compared to 2023, while combine sales dropped 17.7% compared to last year. Factors such as trends for crop yields and commodity demand from both domestic and international markets to impact farm income. Despite the initial optimism, the U.S. agricultural picture for 2024 is clouded by several major uncertainties related to potential weather and trade developments. However sales of 4-Wheel-Drive tractors increased 9.4% in May compared to 2023. During 2021-2026, North America's tractor production is expected to register a CAGR of 4.0% to reach 293,195 units in 2026.

### 3.1.2 Historic Tractor sales development (CY18-CY23) for European market

Europe is one of the major producers of agricultural products. In the long run, the market is anticipated to be driven by the growing trend of agricultural mechanization and technology. The need for tractors is being driven by precision farming and the growing usage of farm technology to increase productivity. The tractor sector in the region is also being driven by the increasing number of farm training programmes that encourage the widespread use of agricultural machinery.

The market in the area is being driven by factors including raising total factor productivity in farming, decreasing post-harvest loss, adding value to agricultural raw materials, and raising the calibre of agricultural products. The French government has developed initiatives to support and finance the acquisition of tractors and other agricultural gear and equipment. These elements support the country's agricultural mechanisation and tractor adoption, especially when combined with export-oriented government policies.

Europe's largest tractor markets include France, Germany, and the United Kingdom. Tractor registrations are a key metric used in the United Kingdom to assess the health of the domestic agricultural machinery sector. Roughly half of the farmer's expenses are covered by the sales of tractors and accessories, when measured by value. As with other European countries, France is a major player in the European market and was a pioneer in the mechanisation of the agricultural industry.

**Market Trends:**

Historically, agriculture in the European Union has been a labour-intensive industry, with a higher number of seasonal foreign labourers employed on member state farms. Based on Eurostat data, the number of agricultural workers in Europe has decreased by 35% over the past ten years, and it is expected to reach 7.9 million by 2030. This downward tendency has been caused by a number of factors, such as the decline in smaller family farms and the notable advancement of technology and machines. But throughout the region's agricultural areas, there is a severe labour shortage.

In 2023, Agricultural tractor registrations were 4.9% lower than in 2022 but were only slightly below the average number registered in the last five years. The number of machines registered in the first half of the year was only marginally lower than in the same period the year before, but the decline was sharper in the second half of the year. Between July and December 2023, nearly 10% fewer tractors were registered than in the equivalent period of 2022. The slowdown in the market also meant that registrations in the second half of the year were 7% below the seasonal average.

One of the reasons that agricultural tractor registrations held up well in the first half of 2023 was that manufacturers were catching up with the backlog of orders which had built up during 2021 and 2022, as a result of disruptions to global supply chains during and after the Covid-19 pandemic and the Russian invasion of Ukraine. By the middle of the year, supply chains had largely returned to normal, so the number of tractors being registered gave a better indication of demand in the market

Tractors with mid-range HP and 2WD power dominate the European tractor market. Farmers primarily prefer 2WD tractors among the several tractor models available in the region. 2WD tractors are increasingly common among farmers due to their inexpensive relative cost of ownership, ample features and haulage power, and custom.

The market for agricultural tractors in Europe is highly concentrated, with a small number of dominant players. Deere & Company, AGCO Corporation, CNH Industrial NV, CLAAS KGaA mbH, and Kubota Corporation are the major companies in the market. These businesses primarily employ product innovation, partnerships, and expansion as ways to boost their market share and enhance their capacity to produce goods utilising contemporary technologies. These businesses are making significant R&D investments and introducing tractors designed to meet the demands of farmers in this area.

In 2022, John Deere and New Holland held a combined industry share of over 25%, dominating the European farm tractor market. Since the top five firms own more than 40% of the market share in the tractor industry in Europe, there is a high risk of rivalry.

John Deere introduced the JD14X engine for the 9 Series and the new electric variable gearbox (EVT) for a few 8 Series tractors in March 2022.

In February 2022, Massey Ferguson introduced the MF 6S line of tractors. This machine uses cutting-edge technology to produce up to 180 HP.

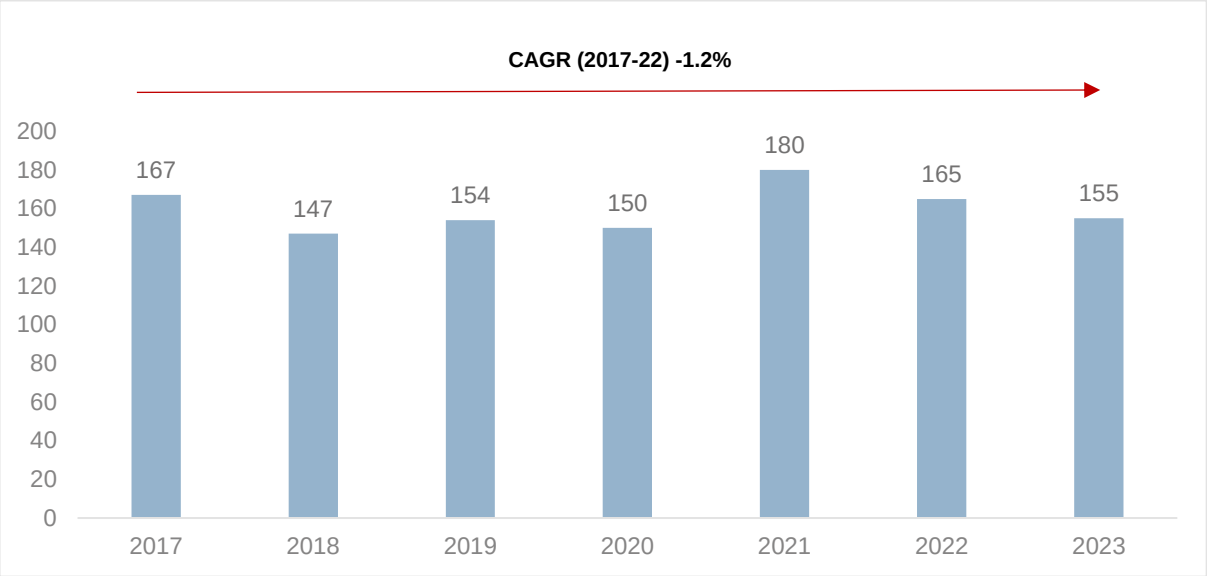
In July 2020, Massey Ferguson introduced the MF 8S line of tractors. This line of tractors is distinguished by a guard-u install engine and a neo-retro design. These tractors are intended to help smart farming technology improve.

CNH Industrial will collaborate with Monarch Tractors, a US-based agri-technology firm, in March 2021 to increase long-term sustainability and raise farmer understanding of the necessity of zero-emission agriculture.

## Demand Review

Although tractor registrations were lower in 2023 than the year before, that wasn't true for all power bands. The highest power bands, machines above 132kW (approximately 175hp) saw strong growth, with registrations of these larger tractors up by 12% year on year. In contrast, 13% fewer tractors were registered between 60kW and 132kW (80-175hp), although this range still made up almost half of the agricultural tractors registered in 2023. There was a small decline in the number of tractors under 60kW registered in Europe, with some growth for the smallest machines. The figures quoted underestimate the total size of the market for low-powered tractors, as not all of them will be used on the road, meaning that they do not need to be registered in some countries.

**Europe Sales of Tractors ('000 units)**




*Source: Off-highway, CRISIL Consulting*

Factors such as shift towards larger farms, income of the farmers, technological innovation, etc. will play an important role in shaping up the market.

# 3.2 Review of Indian Tractor industry (FY18 – FY24)

### 3.2.1 Historic production development

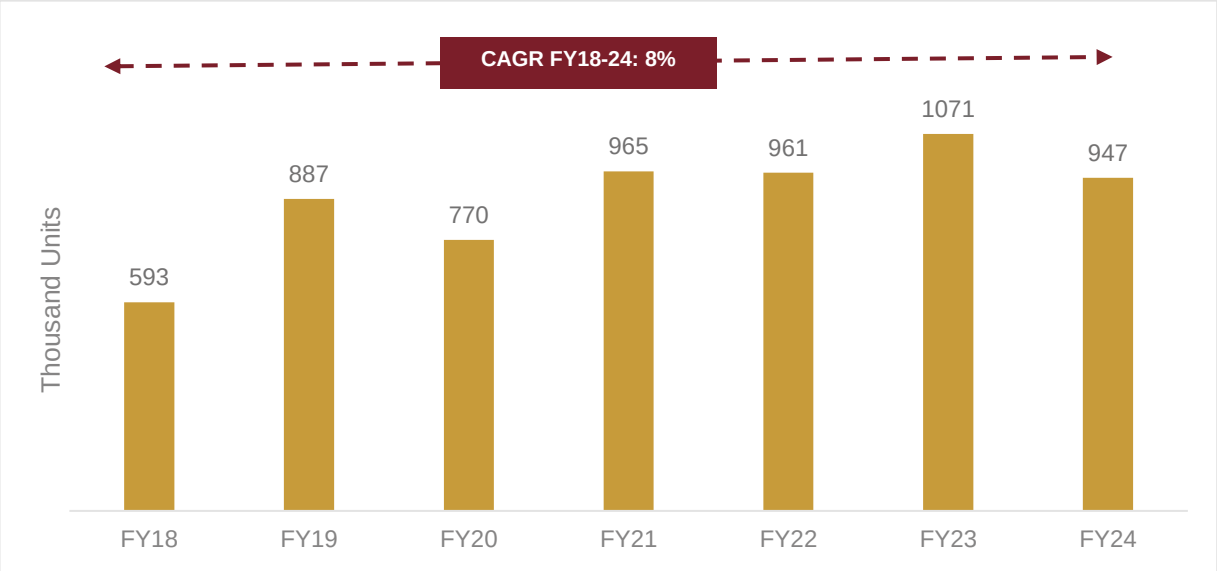
In fiscal 2024 tractor production declined by 11.6% on-year to a low of ~947,143 units after witnessing a growth of 11.4% in fiscal 2023.

In recent years, the production of tractors in India has exhibited a noteworthy trend, as evidenced by the data from fiscal years 2019 to 2024. The production figures have displayed substantial growth during this period, reflecting the significance of the agricultural sector in India and the mechanization of farming practices. In FY19, tractor production stood at 887 thousand units, and by FY24, it had surged to 947 thousand units. This impressive increase signifies a growth of 1.3% CAGR over the five -year period.

The growth trajectory can be attributed to various factors, including the government's focus on rural development and the promotion of agriculture, which has incentivized farmers to invest in modern farming equipment like tractors. Additionally, technological advancements and innovative financing options have made tractors more accessible to a wider range of farmers, further driving production.

This robust growth in tractor production not only reflects the dynamism of the agricultural sector in India but also underscores the industry's role in facilitating increased agricultural productivity. As India continues to modernize its farming practices, the tractor manufacturing industry is poised for sustained growth, providing essential support to the country's agrarian economy.

**Figure1: Tractor production has witnessed a growth of 8% CAGR between Fiscal 2018-24**




*Source: TMA, CRISIL MI&A*

### 3.2.2 Historic domestic tractor industry and exports

Domestic tractor demand dropped 6.3% on-year in fiscal 2022 after growing 26.8% in fiscal 2021. Rising tractor prices amid price hikes taken by OEMs, higher inventory at dealerships, lower commercial demand, negative farmer sentiment due to rising cultivation cost, low fertilizer availability, and increase in other expenditure (such as marriages and other social occasions) hampered demand.

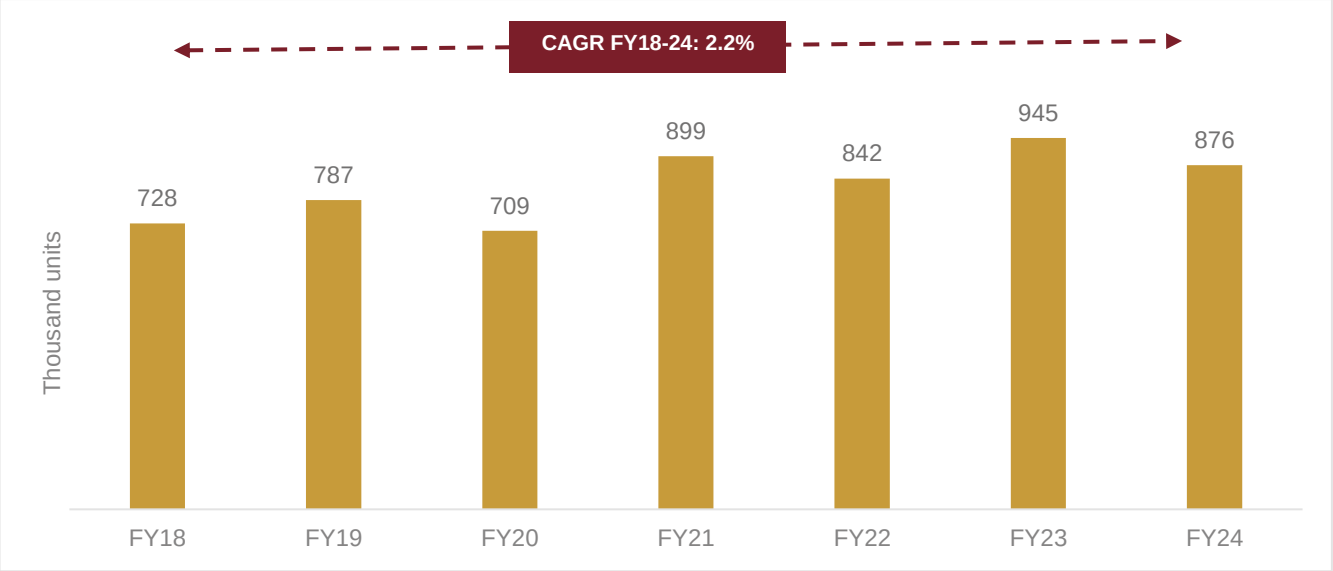
In fiscal 2023, tractor sales grew 12.2% on-year to an all-time high of ~945,000 units. Healthy crop prices, sound reservoir levels owing to above-normal monsoon, higher MSPs announced by the government and better rabi acreage, all led to positive farmer sentiment. Healthy festival demand because of various schemes and discounts supported the retail growth momentum. Commercial demand during the fiscal, however, remained rangebound in fiscal 2023 owing to slower retail momentum in eastern states and a complete ban on sandmining. In the last fiscals, the governments in states such as Bihar, Jharkhand and Uttar Pradesh had clamped down on illegal sand mining, negatively impacting commercial demand for tractors.

Last fiscal (FY24), domestic tractor sales dropped by 7.3% on-year to ~875,724 units, on account of lower reservoir levels and negative farmer sentiments. Negative farmer sentiments also impacted the festive demand, with sales in the festive months September, October, and November for fiscal 2024 - being lower by 6% on-year as compared to the same period last fiscal. Uneven rainfall distribution with monsoon being 6% below normal for the season has led to slower pick-up in the retail market. Barring north-west and central India, remaining regions reported deficit rainfall over normal impacting tractor demand. Reservoir level for the country as of 2nd May 2024, remained at 28% capacity as a percentage of live capacity. Erratic monsoon, lower reservoir levels, anticipated decline in rabi acreage contributed towards a 7.3% on-year decline in tractor sales for fiscal 2024.

A large part of domestic tractor sales is driven by replacement demand. The typical holding period for a tractor is 6-9 years. Most of the tractors in the country is replaced within 7-8 years. Of the domestic demand, 50-60% constitute replacement demand. In states with high penetration of tractors, such as Punjab and Haryana, the replacement

demand accounts for 70-80% of total sales. On the other hand, states with lower farmer incomes than that in Punjab and Haryana have a lengthier replacement cycle (higher age tractors) vs industry average.

**Figure 1: Domestic tractor industry logged 2.2% CAGR between fiscals 2018 and 2024**




*Source: TMA, CRISIL MI&A*

## Tractor exports

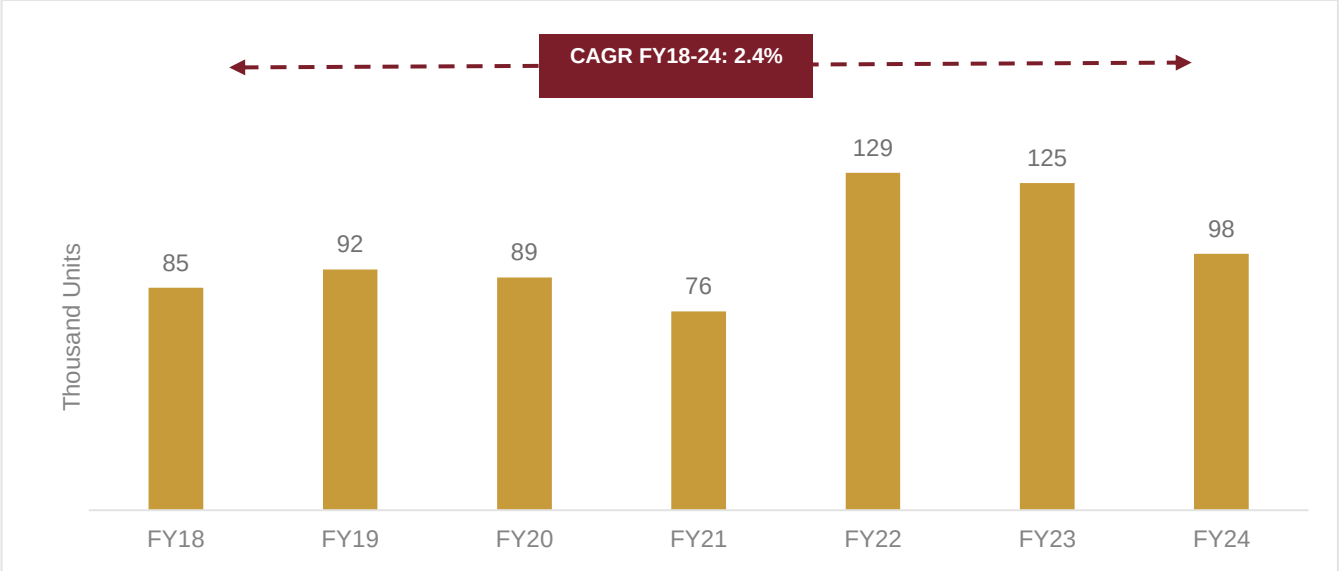
Exports, accounting for about 10% of the overall tractor sales as of fiscal 2024, on a low base of 90,000-100,000 post recording a 21-23% on-year decline in fiscal 2024. Revival in demand from the US, Europe and Asia to further support growth.

Strategic push, such as setting up a base in foreign countries, by players to cater to the global demand would aid export sales. ITL's Solis brand has also been gaining popularity in the European markets. With most of the global companies de-risking exports from China due to the complexities and disruptions in the nation, India has become the natural hedge against Chinese exports. Further, with most of the companies equipped to comply with TREM IV norms, exports have bloomed in the past few years.

The export data for Indian tractors over the years from FY18 to FY24 reflects a fluctuating trend in the international market. This data underscores the influence of various global and domestic factors on the tractor export industry. The CAGR for this six-year period, considering both the ups and downs, stands at approximately 2.4%. While this growth rate may appear moderate, it signifies the resilience of the Indian tractor export industry in the face of various economic and global challenges.

The fluctuations in export numbers can be attributed to factors such as changes in global demand, fluctuations in foreign exchange rates, and economic conditions in importing countries. The resurgence in exports in recent years suggests that Indian tractor manufacturers have adapted to these challenges, improved product quality, and expanded their global reach. This export data underscores the importance of international markets for the Indian tractor industry and the need for ongoing efforts to maintain and enhance competitiveness in the global arena. Despite the fluctuations, the industry remains a vital contributor to India's economic growth and global trade.

**Figure 3: Tractor exports from India has witnessed a growth of 2.4% CAGR between Fiscal 2018-24**



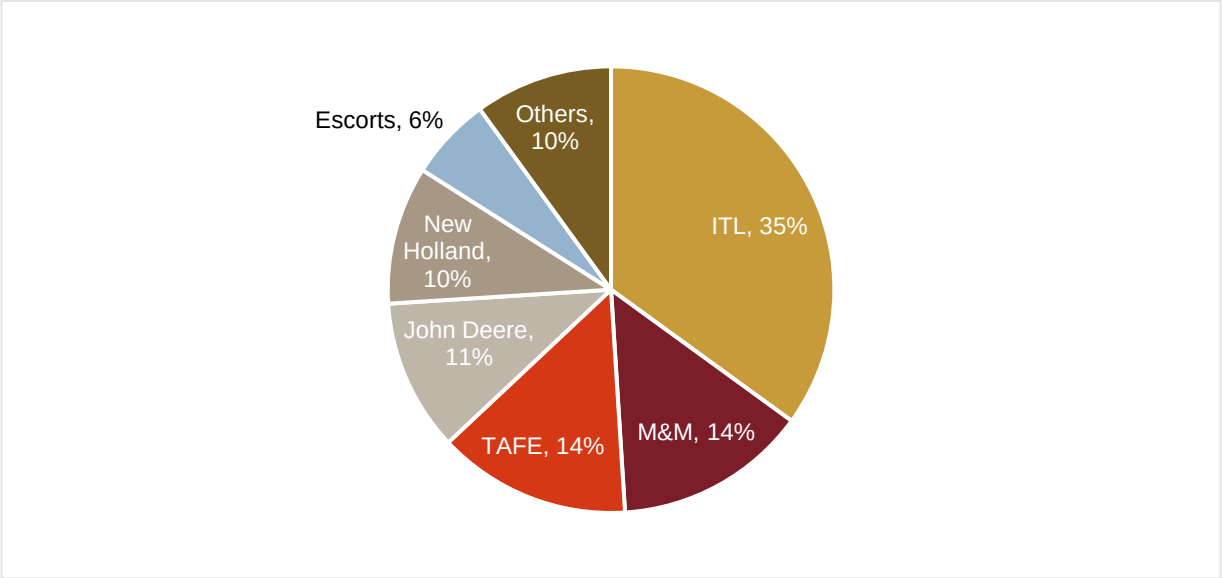

*Source: TMA, CRISIL MI&A*

**>51 hp segment dominates tractor exports**

More than 51 hp tractors accounted for about 62% share in India's tractor export basket for fiscal 2023, the share has come down to 49% in FY24 as demand for lower hp tractors rise. Rising demand for Indian tractors the US and Europe for hobby farming has fuelled demand for lower hp tractors. International tractors limited (ITL) is the largest player in <30 hp tractors while John Deere leads in >51hp tractors.

ITL, John Deere and Escorts have been focusing on growing exports to insulate themselves from the cyclic domestic market demand. Market share of ITL has increased from 25% in fiscal 2021 to 35% in FY24. Escorts reduced exports from its Poland factory and has started exporting from India. Mahindra is a dominant player in exports to the United States and Asian nations. John Deere has been using its Indian manufacturing plant to export to the US, its home country.

**Figure 57: Player-wise share of tractor exports (fiscal 2024)**




*Source: TMA, CRISIL MI&A Consulting*

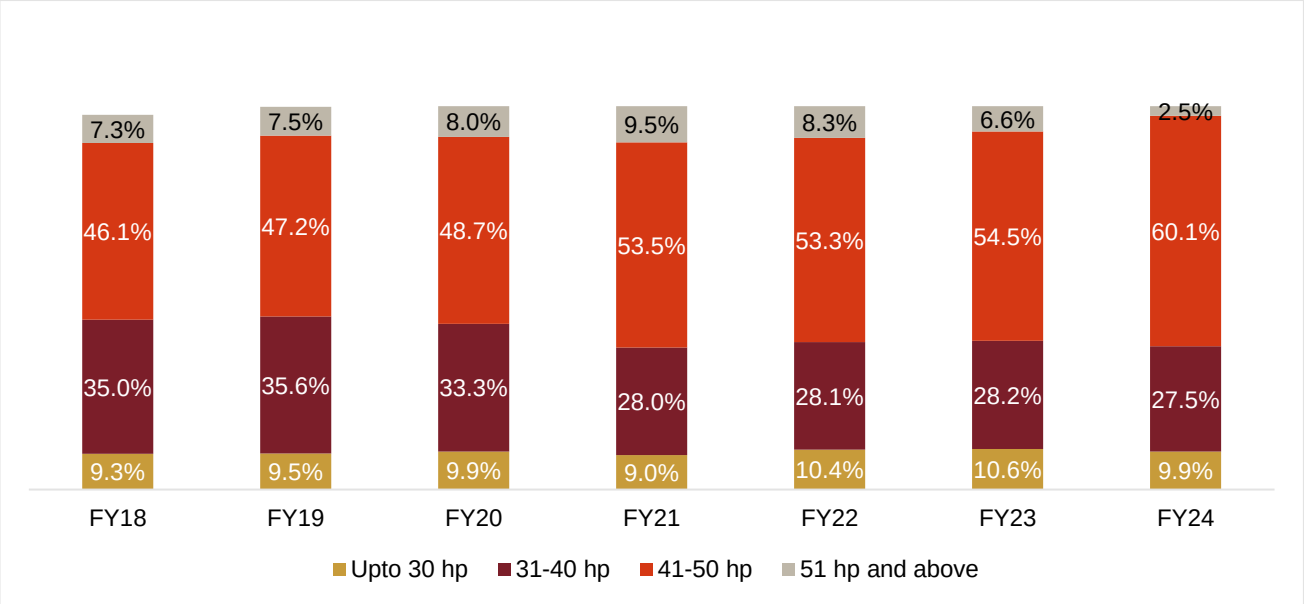
### 3.2.3 Segment wise domestic tractor industry

**Segment-wise tractor sale shows a shift towards higher horsepower**

41-50 hp segment has continued to maintain its dominant share because of multiple applications in agriculture and haulage. Bulk of the implements available are also better suited for 41-50 hp tractors. The move towards 51 hp and above has declined over last few years, as these are less amenable to multi-purpose applications, unlike the 41-50 hp tractors. Moreover, there is a considerable, ~Rs 100,000, price differential between a 40 hp and a 55-60 hp tractor. Also, with application of TREM IV, the price of more than 51 hp tractors has gone up by Rs 1-1.5lacs further dampening demand with farmers shifting towards 41-50 hp tractors. For this reason, share of >51 hp tractors has gone down to 2.4% while the average for last 20 years has been 8%.

However, since fiscal 2021, a sudden shift towards higher hp tractors was observed mainly due to increased usage of implements which require higher hp tractor to operate and increased affordability of farmers on the back of government support and lack of any other investment opportunities in the absence of any social events amid pandemic. Tractors in the sub-20 hp category target specific applications such as orchard farming and inter-cultivation. However, owing to economic and functional considerations, these tractors also find favour among farmers with 0.8-2.0 hectares of land.

**Figure 3: Segment wise domestic tractor sales between Fiscal 2018-24**




*Source: TMA, CRISIL MI&A*

## Key historic regulatory/ macroeconomic trends impacting tractor industry

**Improving farm income and pick-up in commercial activity to drive domestic tractor demand**

| Parameters | Impact | | | |
|---|---|---|---|---|
| | FY21 | FY22 | FY23 | FY24 |
| **Farm income** | **F** | **N** | **F** | **N** |
| Crop prices (minimum support price or MSP) | F | N | F | N |
| Crop output | F | N | F | N |
| *Kharif output* | F | N | F | N |
| *Rabi output* | F | N | F | N |

| | | | | |
|---|---|---|---|---|
| **Demand indicators** | **NF** | **N** | **N** | **N** |
| Infrastructure development | NF | N | F | F |
| Sand mining | N | N | N | N |
| **Finance** | **N** | **N** | **N** | **F** |
| Agri credit, finance availability | N | N | N | F |
| **Supply** | **F** | **NF** | **NF** | **N** |
| Channel inventory | F | NF | NF | N |
| Player action: Pricing and products | F | F | N | N |

*F- Favourable, N- Neutral, NF- Non-Favourable*

*Source: CRISIL MI&A*

### Irrigation intensity and monsoons

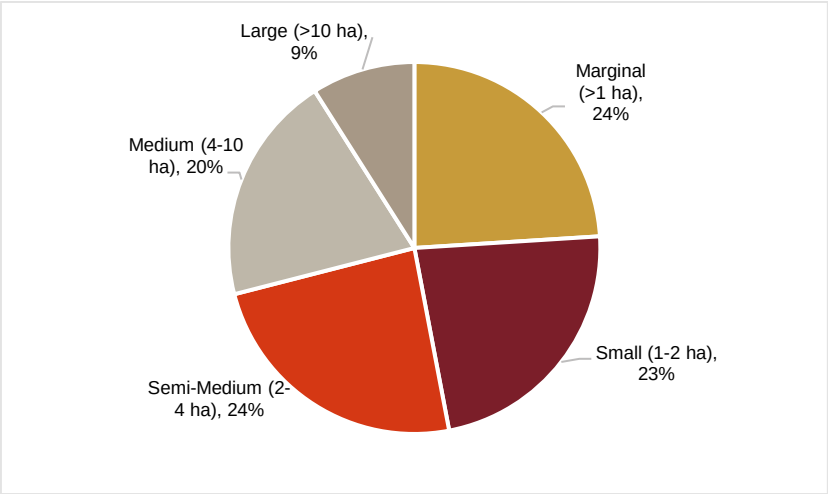
Irrigation plays a vital role in determining the demand for tractors. A farmer will prefer to invest in costlier assets such as tractors only when he is assured of receiving essentials for farming such as water supply. The irrigation spends which increased significantly in last two decades have aided both irrigation and cropping intensity, thus leading to higher and stable farm incomes. Irrigation intensity is expected to improve further over the medium term, thus supporting tractor sales.

Punjab and Haryana have the highest irrigation intensity and also account for the highest tractor penetration in India. Thus, as irrigation facilities improve in other parts of India, tractor penetration will see a corresponding increase. However, extremely fragmented land holdings in certain states may deter them from reaching higher tractor penetration. Besides, deficient monsoons also impact reservoir levels and, in turn, irrigation intensity.

### Landholding pattern

The average land holding size in India is very low at 1.16 hectares (ha) as against a world average of 3.7 ha, with about 68% of farmers being marginal farmers (holding less than 1 ha). This has been a deterrent for tractor demand. Moreover, the average landholding size has been declining due to socio-economic factors such as the break-up of joint families and division of ancestral land. This has both positive and negative impact on tractor demand. With the division of larger landholdings into smaller ones, the number of tractors required is expected to rise. However, the purchase of a tractor would become uneconomical for small farmers due to a reduction in farm size (as a result of the sub-division of already small landholdings). But with the proportion of landholdings below 2 ha being very high, consolidation of landholdings will drive demand in the long run.

**Figure 2: Break-up of landholdings in India (by area)**




*Source: CRISIL MI&A*

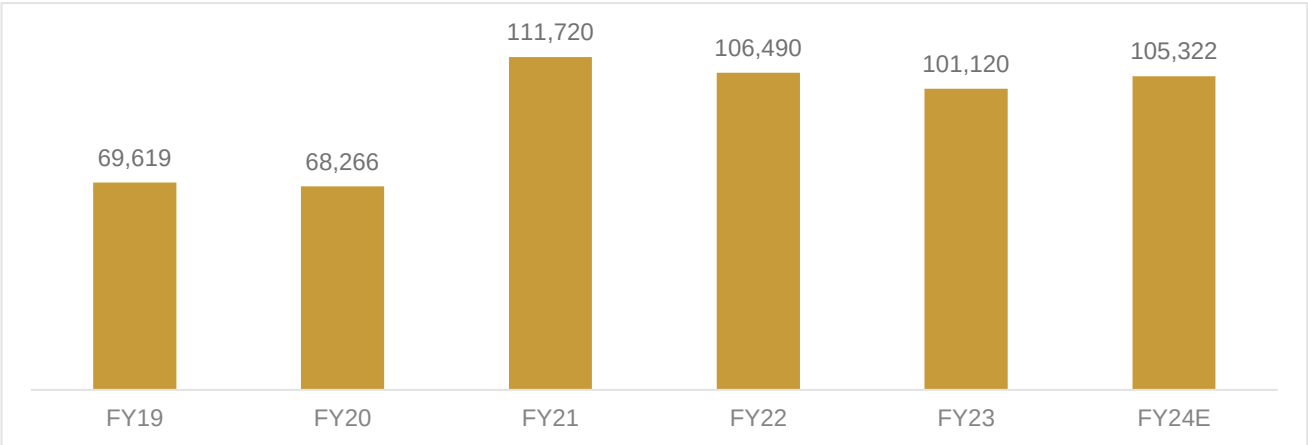
### Availability of credit

In India, around 70-75% of tractors purchased are on credit, so its availability becomes a key demand driver for the industry. Hence, any major changes in financing norms directly impact the demand for tractors. Agricultural credit usage in farm mechanization has been growing steadily over the years, thus enhancing the farmers' ability to buy tractors. Public sector banks and non-banking financial companies (NBFCs) are major financiers. Over the last decade, the cumulative share of public sector banks (PSBs), co-operative banks, and regional rural banks has come down from about 75% to 15-20%, with NBFCs now accounting for about 50-55% of the market.

### MGNREGA spending

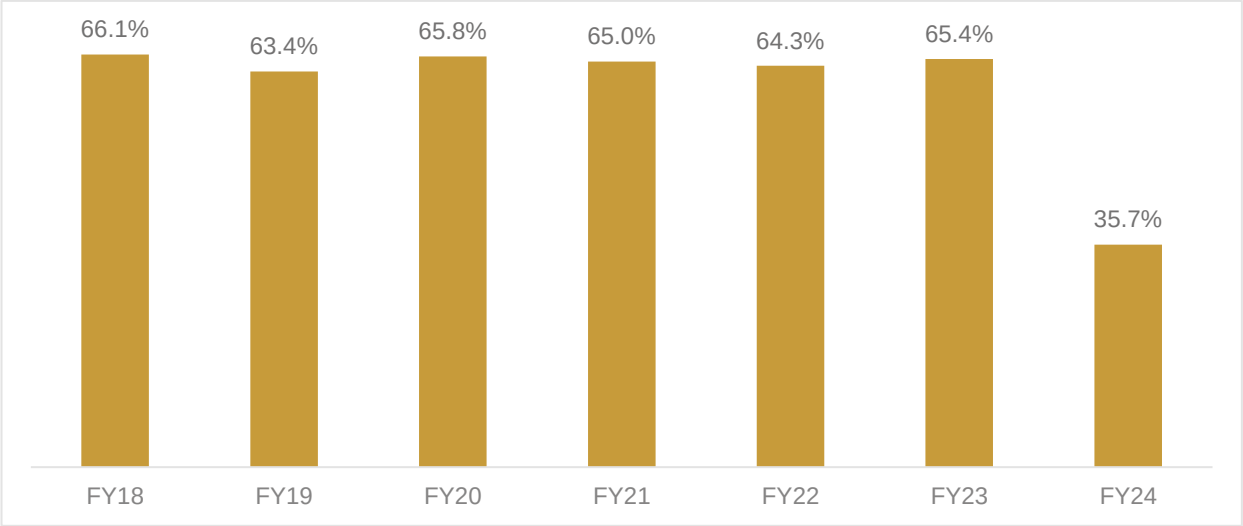
MGNREGA is an employment-generating and asset-creating scheme of the central government and make up a large portion of the expenditure budget of the Department of Rural Development. It is a social safety net scheme and is driven by demand. So, periods of rural stress or shocks result in higher-than-budgeted spending under this scheme. In fiscal 2024, the budget allocation for MGNREGA was Rs 86,000 crore. In fact, the actual spends under the scheme have on average been higher than the budgeted amount in the past.

**Figure 3: MNREGA expenditure (in INR crores)**




*Source: Ministry of Rural Development, CRISIL MI&A*

**Figure 4: MNREGA expenditure as a per-cent of total agriculture and agriculture allied works**




*Source: Ministry of Rural Development, CRISIL MI&A*

MNREGA spending indirectly boosts the demand for commercial use of tractors - demand comes from government spending on infrastructure development like roads, etc

**Minimum support prices of food grains**

The Government's price policy for major agricultural commodities seeks to ensure remunerative prices to the growers for their produce with a view to encouraging higher investment and production and safeguarding the interest of consumers by making available supplies at reasonable prices. Towards this end, Government announces Minimum Support Prices (MSPs) for twenty-two (22) mandated crops and Fair and Remunerative Prices (FRP) for sugarcane at all India level recommendations of the Commission for Agricultural Costs & Prices (CACP) after considering the views of concerned State Governments and Central Ministries/Departments. The 22 mandated crops include 14 Kharif crops viz. paddy, jowar, bajra, maize, ragi, tur (arhar), moong, urad, groundnut, soybean (yellow), sunflower seed, sesamum, Niger seed, cotton and 6 Rabi crops viz. wheat, barley, gram, masur (lentil), rapeseed & mustard, safflower and two commercial crops viz. jute and copra. In addition to that, MSP for toria and dehusked coconut are also fixed on the basis of MSPs of rapeseed & mustard and copra respectively. While recommending MSPs, Commission for Agricultural Costs & Prices (CACP) considers important factors like cost of production, the overall demand-supply situation of various crops in domestic and world markets, domestic and international prices, inter-crop price parity, terms of trade between agricultural and non-agricultural sector, likely effect of price policy on rest of the economy and a minimum of 50 percent as the margin over the cost of production.

- **MSP for Paddy and Maize (2017-18 to 2023-24):** Going by the trends, it could be noticed that there has been an exponential rise in MSP for Paddy and Maize. The MSP for Paddy which was Rs. 1550/- per quintal in 2017-18 has increased to Rs. 2183 /- per quintal in 2023-24, a CAGR increase of 5.9% between fiscal 2018-24%. Similarly, MSP for Maize which was Rs. 1425/- per quintal in 2017-18 has increased to Rs. 2090/- per quintal in 2022-23, a CAGR increase of 6.6%.
- **MSP for major Oil Seeds (2017-18 to 2023-24):** The MSP for groundnut which was Rs. 4450/- per quintal in 2017-18 has increased to Rs. 6377/- in 2023- 24 which is a growth of 6.2% CAGR. Similarly, Sunflower seeds and Soyabean witnessed a CAGR of 9.3% and 7.1%, respectively.

- **MSP for Wheat (2017-18 to 2023-24):** The MSP for Wheat which was Rs. 1625/- per quintal in 2017-18 has increased to Rs. 2275/- per quintal in 2022-23, a CAGR increase of 5.8% between fiscal 2018-23.

The government fixes the procurement prices of food grains. These prices affect market prices, as they are used as a base for their calculation. Change in procurement prices directly affects the farmer's income as it impacts his loan repayment capability. This has reduced volatility in farm incomes, notwithstanding some fluctuations in agricultural production arising from deviation in rainfall. In fiscal 2019, the MSP hike was around 15-20% on-year, coupled with good crop output, which resulted in higher farm income across all the major regions. However, in fiscal 2023, hike in MSP was only 4-6% on year. Going forward, high growth in minimum support prices is unlikely to continue in view of the central government's fiscal constraints and fixing of inflation control emerging as the central pillar of economic policy.

**Cropping pattern**

Farmers are being encouraged and educated by state governments to improve farm productivity, and consequently increase their incomes. To improve farm productivity, farmers are practicing multiple cropping. Consequently, the use of tractors helps the farmer to complete operations quickly, following which he can move on to the next crop.

**Increase in cash crop production**

Extensive cultivation of cash crops has yielded higher incomes for farmers and boosted tractor demand. Over the years, cultivation of cash crops has been rising in terms of the land area and the share of output.

**Nature of soil**

Smaller tractors are more suitable for soft soil conditions, as conducting agricultural operations in such conditions requires lower-powered tractors. In India, the northern states of Punjab, Haryana and the western parts of Uttar Pradesh have relatively soft soil. Hence, the demand for small tractors is high in these regions. In the southern and western regions, the soil is relatively hard, thus requiring medium and large-sized tractors.

**Crop mix**

The crop mix and the nature of crops cultivated have a significant role in determining the choice of a tractor. Medium and large tractors are preferred for the cultivation of cash crops such as sugarcane and cotton, where the agricultural activity involved is high, and the timeliness of operations is significant. Similarly, high-power tractors are preferred in the case of intensive farming and multiple cropping, land bed preparation, harvesting and when transportation needs to be quick.

**Replacement demand**

The lifespan of a tractor is estimated at 18-20 years, though the actual usage could vary, depending on the soil and cropping conditions. Usually, the farmer who is replacing a tractor would want to upgrade to a higher-powered tractor. Hence, given the increasing income levels and the existing numbers of lower-powered tractors, the replacement demand in states such as Punjab and Uttar Pradesh would be high for higher-powered tractors.

**Purpose of use**

The choice of a tractor depends on whether the customer is a farmer, who is purchasing the tractor for agricultural purposes, or a contractor, who would use it for commercial purposes such as in construction projects for the transportation of goods and materials. The higher-powered tractors are preferred in construction projects.

**Resale price of tractors**

A tractor is typically replaced after 6-8 years of use. But it is estimated that it still continues to be useful for around 18-20 years. Since the farmer tries to cover the margin money payment for a new tractor from the sales proceeds of

the existing tractor, he takes into account the resale price, which a particular tractor is expected to earn after it has been used for a certain number of years.

**PMGSY completion trend**

Pradhan Mantri Gram Sadak Yojana (PMGSY) is a one-time special intervention to provide rural connectivity, by way of a single all-weather road, to the eligible unconnected habitations in the core network with a population of 500 persons and above (Census 2001) in plain areas. The Pradhan Mantri Gram Sadak Yojana (PMGSY) phase 1 was launched in 2000. Under the scheme, the Centre recognized 178,184 habitations as requiring all-weather roads, of which 97% of the eligible and feasible habitations have been connected as of November 2019.

Further, the Government launched a new intervention in the scheme namely PMGSY-II in the year 2013-14 for consolidation of total 50,000 km existing Rural Road Network to improve its overall efficiency as a provider of transportation services for people, goods and services. 41,434 kms of rural roads are sanctioned under PMGSY-II as of date, of which, 75% have been completed. The umbrella scheme involves construction/upgradation of over 800,000 km of rural roads. In PMGSY-I, 97% of target has been achieved. In PMGSY-II, 75% of the target has been achieved. PMGSY III target km are lower by 40% as compared to roads constructed over the last 5 fiscals.

Under the PMGSY-III scheme, announced in the Union Budget 2019-20, it is proposed to consolidate 125,000 km road length in states over the next five years. The scheme will also include 'through routes' and 'major rural links' that connect habitations to Gramin Agricultural Markets (GrAMs), higher secondary schools and hospitals.

It will entail an estimated cost of Rs 80,250 crore (Central share Rs. 53,800 crore, states' share Rs 26,450 crore).

The road length in km to be constructed under PMGSY-III is significantly lower than the 218,000 km constructed under the umbrella scheme between fiscals 2015 and 2019. CRISIL Research expects investments in rural roads to slow down by ~10% over the next five years, due to the lower targets.

Rural road construction (in kms) was almost half in fiscal 2020 at ~27,000 kms construction, as compared with ~49,000 kms in the previous year. Fiscal 2021, saw construction of ~37,000 kms, while fiscal 2022 construction was ~42,000 kms. In fiscal 2023, rural road construction remained muted and failed to achieve the year's target. In fiscal 2024, the target for rural road construction has been slashed to 38,000 km.

After fiscal 2017, budgetary allocation by the Central government to the scheme was kept at Rs 190 billion, budgetary allocation for FY23 has been increased to Rs 195 billion. The actual expenditure has been lower than the allocation, achievement ratio has slipped to 74% from 81% in fiscal 2019. Total investment in PMGSY, both state and Centre, was Rs 234 billion in fiscal 2019, up 35% from Rs 173 billion in fiscal 2018, because of an uptick in length being constructed as well as higher cost per km.

Despite the challenges faced, the progress under PMGSY has been satisfactory. The vertical-wise details of achievement under PMGSY (overall) are as follows:

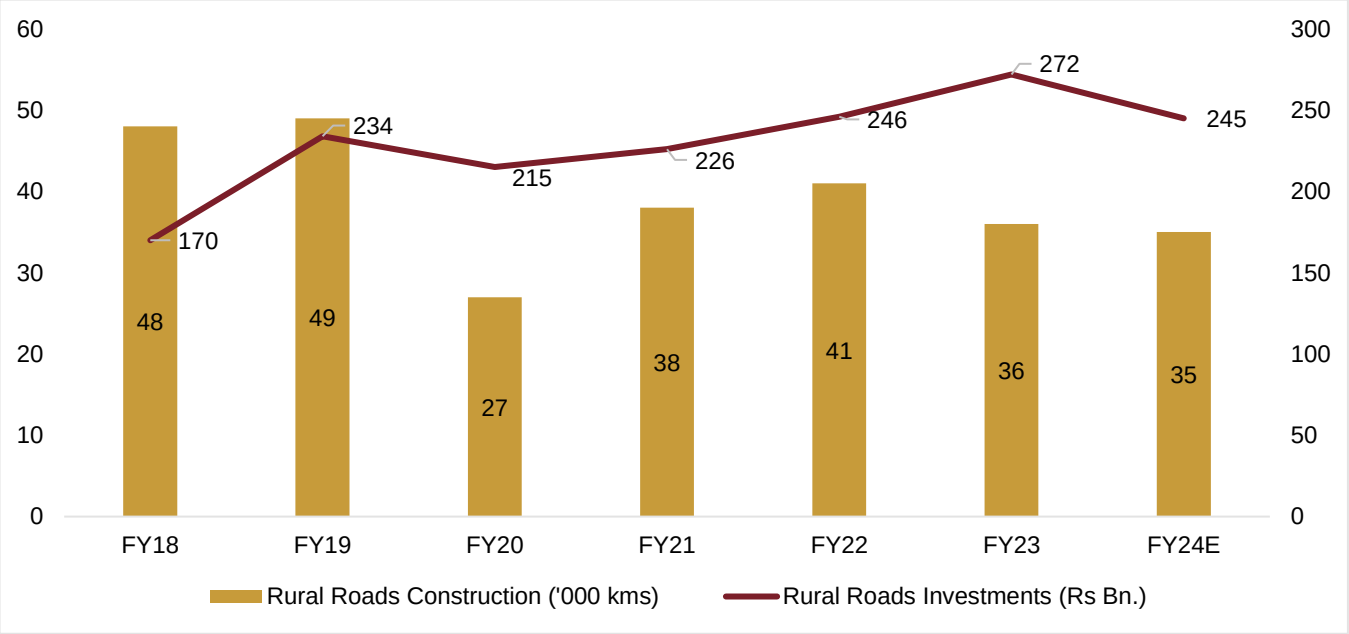
| Vertical | Sanctioned | | | | Completed | | |
|---|---|---|---|---|---|---|---|
| | Launch date | No. of Roads | Road Length (in km) | No. of bridges | No. of Roads | Road Length (in km) | No. of bridges |
| **PMGSY-I** | 2000 | 164806 | 645605 | 7516 | 159783 | 613030 | 5864 |
| **PMGSY-II** | 2013 | 6700 | 49885 | 765 | 5755 | 46468 | 562 |
| **RCPLWEA** | 2016 | 1030 | 10231 | 463 | 363 | 5310 | 135 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PMGSY-III** | 2019 | 9972 | 77129 | 708 | 1984 | 29773 | 96 |
| **Total** | | 182508 | 782850 | 9452 | 167885 | 694581 | 6657 |

*Note: Road Connectivity Project for Left Wing Extremism Affected Areas (RCPLWEA)*

*Source: PIB, CRISIL MI&A*

**Figure 7: Rural Road construction investments**

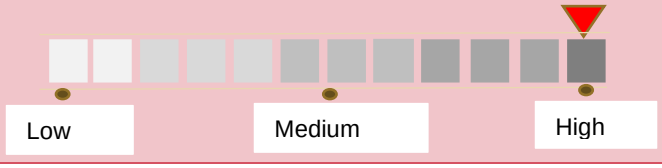


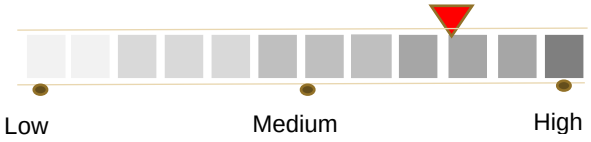
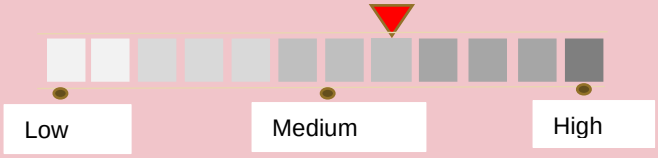
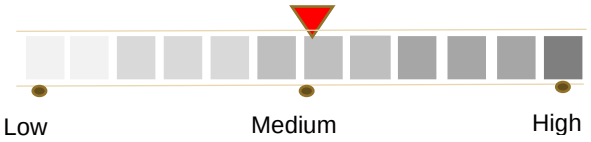

*Source: Ministry of Rural Development, CRISIL MI&A*

Residual construction target under PMGSY II and future targets under PMGSY III are largely concentrated in northern and eastern states in the country. It is expected that Odisha would see 15-20% of targeted rural road construction under PMGSY. Followed by Assam, which would see 9-11% of the total PMGSY target construction. Arunachal Pradesh, Bihar and Uttarakhand would each see 5-10% of the total construction under PMGSY. Other states such as West Bengal, Jammu and Himachal Pradesh also have potential for rural road construction under the scheme.

### 3.2.4 Growth Drivers

Tractor demand in the country is mainly dependent on farmer incomes from agricultural operations, which in turn gets impacted by various factors - monsoon, crop prices, procurement, etc. Government regulation over rural infrastructure development also affects non-farm tractor demand, which accounts for roughly 20-25% of overall domestic demand. Additionally, the availability of formal financing channels also helps in supporting demand.

| Risk Factor | Impact |
|---|---|
| **Monsoon Performance** |  |

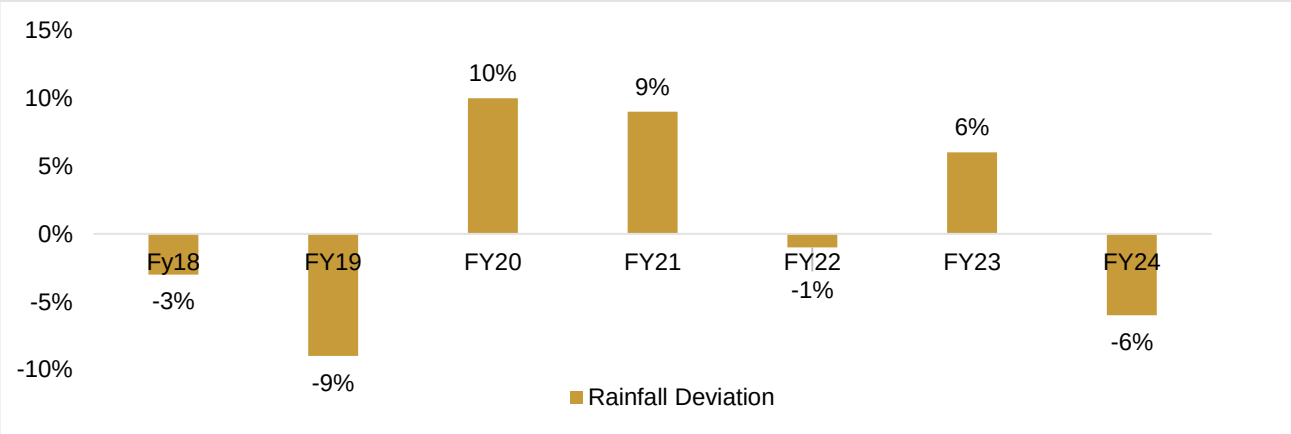
| | |
|---|---|
| **Crop Prices** |  |
| **Government Regulation** |  |
| **Finance Availability** |  |

**Monsoon Performance**

The south-west monsoon (Jun-Sep), as well as the north-east monsoon (Oct-Dec) to some extent, is very critical for the Indian farming community, as its performance decides the overall crop production in the country. A poor monsoon with uneven geographical spread, and even unseasonal rainfall, can severely dent the rural economy by impacting farm incomes, which would result in tractor demand getting affected. Monsoon therefore presents the highest risk for the tractor industry.

The consecutive droughts in fiscal 2015 and 2016 left the rural economy in high distress, with Agri GDP growth of -0.2% and 0.7%, and domestic tractor sales also declining by 13% and 11%, respectively. However, a normal monsoon in fiscal 2017 & 2018 led to a revival in tractor demand, with sales increasing by a healthy 18% & 22% respectively during the fiscals. In fiscal 2021, 9% above normal monsoon and positive retail sentiments contributed towards a substantial 27% on-year increase in tractor sales. In fiscal 2023 and fiscal 2024, uneven rainfall distribution with monsoon being 6% below normal for the season has led to slower pick-up in the retail market.

**Figure 7: Rainfall deviation**




*Source: IMD, CRISIL MI&A*

**Crop prices**

The central government announces Minimum Support Price (MSP) for majority of crops, however only paddy and wheat crops get procured at scale. Other crops (pulses, oilseeds, vegetables, etc.) are mostly sold to mandis/private

traders, and thus subject to high price volatility and cartelization. As a result, despite surplus production, subdued crop prices can have a negative effect on farmers' cash flow, and in turn impact ability to purchase tractors.

**Government regulation**

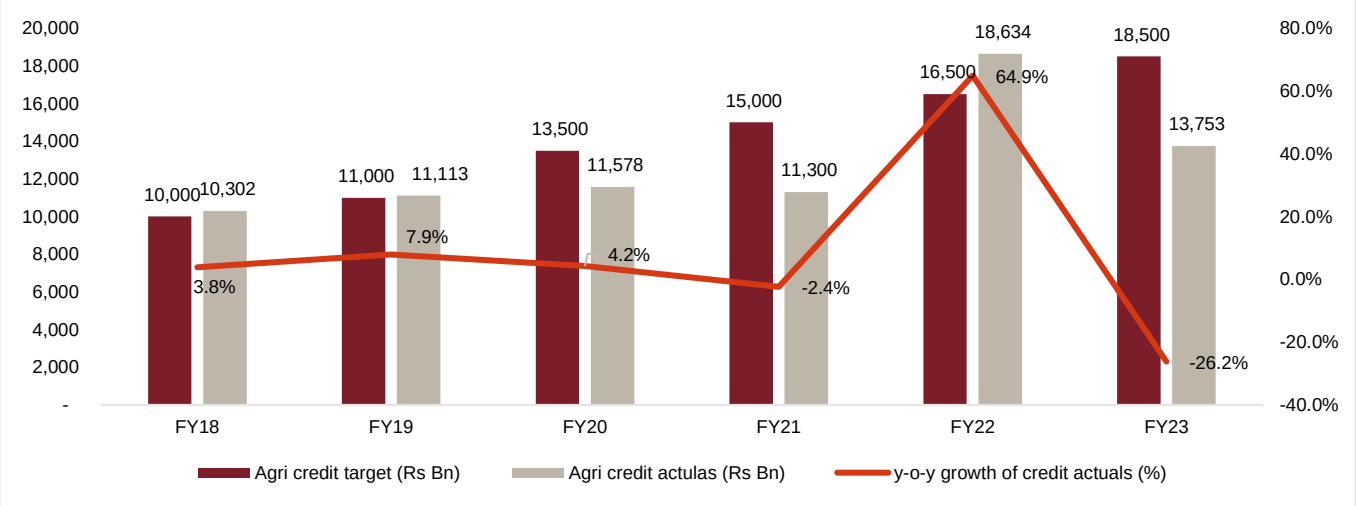
There is significant government intervention in both the agri and non-agri aspects of the rural economy. While marginal increase in MSP hurts farm sentiments, government monitoring of sand mining activities and funds disbursal towards rural infra development, key drivers for non-farm tractor demand (commercial/non-farm demand of tractors accounts for 15-20% of total tractor demand), can also have a significant impact on the industry.

In fiscal 2021 and 2022, illegal mining activities were at a standstill in states such as Bihar, Jharkhand and Uttar Pradesh which is has impacted commercial demand negatively. In fiscal 2023, decline in construction activities led to slower growth in commercial demand along with ban on illegal mining and change in rules and regulations for operation of brick kilns which are impacting commercial demand in fiscal 2024 as well.

**Finance & Credit availability**

The availability of formal financing channels also plays a very important role in enabling industry growth, as nearly 70% of tractors purchased are backed by loans. However, as farm incomes are dependent on vagaries of monsoon, rise in NPA levels results in financiers taking a cautious stance towards disbursing tractor loans, which impacts tractor sales, and this has been witnessed in fiscals 2023 and 2024 majorly in the states of Andhra Pradesh and Telangana where financers have reduced the funding due to increase in delinquency levels.

**Figure 7: Agri credit availability**




*Source: CRISIL MI&A*

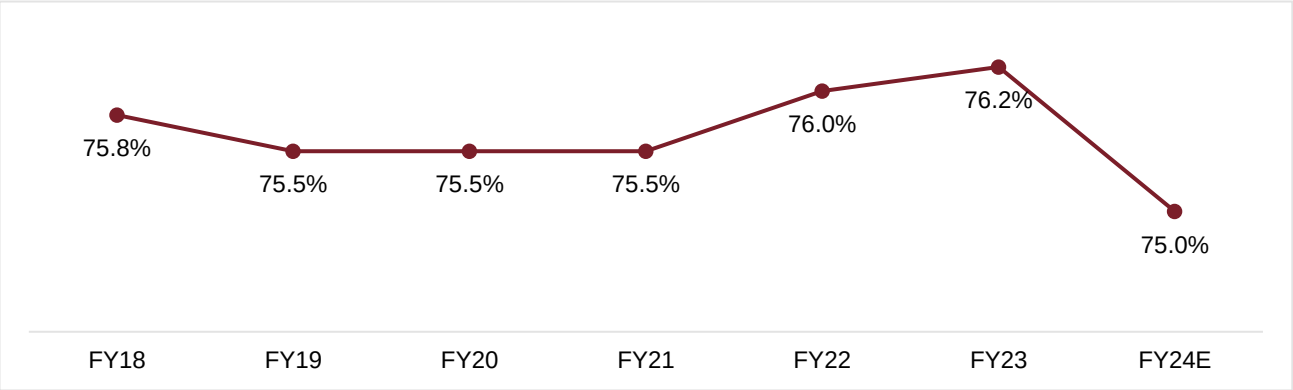
Banks (Public, Private and other banks) account for 35-40% of the total tractor loan book, rest 55-60% is accounted by NBFCs (Non-Banking Financial Company). However, NPAs are more prominent in public banks as compared to private banks and NBFCs.

Owing to the low purchasing power of most farmers in India, credit availability is the key to a rise in tractor demand. Currently, about 70-75% of the tractors are purchased on credit, this steady growth along with the government's emphasis on increasing agriculture credit has helped boost the domestic tractor demand. Tractor loans are easy to come by since agricultural credit is a part of priority sector lending.

Following are some scheme proposed by the government and fund allocations:

- In Budget 2023-24, provision of Rs 450 crore has been made for the Digital Agriculture Mission started by the Modi Government, and about Rs. 600 crore allocated for the promotion of Agriculture sector through technology.
- The total budget of the Ministry of Agriculture and Farmers Welfare, including Agricultural Education and Research, is about Rs 1.25 lakh crore in FY24. Out of this, provision of Rs. 60,000 crore has been made for the Pradhan Mantri Kisan Samman Nidhi (PM-Kisan)
- Target for Agricultural credit has been increased to Rs 20 trillion from Rs 18.5 trillion in FY24

**Figure 7: LTV (Loan to Value Ratio) rates**




*Note: E - estimated*

*Source: CRISIL MI&A*

## 3.2.5 Growth drivers for Indian tractor exports and key export destinations

India's tractor industry gets 10 per cent of its revenue from exports.

Since 2014 the government has taken several proactive and effective steps to boost India's exports. A new Foreign Trade Policy (FTP) 2015-20 launched on 1 April 1, 2015, rationalized the earlier export promotion schemes. Two new schemes: Goods Exports from India Scheme (MEIS) to improve export of goods and Services Exports from India Scheme (SEIS) to increase exports of services were also introduced, as per the report. Reasons for the growth in exports is the government's support for agriculture in those countries where farm mechanization and food security have larger interest. The trend of surge in tractor exports has been seen in Europe and America where the volumes and demand has gone beyond expectations.

**Growth drivers in key markets in FY24, are as detailed below:**

**North America**

- Average land holding size in the US is among the highest in the world, translating into demand for higher hp tractors, where Indian players have minimal presence so far.
- Indian tractor manufacturers mainly cater to hobby or weekend and livestock farmers who require lower hp tractors.
- Replacement sales constitute bulk of sales in the US and Canada due to high tractor penetration.

**Africa**

- Africa is termed the 'future food basket' due to its large arable land parcels, favorable climate, and significant potential over the long term. It has low tractor penetration (estimated at 13/sq km compared with the global average of 200/sq km).
- Tractors of a higher horsepower (up to 600 hp) are used in large farms owned by corporates and government entities.

- Indian companies are investing in distribution and after-sales network due to the potential demand and lack of domestic competition. However, fluctuating demand because of institutional purchases and low retail demand with underdeveloped financing channels are the key deterrents.

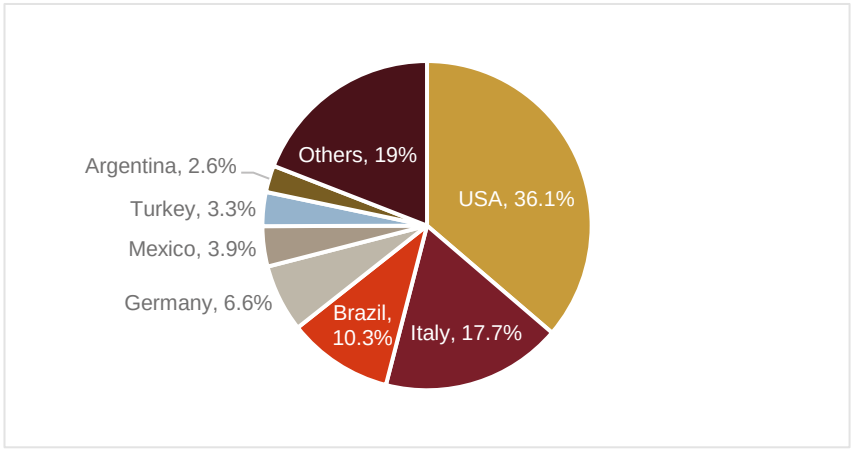
**Europe**

- Major tractor segments used in Europe are 110-120 hp, while Indian tractor exported to the region are used for some of the less rigorous farm activities.
- Germany, Spain, France, Italy, and the United Kingdom have average farm sizes of 54 acres, resulting in demand for higher hp tractors, thereby limiting exports of the primarily low-hp Indian tractors.
- India's tractor exporters are better placed to cater to East Europe, which has smaller landholdings of 15 acres.
- New Holland as well as TAFE have set up a base in Turkey to cater to demand from this region, and Mahindra, via acquisitions of farm machinery players in the country, now has a significant presence in assembly plant and distribution network.

**Asia**

- Indian tractors find more acceptance in the neighboring countries of Nepal, Bangladesh, and Sri Lanka, due to similar climatic conditions, soil conditions, land size and agricultural patterns.
- Bangladesh is one of the biggest markets for Indian manufacturers and accounts for ~38% of overall exports and is one of the fastest growing economies. The economic growth is expected to be supported by private consumption.

**Figure 7: Key export destinations FY24**




*Source: DGFT, CRISIL MI&A*

# 3.2 Outlook of Indian Tractor industry (FY24 – FY29P)

## 3.3.1 Production outlook

Tractor production to decline by ~11.6% in fiscal 2024 on a high base of fiscal 2023 due to de-growth in domestic tractor sales which have been impacted by delayed and erratic monsoon this year.

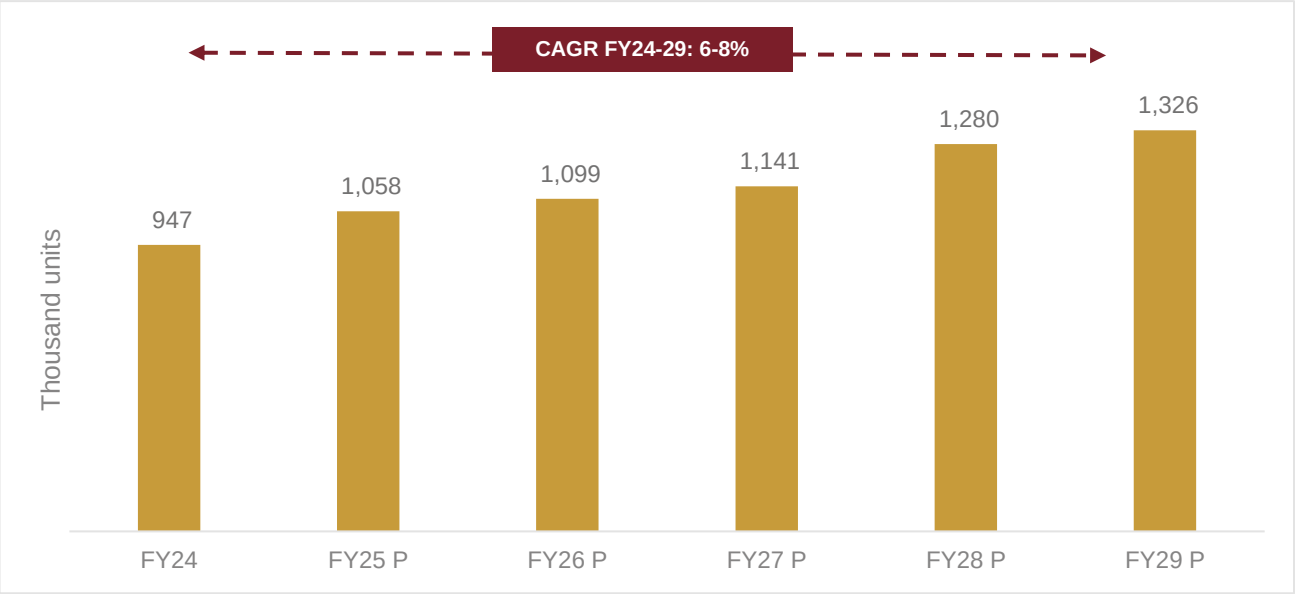
By fiscal 2029 tractor production is expected to grow at a CAGR of 4% on-year to an all-time high of ~13,26,000 units. This increase signifies a growth of 6-8% CAGR over the 5-year period.

Several factors contribute to this optimistic outlook. India's agricultural sector remains a cornerstone of the nation's economy, and tractors are indispensable for increasing farm productivity and supporting the country's food security

objectives. Government initiatives, technological advancements, and evolving farming practices are expected to drive demand for tractors in the coming years.

The projected production figures are based on the role that the tractor manufacturing industry will play in India's agricultural modernization and economic development. As the industry grows and evolves, it is expected to contribute significantly to the mechanization of farming practices and further strengthen India's position as a global agricultural powerhouse.

**Figure 7: Tractor's production expected to grow by 6-8% between fiscal 2024-29P**




*P - projected*

*Source: CRISIL MI&A*

### 3.3.2 Domestic tractor sales and exports

CRISIL Consulting projects domestic tractor sales to expand at 4-6% compound annual growth rate (CAGR) during fiscals 2024 to 2029, after factoring in one to two years of erratic monsoon during the period along with healthy sales expected in the remaining years. From fiscal 2018 to 2023, the industry registered a CAGR of 5% due to healthy sales in fiscals 2017, 2018, 2021 and 2023.

during the period along with healthy sales expected in the remaining years. From fiscal 2018 to 2023, the industry registered a CAGR of 5% due to healthy sales in fiscals 2017, 2018, 2021 and 2023.

However, anticipated decline in rabi profitability, low subsidy disbursement in the first quarter amid general elections and slower growth in commercial demand to prevent further growth.

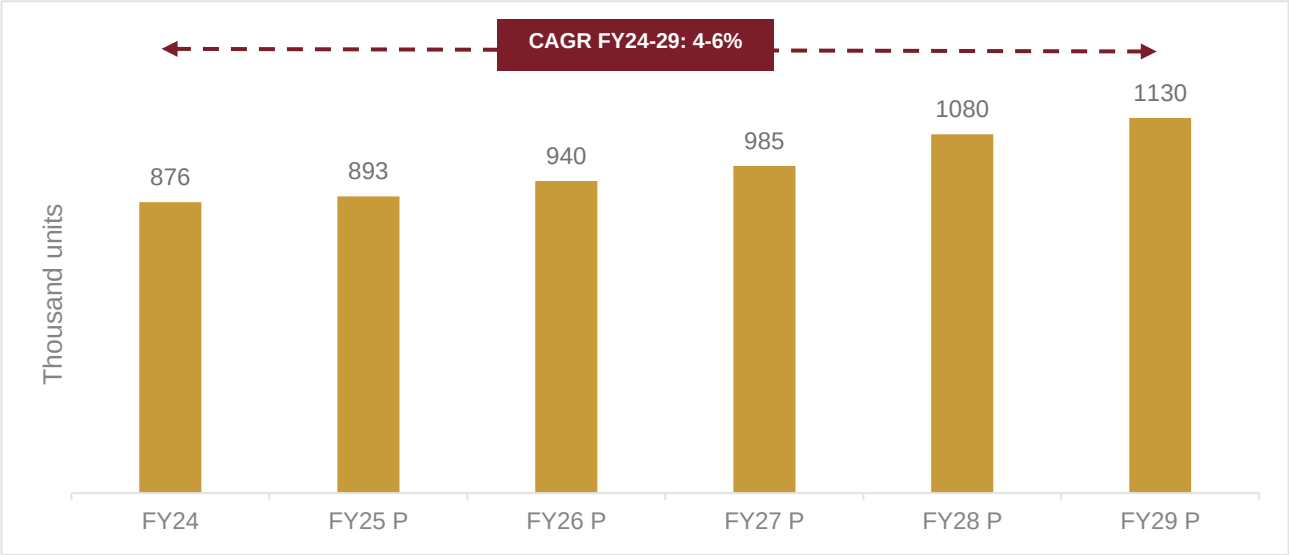
In FY25, with IMD's (Indian Meteorological Department) prediction of a normal monsoon season, domestic tractor sales are expected to grow by 1-3% on-year in volume terms. A normal monsoon season is expected to lead to healthy reservoir levels thereby positively impacting farmer sentiments. A 8-10% on-year increase in volumes up for replacement to further support growth in the fiscal. Anticipated healthy rainfall is expected to lead to higher festive demand in the second and third quarters. Healthy reservoir levels to boost rabi acreage and thereby crop profitability which, in turn, is expected to boost tractors sales in the last quarter of the fiscal.

al.

Growth up to fiscal 2029 will be on the back of low tractor penetration in the country (three tractors per 100-hectare area), government's focus on improving farm incomes through various schemes, promotion of farm mechanisation, and investments to improve rural infrastructure.

Tractors are a cyclical industry and has been observed that whenever the industry gets into a downturn, it takes 4-5 quarters for the industry to recover. Thus, assuming that the industry will be impacted by poor monsoon for one to two years between fiscal 2024 and 2029 with the industry taking 4-5 quarters to recover, our long-term assessment suggests that the tractor industry will grow at a CAGR of 4-6%. The growth will be supported by low tractor penetration in India (3 tractors per 100-hectare area); government's focus on improving farm incomes through various schemes, promoting farm mechanization; and investments to improve rural infrastructure.

**Figure 7: Tractor industry expected to grow by 4-6% between fiscal 2024-29**




*Note: Graph represents sales volumes | E – estimated, P - projected*

*Source: CRISIL MI&A*

India’s tractor market has undergone significant expansion and transformation, driven by its growing utilization in both farming and non-farming activities. This growth is facilitated by improved credit facilities for farmers and various government policies aimed at meeting the rising demand for tractors. Furthermore, the emphasis on infrastructure development by the government has spurred the use of tractors in non-farm activities.

Replacement demand is expected to be higher by 4-6% on-year in fiscal 2024 and rise by 8-10% on-year in fiscal 2025 with healthy sales registered in fiscals 2017 and 2018.

## Tractor exports

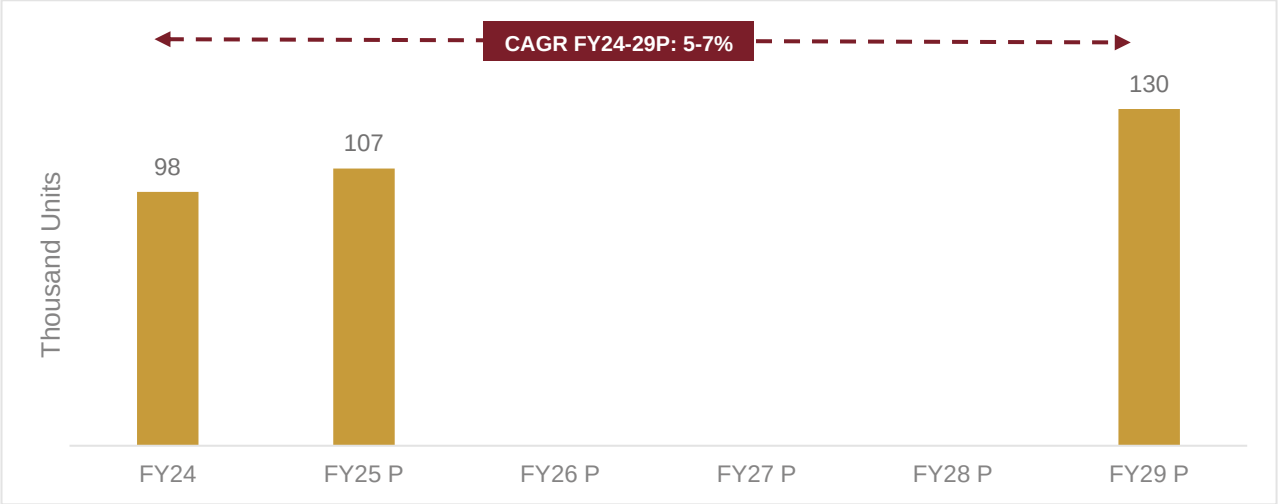
Exports are projected to grow by 5-7% year-over-year to 100,000-110,000 units in fiscal 2025, up from a low base of 90,000-100,000 units following a  23-25 % year-over-year decline in fiscal 2024. Revival in demand from the US, Europe and Asia to further support growth.

Strategic push, such as setting up a base in foreign countries, by players to cater to the global demand would aid export sales. ITL's Solis brand has also been gaining popularity in the European markets. With most of the global

companies de-risking exports from China due to the complexities and disruptions in the nation, India has become the natural hedge against Chinese exports. Further, with most of the companies equipped to comply with TREM IV norms, exports have bloomed in the past few years.

The compounded annual growth rate (CAGR) between fiscals 2024 and 2029 is expected to be 5-7%. The USA, Europe & Asia are likely to remain the focal regions for long-term exports. Further, with India emerging as an export hub for relatively small tractors (30-75 horsepower/hp), and major companies increasing focus on international markets with the launch of 90-120 hp tractors, we expect sustainable export growth over the next five years. Rising demand for <30 hp tractors for gardening and hobby farming purposes is also expected to support growth.

**Figure 7: Exports expected to grow at a CAGR of 6-8% from fiscal 2024 to fiscal 2029**




*Note: E – estimated, P - projected*

*Source: CRISIL MI&A*

More than 51 hp tractors accounted for about 62% share in India's tractor export basket for fiscal 2024, the share has come down to 49% in FY24 as demand for lower hp tractors rise. Rising demand for Indian tractors the US and Europe for hobby farming has fueled demand for lower hp tractors. International tractors limited (ITL) is the largest player in <30 hp tractors while John Deere leads in >51hp tractors.

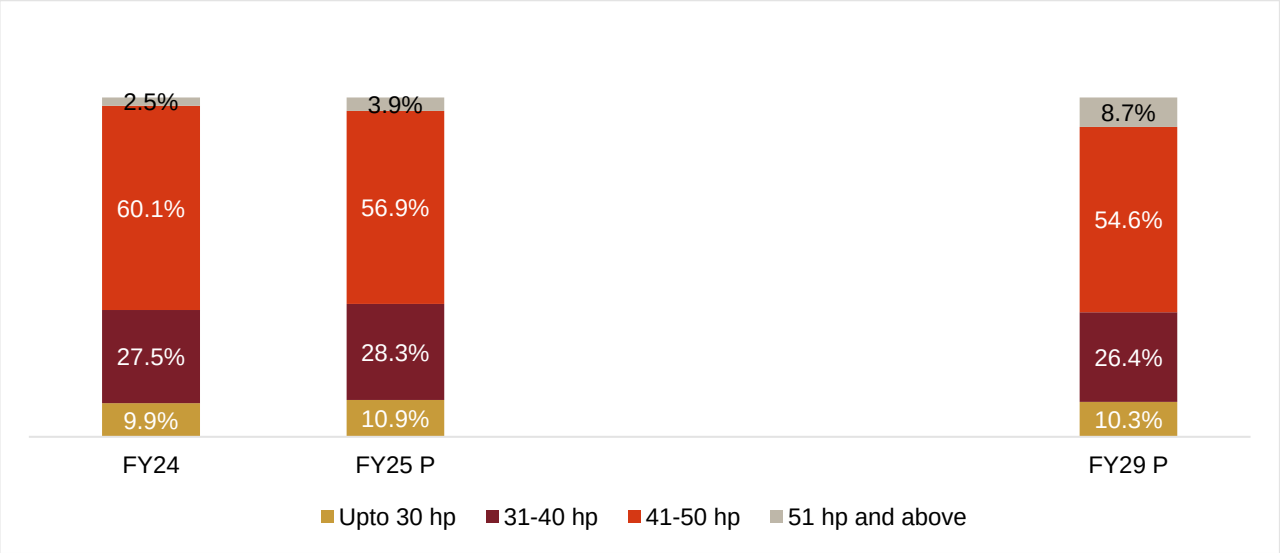
### 3.3.3 Segment wise outlook of domestic tractor industry

41-50 hp segment has continued to maintain its dominant share because of multiple applications in agriculture and haulage. Bulk of the implements available are also better suited for 41-50 hp tractors.

We expect upgradation from 31-40 hp tractors to 41-50 hp tractors over the next five years, as farmers are likely to upgrade to higher hp segments, realizing the benefits of mechanization and higher productivity from increased usage of implements along with tractors. Additionally, the growing trend of collaborative farming, increasing commercial usage, and higher irrigation intensity will boost usage of higher hp tractors. However, in case of a decline in farm incomes on account of weak monsoon, farmers tend to shift towards lower hp tractors (below 40 hp). We expect a

more gradual movement towards 51 hp and above tractors, as they are less amenable to multipurpose applications (like the 41-50 hp) and the price gap is big (at least 10-15% between a 50 hp and a 55-60 hp tractor since emission norms change at 50 hp).
The market for 70-75 hp tractors is niche and is still evolving in India. These tractors are used mainly for farming along with implements, while 41-50 hp tractors can also be used for haulage and commercial activities such as sand mining. This increases their viability as these can be used for at least 700 hours a year.

**Figure 7: Segment wise tractor industry between fiscal 2024-29**




*Note: P - projected*
*Source: CRISIL MI&A*

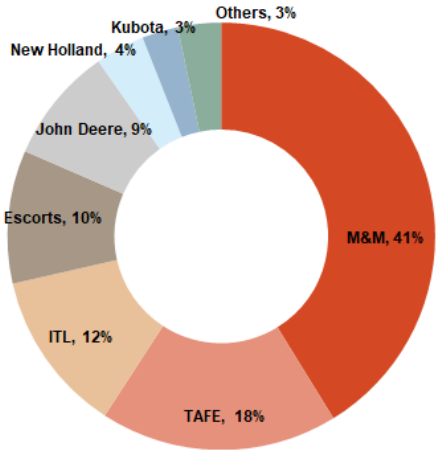
The four major factors that cumulatively influence hp demand are:

- Irrigation: Higher irrigation leads to higher and stable income streams to purchase higher hp tractors. For instance, Punjab and Haryana (despite soft alluvial soil) have migrated to higher hp tractors.
- Soil type: Extremely hard soil necessitates use of higher hp tractors. Western Maharashtra, for example, has hard black cotton soil, where 41-50 hp tractor is preferred. However, some pockets of Vidarbha have soft red soil and small farm size, so 31-40 hp tractor is preferred.
- Farm size: States having more marginal and fragmented land holdings, drives sales of lower hp tractors.
- Commercial usage: High commercial usage of tractors in eastern and southern states also hikes demand for relatively higher hp tractors.

**Competitive Profile**

The competitive scenario in tractors industry has remained unchanged in the last 6-7 years, with large players having cemented their position on the back of a pan-India distribution channel and presence across all product segments.

**Fig: Top 4 players constitute >80% of domestic market**




*Note: Market share in fiscal 2023 domestic sales*
*Source: TMA, CRISIL Research*

Capital intensive nature of business as well as competitive intensity are the key entry barriers to the industry. Hence, the top 3 companies account for ~70% of the domestic market. Mahindra & Mahindra (M&M) retains its leadership position in fiscal 2023. A strong pan-India network, strategic manufacturing locations, and a comprehensive product range have been the major factors behind M&M's consistent market dominance. In fiscal 2023, International tractor Ltd was the top exporter of tractors followed by John Deere.

### 3.3.4 Key growth drivers for tractor industry

#### Replacement demand expected to be higher

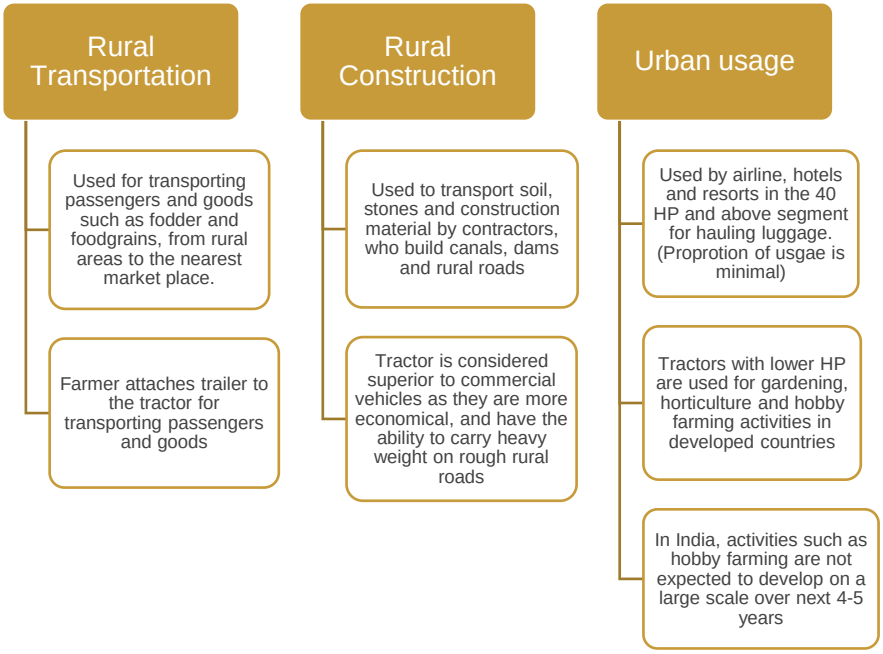
A large part of domestic sales is driven by replacement demand. Typical holding period for a tractor is around 6 to 9 years with most of the tractors being replaced in the country within 7-8 years. Of the overall domestic demand, 50-60% of the sales are replacement demand. For states having high penetration of tractors such as Punjab and Haryana, the replacement demand accounts for about 70-80% of the total sales. While states where farmer incomes are lower as compared to Punjab and Haryana have a lower replacement cycle (higher age tractors) compared to the industry average.

Replacement demand is expected to be higher by 4-6% on-year in fiscal 2024 and rise by 8-10% on-year in fiscal 2025 with healthy sales registered in fiscals 2017 and 2018.

#### Increasing non-farm usage of tractors

Farmers primarily purchase tractors for agricultural operations but also use them for commercial purposes. Taking into consideration the short period of time that tractors are used on the farm, farmers look for alternate uses such as renting it out to other farmers or rural contractors involved in construction activities. Currently, non-farm usage accounts for 30-35% of domestic tractor demand. As tractors are used only for short periods on farming activities, it is not economically viable for farmers to deploy them solely for farming purposes.

**Figure 7: Various non-farm usage of tractors**

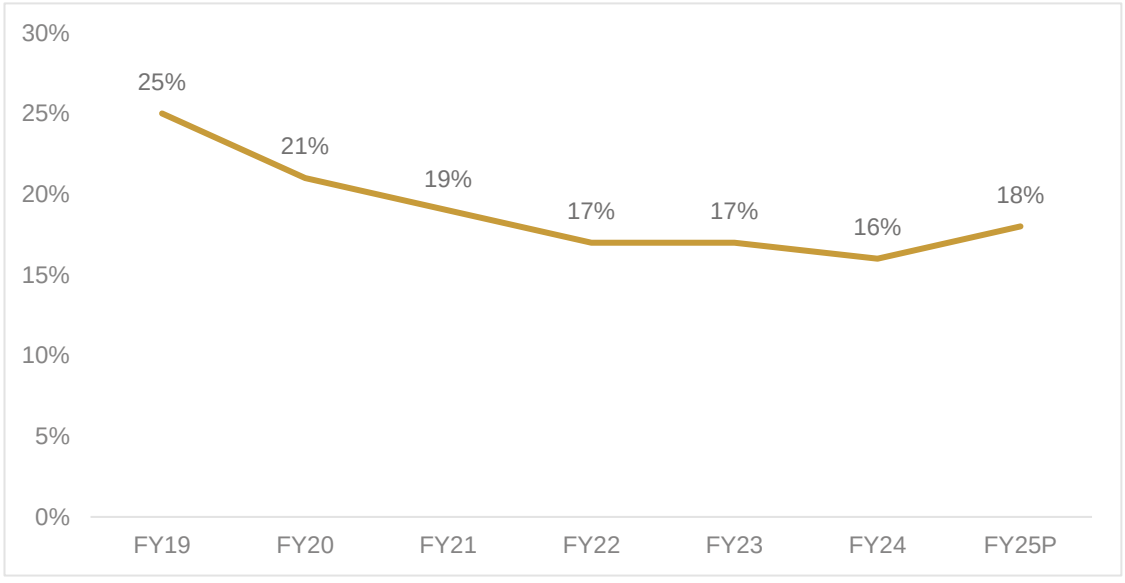



*Source: CRISIL MI&A*

Going forward, tractors are expected to continue being largely be used for agriculture activities, while rural construction, and transportation purposes are expected to continue contributing to a secondary use case.

## Commercial demand expected to remain rangebound in fiscal 2025

**Figure 7: Share of commercial demand in tractor industry**




*Note: P - projected*

*Source: CRISIL MI&A +69-*

Commercial demand for tractors account for 18-23% of overall tractor demand. Apart from their primary application in agriculture operations, tractors are also used to haul bricks, sand, and farm produce. In poor crop years and in months when there is no agricultural activity, renting out tractors for commercial purposes provides farmers an alternate source of income, thereby proving to be a good hedge. Some tractors are designed specifically for haulage

operations and are used exclusively in commercial activities. Based on our industry interactions, tractors are also used as an alternative to pickups for haulage purposes.

In fiscal 2024, commercial demand is expected to rise due to anticipated increased in construction activities and sandmining activities. In fiscal 2023, with slower retail momentum in eastern states coupled with complete ban on sandmining activities, commercial demand remained rangebound.

Illegal mining activities have been at a standstill in states such as Bihar, Jharkhand and Uttar Pradesh which had impacted commercial demand negatively in last two fiscals.

**Rental models and low-cost tractors key to penetrating fragmented land holdings in India**

Despite the huge potential total arable land offers, the fragmented land-holding pattern in India remains a hurdle. With over 80% of land holdings being small and marginal (less than 2 ha), most farmers are unable to afford tractors. They depend on renting tractors or buying small tractors to improve productivity, a trend which is rapidly gaining hold.

Custom Hiring Centers (CHC) are a major component of the government's 'Sub-Mission on Agricultural Mechanization (SMAM)' policy. These centers maintain farm equipment and machinery which can be rented out, especially to small and marginal farmers who cannot afford them. The state governments of Karnataka, Andhra Pradesh, Madhya Pradesh, Telangana, Odisha, and Punjab have been promoting CHCs on public-private partnership (PPP) basis through training, demonstration, and financial incentives. Private sector participation via unique business models is also improving farm mechanization.

- EM3, a new entrant in the farm machinery industry, is creating a pan-India network of Samadhan Kendras which operate as CHCs, with its focus currently on Madhya Pradesh, Rajasthan, and Uttar Pradesh.
- Zamindara Farm Solutions uses a combination of library and radio taxi models to provide farm equipment services, with major operations in Punjab.
- OLAM India is using CHC in collaboration with agri-tech service providers for sugarcane harvesting in Madhya Pradesh.
- India’s agriculture ministry has developed a farm equipment rental app for Indian farmers, which lets them hire tractors, rotavator and other farm related machinery on rent with flexible tenures.
- Highest number of CHCs are found in Punjab, UP, Tamil Nadu and Andhra Pradesh followed by Haryana and Odisha. Under SMAM (Sub-Mission on Agricultural Mechanization), ~13 lakhs of agricultural machinery have been distributed while ~15,180 Custom Hiring Centers have been established.

CHCs face challenges such as lack of awareness among consumers about farm equipment usage, availability issue, high initial investment cost, maintenance of farm machinery, and providing equipment specific to local cropping patterns. Monitoring of CHCs remains a major challenge. However, involvement of key stakeholders and introduction of favorable schemes and policies can make the CHC concept successful in India.

### 3.3.5 Factors influencing long-term demand for tractors

Apart from cyclical factors such as stable farm incomes, which depend on the monsoon and crop prices (minimum support prices and mandi prices), structural factors drive tractor sales. These include:

- Rising cost of farm labour due to employment schemes such as Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA)
- Farmers are increasingly aware of the benefits of mechanized farming, leading to a rise in the replacement of non-mechanized farming methods, such as animal labor
- Growing commercial use of tractors (including transport of farm produce, haulage and personal transport applications, and transport of materials for road construction and other infrastructure projects)

Credit availability and affordable rates of finance, increasing budgetary allocation towards the rural sector, and government support for farm mechanization also encourage growth.

**Rise in farm incomes to push up tractor sales in long term**

Tractor sales expanded at 5% CAGR over past 10 years. Over the past decade, growth in tractor sales primarily tracked growth in farm incomes, except for fiscal 2010 when tractor sales were more influenced by debt relief and debt waiver schemes announced by the government. Farm incomes, thus, are an important indicator of tractor sales. We expect farm incomes to grow moderately going forward, with improvement in irrigation facilities, increase in mechanization and crop yields, and continued government support.

**Other farm-related factors**

Irrigation investments have risen considerably in past 10 years, resulting in a consistent increase in irrigation intensity. This, in turn, heightened cropping intensity has led to higher and stable farm incomes over the period. Irrigation intensity is expected to continue to improve over the medium term, supporting tractor sales.

Irrigation intensity is the highest in Punjab and Haryana, which have the highest tractor penetration in India. As irrigation facilities improve in the rest of India, tractor penetration will see corresponding increase. One limitation, however, is that fragmented land holdings in certain states may deter the states from reaching average tractor penetration levels despite high irrigation intensity.

Average land holding size in India is 1.5 ha as against world average of 3.7 ha, with ~65% of farmers being marginal farmers (holding less than 1 ha). We do not expect a major change in land-holding patterns. However, increased allocation for foreign direct investment in retail is expected to favor tractor sales with growing instances of farming operations being consolidated and output being contracted to large retailers.

## 3.3.6 Growth drivers for tractor exports

CRISIL MI&A Research estimates exports to grow in Africa following improved output of major crops such as wheat, cassava and maize, and an increased funding mechanism to support demand. According to IMF, GDP growth in South Africa (largest contributor to exports in Africa), is expected to grow by 1.8% and 0.1% in 2024 and 2023 respectively after rising by 3.7% on-year in 2022. Indian tractors are currently implementing Bharat (TREM) Stage III A norms (India follows the European standard of emission norms), but have made manufacturing provisions for advanced emission norms, mainly to cater to international markets. According to IMF, in Europe, GDP is expected to grow by a slower 0.6% and 1.5% in 2023 and 2024 respectively after a 1.8% on-year growth in 2022. Growth of Indian tractor exports in Asia will be driven by strong demand from neighboring countries such as Myanmar, Bangladesh, Nepal, and Sri Lanka, while Indian exports will expand their position in bigger markets such as Thailand. According to IMF, in Asia, GDP is expected to grow by 4.4 in both 2023 and 2024 after a 4% on-year growth in 2022.

## 3.3.7 Impact of regulatory changes on tractor sales

**Pollution control norms have increasingly become stringent**

TREM IV norms came into effect from 1st January 2023 after being pushed multiple times over last 2 fiscals. The norms are applicable only for more than 50HP tractors which contribute only ~3% to overall tractor sales (as of FY24), thus we expect limited impact on tractor industry. Although major technological changes are available with OEMs (original equipment manufacturer). However, the pass through of the incremental cost, related to the technological changes, to the farmers is likely to be a challenge, given the price sensitive nature of the farming community. Cost escalations to the tune of 10-15% is expected. John Deere, Mahindra, and Sonalika accounts for about 66% in more than 51 hp tractors in the domestic market.

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Trem IV rules are driving companies to develop cleaner and more efficient engines for Trem IV Tractors. Furthermore, prominent brands like John Deere, Sonalika Tractors, New Holland, and Farmtrac are actively manufacturing tractors that adhere to these regulations. This ensures that Trem IV Tractors are not only environmentally friendly but also incorporate advanced technologies for improved performance. All the major OEMs are equipped to comply with TREM IV which is equivalent to US (Tier 4) and Europe (Stage IV) norms. Players have been able to export more higher hp tractors after complying with the new norms.

**Over next few years (fiscals 2024 to 2029), the following structural factors to support growth:**

- The government's objective of supporting farmers through direct income support and improvement in land productivity via soil health cards. These measures should improve farmers' crop yields and affordability, improve purchasing capacity and support tractor penetration.
- The government's renewed thrust on enhancing irrigation intensity and making the nation more drought-proof is expected to support agriculture growth and increase mechanization.
- After the huge downward revision seen in irrigation spends in fiscal 2021, the industry is set to recover 20-25% in fiscal 2022 with pent-up investments in delayed projects. Investments are expected to grow at a 14% CAGR over the next 3 years with them surpassing pre-covid levels in fiscal 2022 itself.
- Custom-hiring centers (CHC) are being promoted through government incentives with number of CHCs rising at a CAGR of 18% from fiscal 2017 to fiscal 2022 (latest available data). The trend is catching up in Karnataka, Madhya Pradesh, Andhra Pradesh, Telangana, and Orissa and encouraging farmers to lease tractors. States such as Karnataka, Madhya Pradesh, Andhra Pradesh and Punjab are promoting such hiring centers through training, demonstrations and financial incentives.
- Tractor rental services made available on mobile applications by manufacturers -- such as Jfarm by TAFE and Trringo by Mahindra -- to prop up demand for tractors in long term. Global companies such as Hello Tractors in association with Aeris, a California-based technology company, is also planning to launch a pay-as-you-use tractor service for Indian farmers.
- With increasing government focus on infrastructure, demand for haulage is also expected to rise boosting tractor sales
- Higher government focus on agriculture and on farmers to lead to healthy crop prices impacting tractor demand positively

# 4 Review and outlook on the Indian railways industry

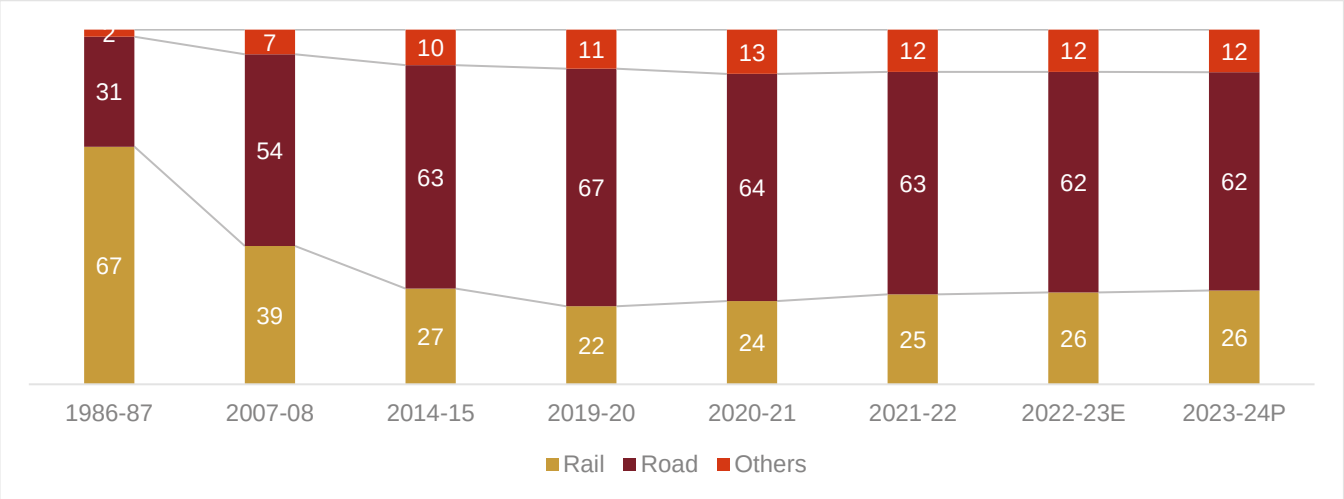
## 4.1 Review and outlook of the Indian Railways industry in value terms

### 4.1.1 Modal mix of rail FY18 to FY23 and projection for FY24

Transporting ~1.59 billion tonne of freight and carrying over eight billion passengers a year, India's railway network is the fourth largest in the world, spanning over 68,103 route km.

The behemoth, however, is plagued by challenges of underinvestment in infrastructure augmentation and technological upgradation. Its share in freight modal mix has slipped over the years to less than 30%, which is sub-optimal considering the size of the country.

**India's freight modal mix (% of tonne km travelled)**



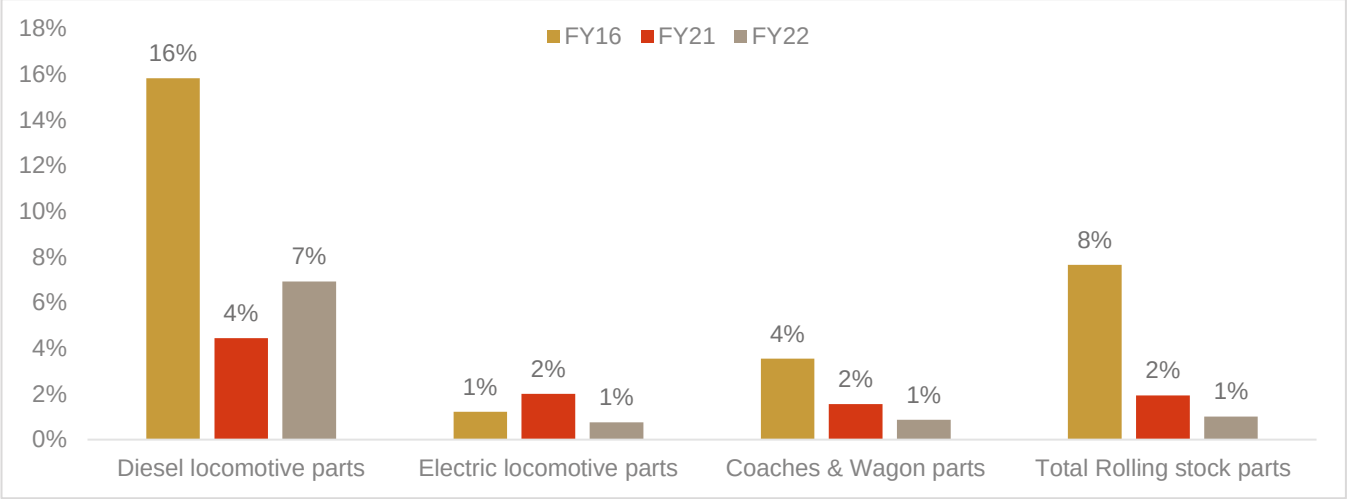

*Source: RITES, NTDPC, CRISIL*

Indian Railways is an important pillar in the nation's growth. The total budgetary allocation on capital expenditure in infrastructure for FY24 saw a 37% increase from FY23 at ~Rs 10 lakh crore. Railways capex for fiscal 2023-24 is ~50% higher than fiscal 2023RE. With most of the electrification targets across the country having been already met by the Railways, the focus is now expected to shift towards improving the existing infrastructure with government identifying redevelopment opportunities worth ~Rs 1 lakh crore.

### 4.1.2 Indigenisation of coaching and wagon parts relatively better

The share of imports for rolling-stock parts declined from 7.7% in fiscal 2016 to 1.9% in fiscal 2022.

**Share of import purchases (as a % of overall purchases) by Indian Railways**



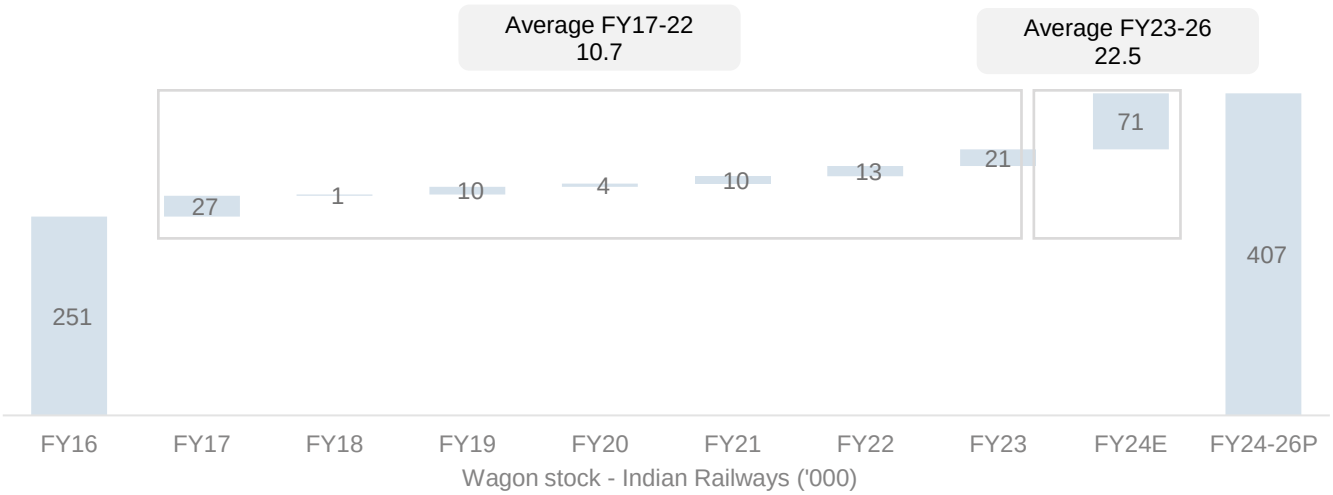

*Source: Annual Statistical Statements, Indian Railways – FY2022, CRISIL*

In consonance with the 'Make in India' initiative of the central government, has led to sustained indigenisation efforts with major rolling stock being manufactured in India along with boosting establishment of ancillary units and helping to generate employment.

### 4.1.3 Wagon procurement ramped up significantly

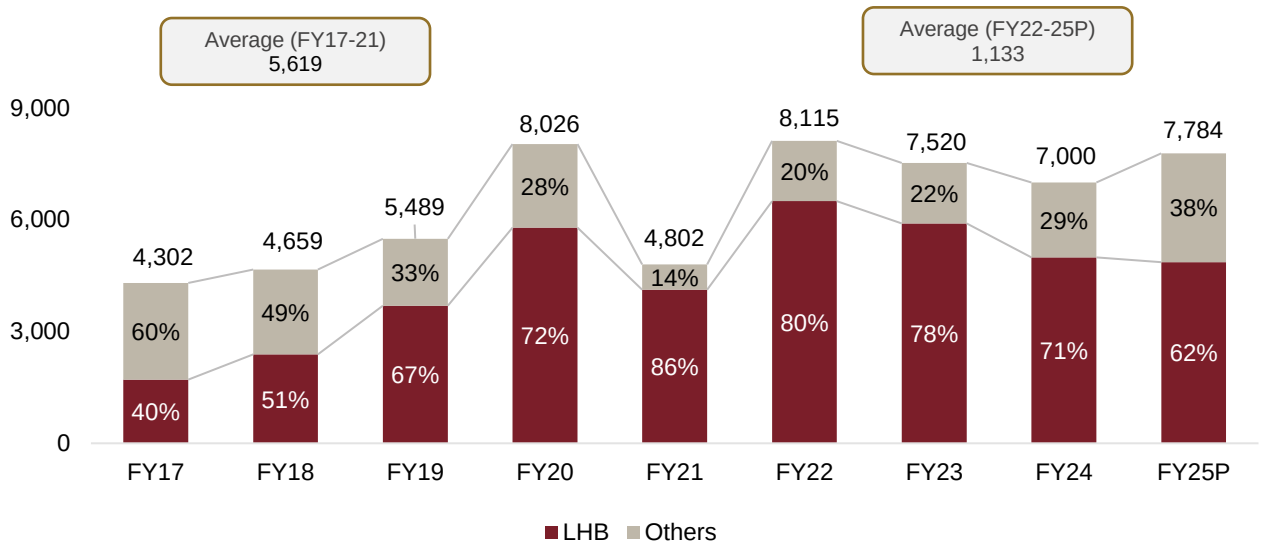
Indian Railways has put out orders for the procurement of ~72,000 wagons, as a part of the procurement plan of 90,000 wagons until fiscal 2026. Indian Railways' annual wagon addition plan for fiscals 2023-2026 period is already more than double the fiscal 2017-2022 level.

**Annual wagon addition ('000 units) for Indian Railways**




*Source: Indian Railways Annual Statistics 2023,2024, High Value Order Summary, CRISIL*

**Annual coach production plans**

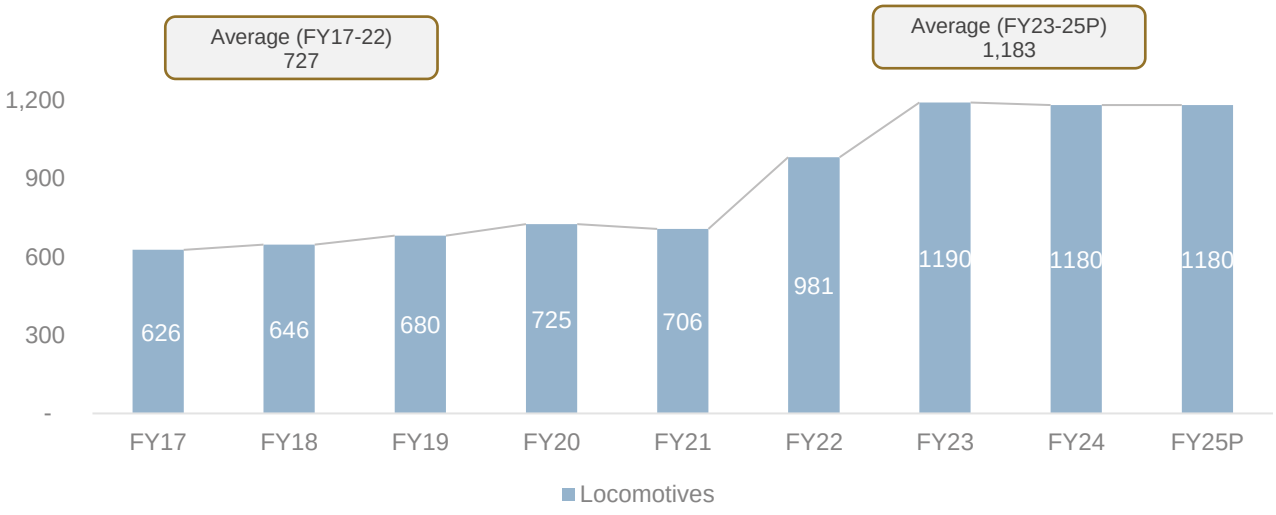



*Source: Coach production plans (Indian Railways), CRISIL*

## 4.2 Indian Railways has ramped up electric-locomotive production

Indian Railways has switched fully to production of electric locomotives across its production units at Chittranjan, Dankuni, Banaras and Patiala. Annual production has also increased from 727 locomotives on average during fiscals 2017-2022 to 1,183 for the fiscal 2023-2025P period.

**Locomotive production**



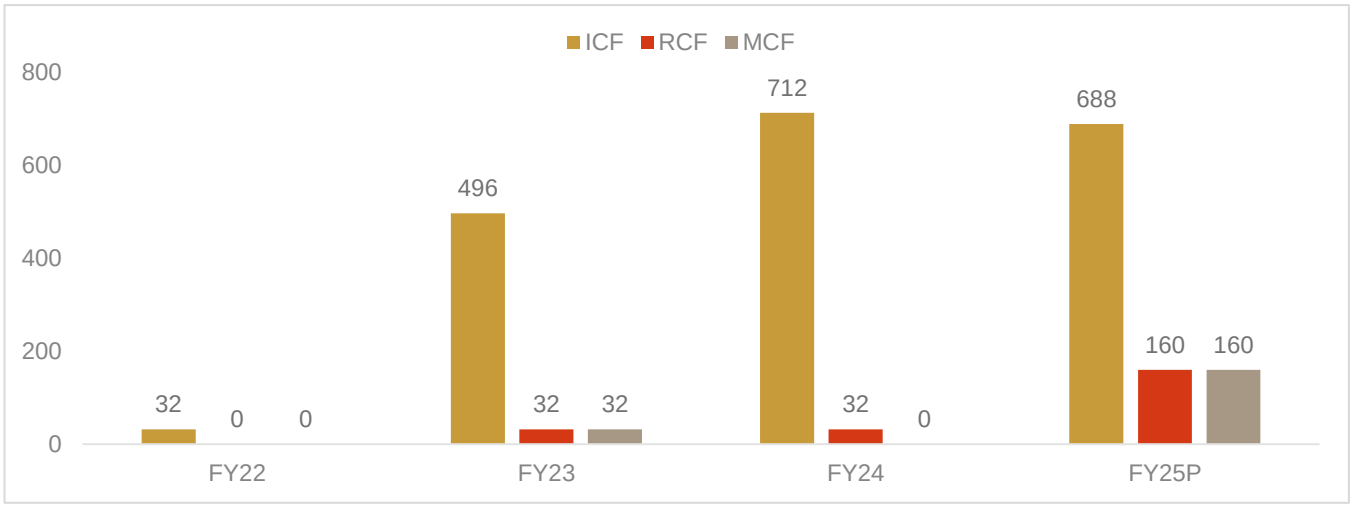

*Source: Locomotive production plans (Indian Railways), CRISIL*

## 4.3 Vande Bharat trainsets speeding up

### 4.3.1 ICF to lead the production of trainsets

Trainsets comprise self-propelled LHB (Linke-Hofmann-Busch) coaches, which will be used in 75 Vande Bharat trains to be inducted by fiscal 2024. As per coach production plans of Indian Railways, Integral Coach Factory in Chennai will manufacture the majority of 'trainsets'. Indigenisation will rise, and unit cost will decline with scaled-up production of trainsets.

**Trainset manufacturing plans**

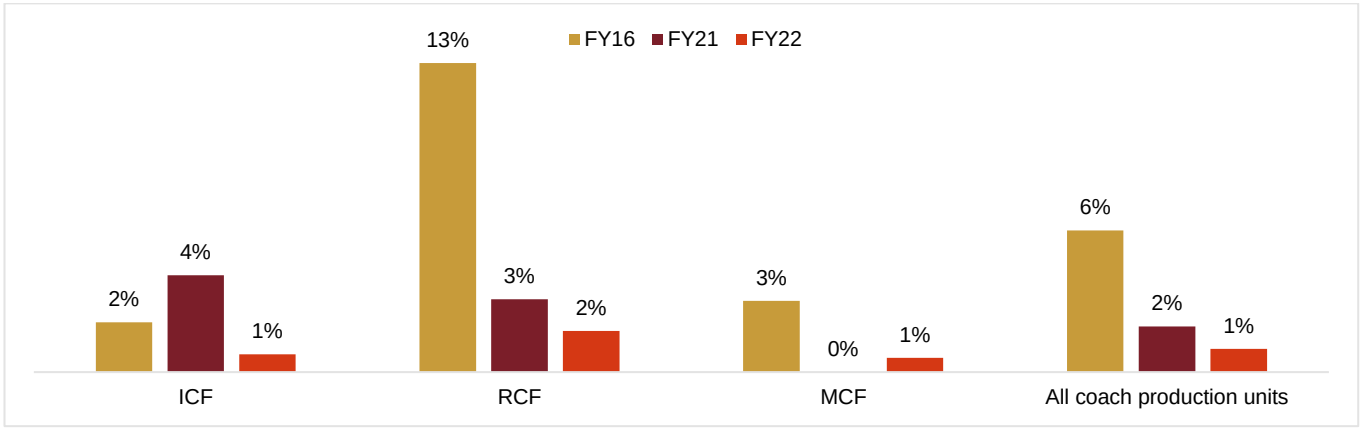



*Source: Annual coach production plans – Indian Railways*

### 4.3.2 Continued improvement in Indigenisation expected over the long term

The share of imports has declined across coaching-production units across the country. With Indian Railways' plan to induct 75 Vande Bharat trainsets, the share of indigenisation will touch 100% in the next few years.

**Share of imports – Coaching parts**

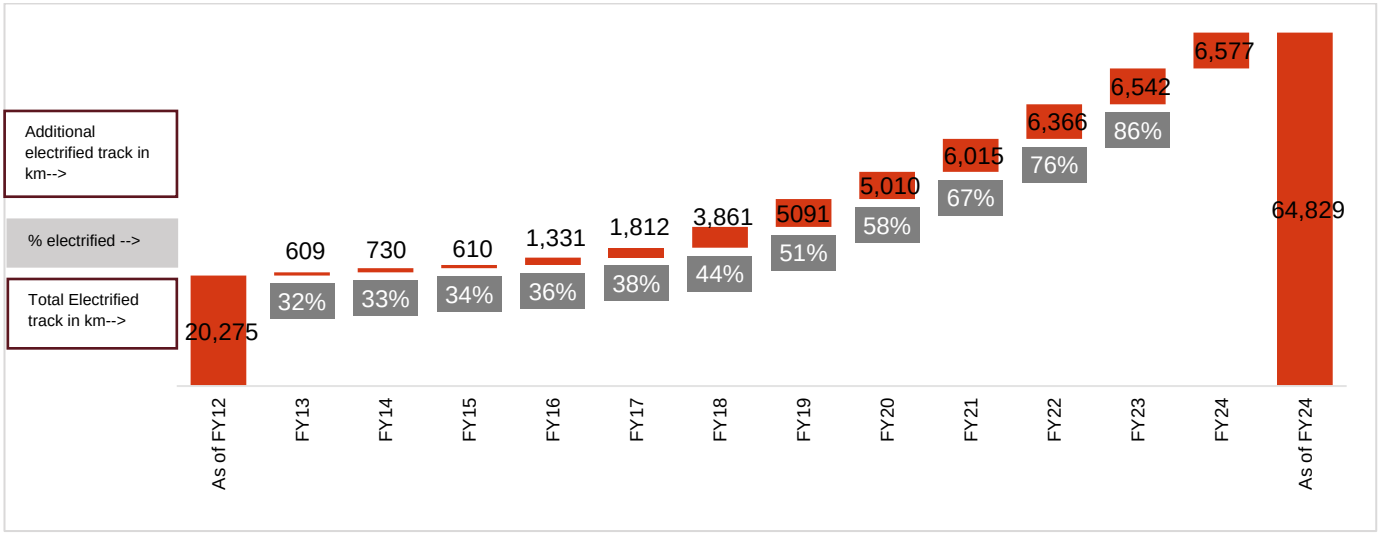



*Source: Annual coach production plans – Indian Railways*

## 4.4 Electrification of tracks ramped up

Indian Railways has set a target of 100% electrification of tracks by fiscal 2024. In line with this, annual electrification had crossed 6,000 route kilometres by fiscal 2022. Indeed, average annual electrification during fiscals 2018-2024 was ~5.6x vis-à-vis fiscals 2013-2018.

**Electrification in tracks**

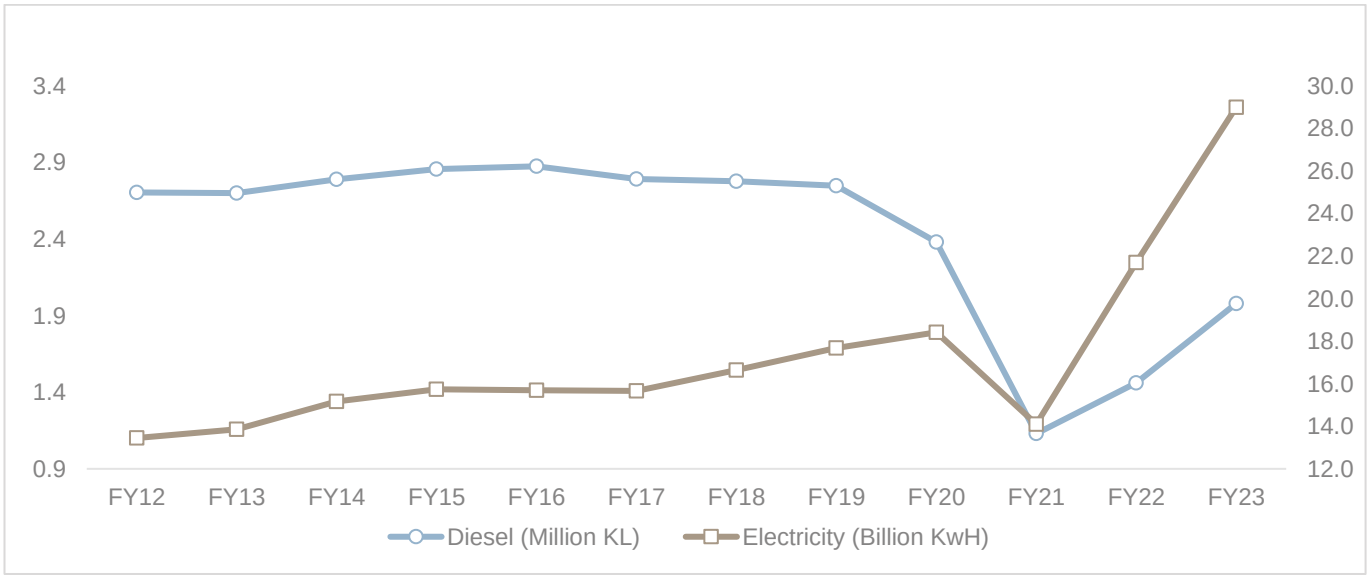



*Source: Indian Railways – Statistical Summary, PIB, CRISIL*

### 4.4.1 Diesel usage has fallen continuously over the years

Diesel usage by Indian Railways declined by 5% over fiscals 2016-2020. With electrification on the rise, the electricity consumed increased by ~4% during the same period.

**Fuel consumption of Indian Railways**

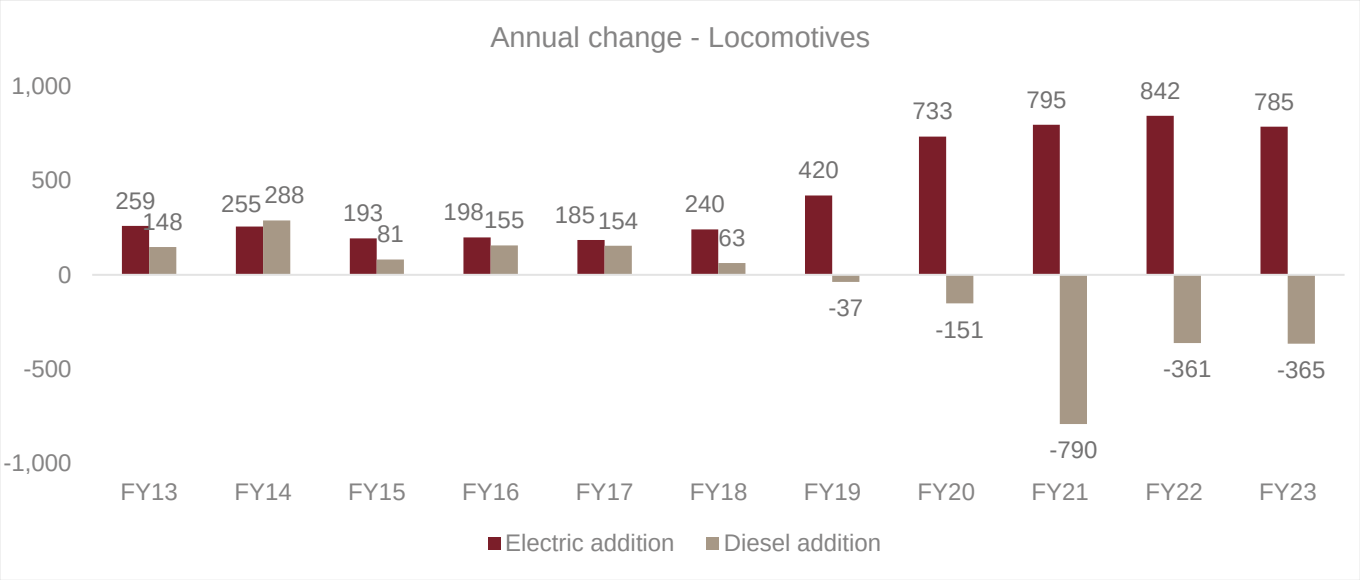



*Source: Indian Railways – Statistical Summary, Indian Railways Annual Report FY23, CRISIL*

### 4.4.2 Diesel locomotives are also gradually discarded in favour of electric locomotives

Indian Railways is also retiring diesel locomotives to electrify the railway network. In fiscal 2021 itself, railways discarded ~800 diesel locomotives, when ~800 electric locomotives were effectively added to loco fleet. The aim is to have about 10,000 electric locos for train operation with gradual switching over to electrical traction and subsequent withdrawal of diesel locos.

**Locomotive fleet of Indian Railways**



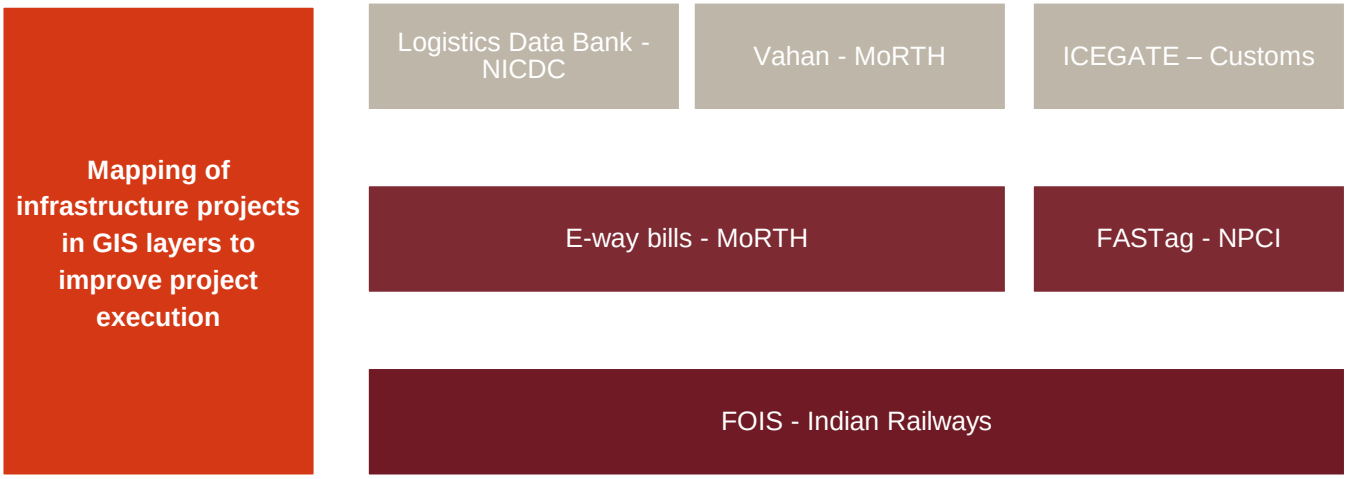

*Source: Indian Railways – Statistical Summary, CRISIL*

## 4.5 GatiShakti and National Logistics Policy among spurs

### 4.5.1 FOIS data can aid in filling cargo trackability void

GatiShakti portal will integrate the various real-time logistics data sources available with different ministries, through a Unified Logistics Interface Platform (ULIP). As per news articles, the government has signed the first round of agreements with industry stakeholders for the usage of ULIP. The comprehensive FOIS data, otherwise, disjointed from other data sources can significantly improve the traceability and trackability for cargo.

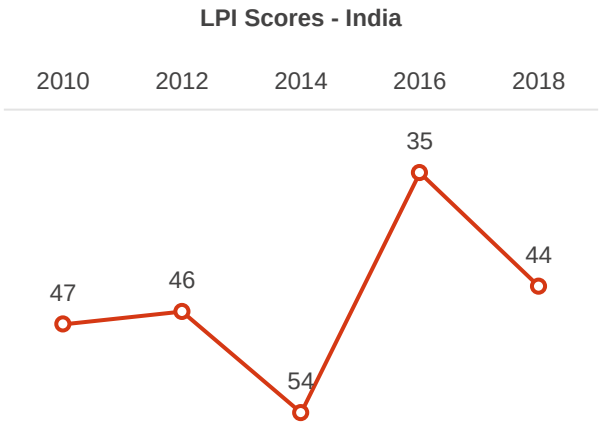
**Key pillars of GatiShakti/ULIP**

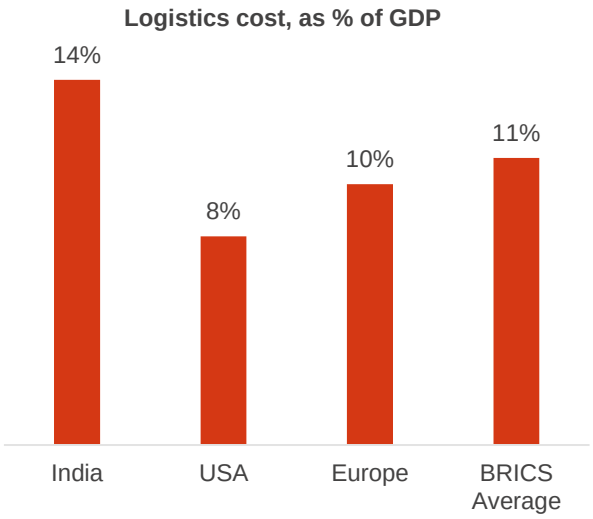



*Source: Industry, CRISIL*

### 4.5.2 Indian Railways' role imperative in achieving National Logistics Policy targets

Modal-mix optimization, with an increased share of Indian Railways in primary transport will also be critical to achieve the target of logistics cost reduction and improve the Logistics Performance Index (LPI) scores of the country.



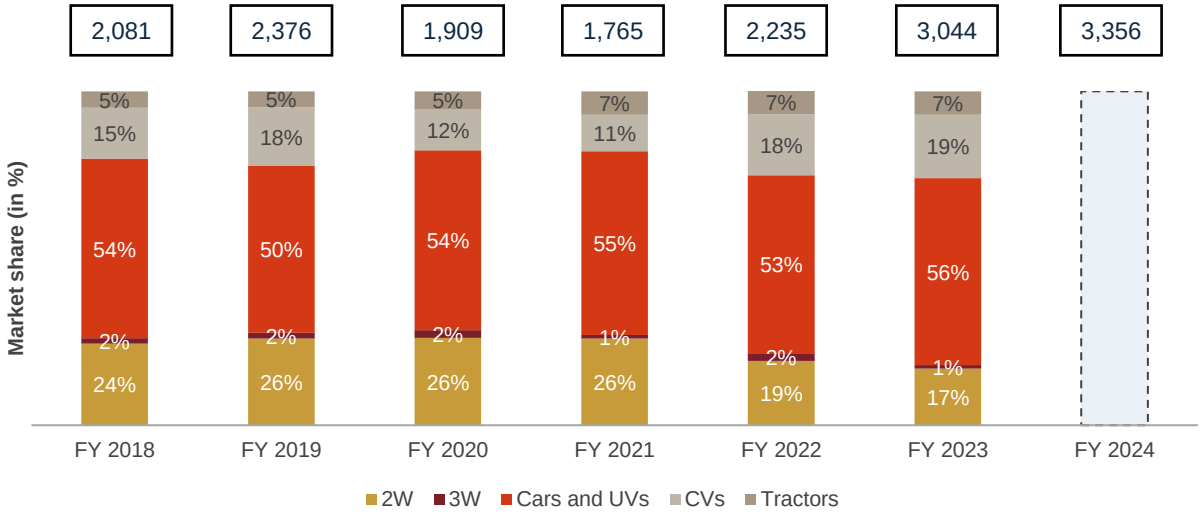



# 5 Review and outlook of the Indian auto components industry

## 5.1 Review of the Indian auto component sector in value terms (FY18-FY24)

### 5.1.1 OEM auto component industry split by vehicle categories in value terms

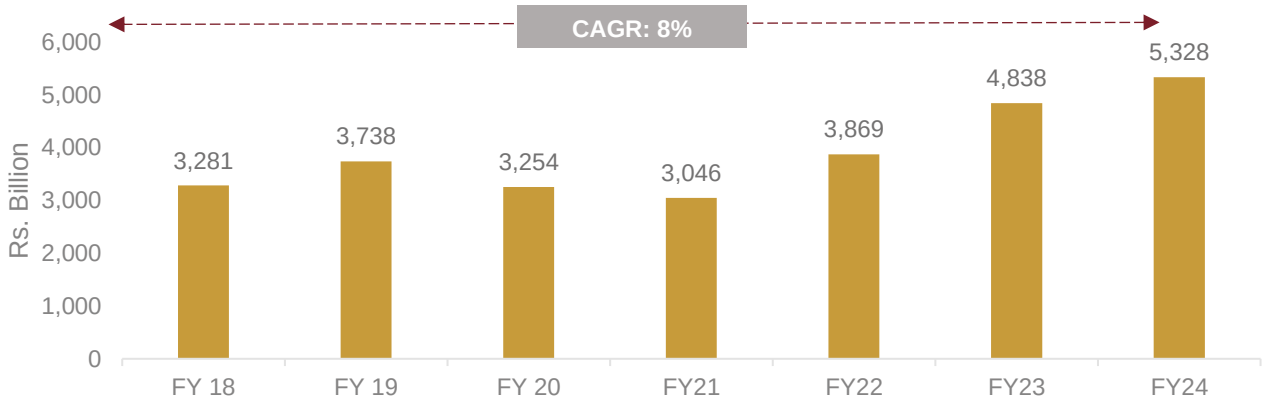
OEM auto component have the highest contribution to auto component revenues. In OEM auto component Passenger Vehicles (Cars and UVs) is dominating the industry from years accounting for 56% in FY23 followed by Commercial Vehicles and 2W respectively. OEM accounted for Rs 3,356 Bn of the overall sales in FY24




*Source: CRISIL MI&A*

### Trend of auto component industry by OEM, export and aftermarket in value terms

**Trend in domestic production of auto components (fiscals 2018-24)**




*Source: CRISIL MI&A*

Auto component production increased at 8% CAGR between fiscal 2018-2024 was aided by recovery in economy, buoyant demand from OEM and replacement market as well as increase in exports. CRISIL estimates domestic auto-component production revenue to increase by 8-10% in fiscal 2025.

Production of automotive components depends on consumption by different end-user segments: original equipment manufacturers (OEM), exports and the replacement market. OEM demand can be further segregated based on various vehicle segments. In fiscal 2023, OEMs accounted for almost 62% of auto-component production by value. Among OEMs, cars and utility vehicle manufacturers remain the largest consumers.

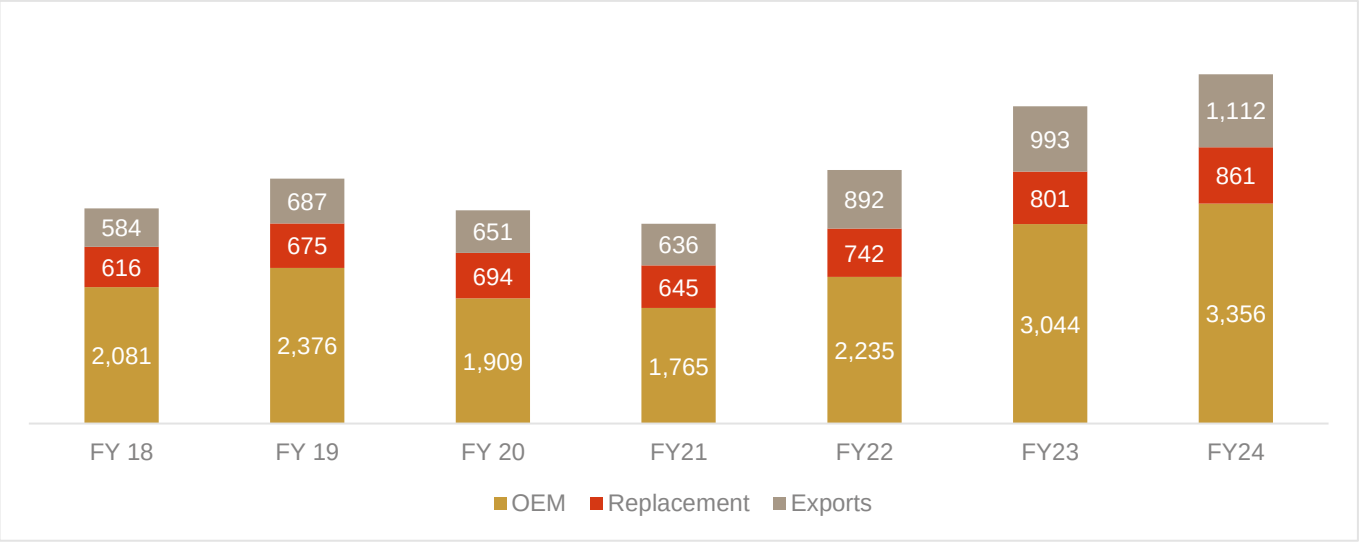
Automotive component players are prone to risk due to the dependence on a few select clients or vehicle category and are highly dependent on demand from the OEMs.

The domestic auto components industry largely consists of small and medium enterprises. The industry is composed of 780+ organized players and 5,800 unorganized players. In terms of revenue, however, the organized segment dominates the industry. Auto Component Manufacturers Association (ACMA) members represent 85% of the overall industry turnover. Over the past few years, more and more auto component companies have been registering as members of the ACMA.

The use of semiconductors in automobiles has increased significantly in recent years. These components are now integral to engine control units, power steering, airbags, reverse parking assist, smart keys, telematics, in-car entertainment, and other applications. The intensity of semiconductor use is higher for passenger vehicles (especially high-end models) and moderate for commercial vehicles, while it is lower for two-wheelers (except premium motorcycles) and tractors due to their lesser electronics usage. Semiconductor supplies were heavily impacted in the Covid-affected fiscals 2021 and 2022 due to increased demand from electronics, surging freight costs, lockdowns, and natural calamities. Despite improvements in supplies after two years of shortages, ongoing disruptions in the global semiconductor supply chain have persisted, affecting the production of various vehicles. The Ukraine conflict further exacerbated supply chain issues, although there has been an improvement since early 2023, with larger microchip volumes easing bottlenecks in FY23. However, long-standing relations between OEMs and suppliers remain crucial for the stability of the sector.

Semiconductor manufacturing in India has received significant attention, requiring substantial investment and government incentives to ensure a sustained increase in production. The government's efforts include PLI schemes promoting the domestic manufacturing of electronic components. Companies like Vedanta and Foxconn are investing heavily in setting up semiconductor manufacturing plants in India. Abu Dhabi-based Next Orbit Ventures' ISMC is also participating in this initiative, aiming to bolster the country's capabilities in the semiconductor sector and reduce reliance on imports.

**Trend in domestic consumption of automotive components (fiscals 2018-24)**




*Source: CRISIL MI&A*

OEM demand, which is the largest contributor to auto component revenue is pegged to grow at a healthy pace over the next 5 years over a low base of fiscal 2021. Replacement market to witness a slower growth in long term. With Indian safety and emission norms approximating global standards and domestic companies gaining technology capabilities through joint ventures, it is expected exports will benefit in next five years. Implementation and effectiveness of production-linked (PLI) scheme will be the key monitorable criteria and may have an upward bias to the export calls

In fiscal 2024, the replacement segment clocked 6-8% growth supported by the economic growth supported by the economic growth. In fiscal 2023, replacement demand growth was on the back of healthy OEM demand witnessed between fiscals 2017 and 2019. Assuming a two to three years of lifespan of automotive components, pent-up demand from fiscal 2020 and 2021 is likely to have translated into replacement opportunity in fiscals 2022 and 2023. Additionally, demand in the replacement market is expected to grow due to an increase in penetration of cab aggregator services in the overall stock of passenger vehicles in the medium term.

Auto component production revenue has surpassed the levels witnessed in FY19, wherein the industry reported a robust growth across all segments. Passenger vehicles, commercial vehicles and tractors are seen surpassing pre-Covid levels of production in fiscal 2023 while 2W, 3W will recover from slump in fiscals 2021 and 2022, albeit still below pre-Covid levels. Healthy demand from OEMs will drive auto-component demand followed by replacement and export markets.

Outbreak of second wave of COVID in the domestic market since April 2021 and the resultant state-wide lockdown impacted industry's revenues in Q1 of fiscal 2022. Post unlocks, some recovery was seen in the industry in H2 fiscal 2022. The growth in fiscal 2022 was aided by recovery in economy, buoyant demand from key export destinations like North America and Europe and increased demand from replacement market led by pent-up demand. CRISIL MI&A estimates that production revenue increased 27% in fiscal 2022.

In fiscal 2024, imports increased by ~10% on year growth. Fiscal 2022 saw big spike of 37% in imports on lower base of FY21. In fiscal 2021, imports declined by ~20% owing to subdued demand from OEMs and aftermarket amid the pandemic. Besides, the domestic auto component manufacturers also operated at below-normal utilization levels in the first half owing to subdued demand and nationwide lockdown.

### 5.1.2 Review of exports of auto components (fiscals 2018-24)

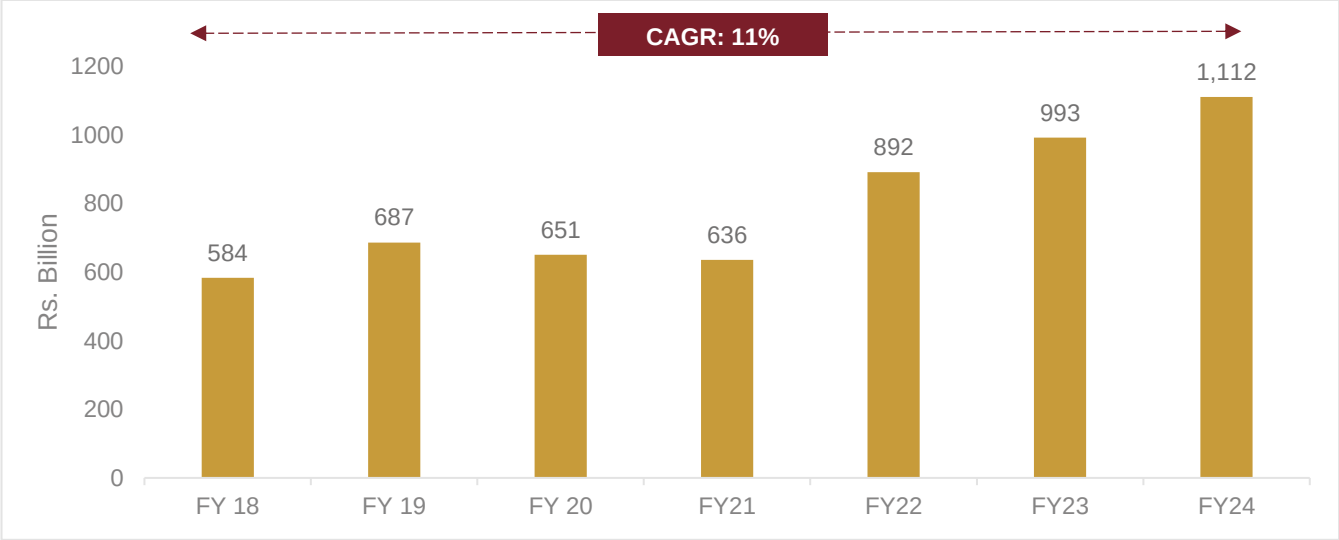
Auto component exports witnessed a strong growth at 11% CAGR during fiscal 2018-2024 period. Even during fiscal 2017-2020 period, exports witnessed a healthy growth at 11% CAGR. Fiscal 2021 witnessed a contraction amidst the pandemic and the restrictions.

Auto component exports accounts for 21% of the overall demand in FY24 and is projected to record a 7-9% on year growth in fiscal 2025 post expected growth of 11-13% in fiscal 2024. The growth would be on the back of demand from North America and Europe which together contributed ~45-50% to the export demand during April-Jan fiscal 2024. As per S&P Global Ratings, global light vehicle sales are expected to grow by 5-7% in calendar year 2023. Export revenues are also expected to be supported by increased global demand and China +1 strategy. However, rising inflation and global economic slowdown remains key monitorable.

Exports witnessed growth in fiscal 2023 despite higher base of fiscal 2022. Demand from North America surged by 19% whereas Europe witnessed modest growth of 3% on-year during fiscal 2023 over a high base. From April to May 2024, demand form North America and Europe grew by 8% and 21% respectively.

India's top exports destinations are USA (27.8% of total exports), Germany (6.9%), Turkey (5.4%), Brazil (3.7%). Export demand has shown a strong recovery post unlock. However, demand from Europe has been under pressure due to recessionary fears and global slowdown.

**Review of exports of auto components (fiscals 2018-24)**



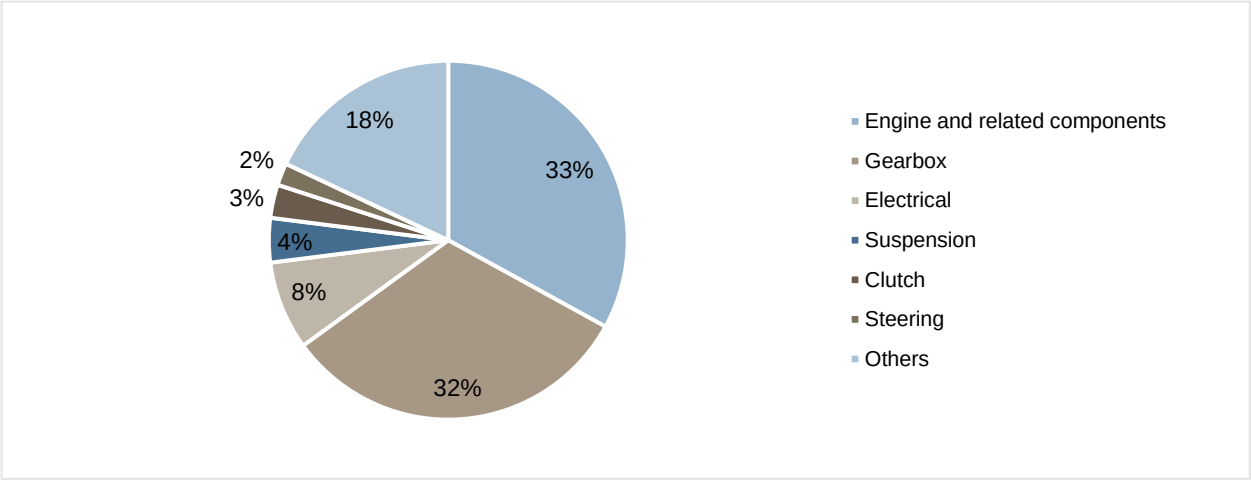

*Source: CRISIL MI&A*

### Split by major auto component categories in value terms (includes engine parts, drive transmission, suspension and braking parts and body & chassis)

Major auto component from the revenue share is Engine component followed by suspension and breaking, drive transmission and steering etc.

Critical components, such as engine parts, drive transmission and steering, and electrical, are technologically more complex compared with lower-margin components, which were earlier the preserve of Indian players. They offer higher margins to manufacturers, but require greater investment in research and development, as well as high-precision engineering to adhere to the stringent quality standards of global OEMs.

**Fig: Split by major auto component categories in value terms (Rs.billion) and percentage share (FY24)**




*Source: CRISIL MI&A*

### Historic growth drivers for Indian auto component industry

Passenger vehicles, commercial vehicles and tractors are seen surpassing pre-Covid levels of production in fiscal 2023 while 2W, 3W will recover from slump in fiscals 2021 and 2022, albeit still below pre-Covid levels. Healthy demand from OEMs has been driving auto-component demand followed by replacement and export markets.

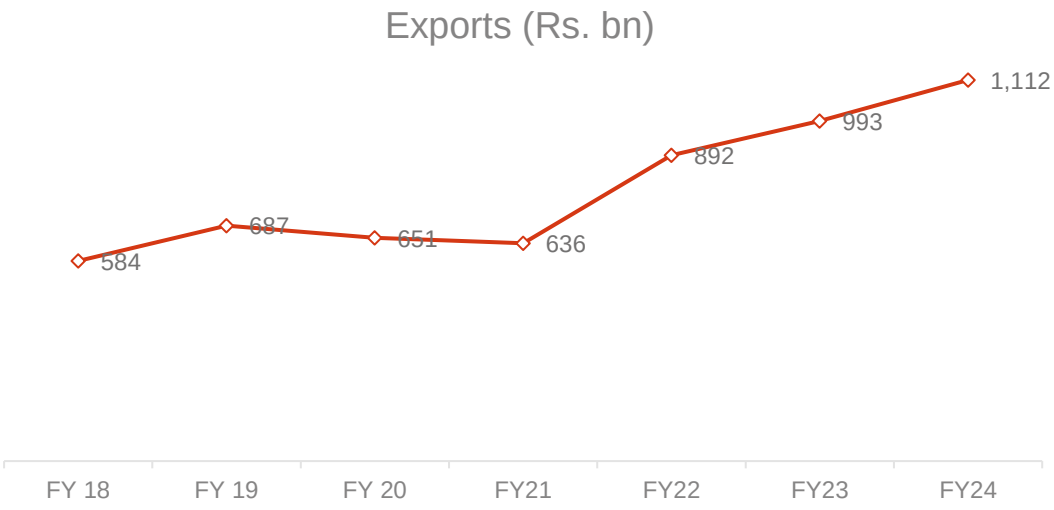
The Indian auto component industry is expanding quickly, fuelled by rising domestic demand for vehicles, increased localization by international automakers, and a focus on exports. India's burgeoning middle class is driving up demand for all types of vehicles, which is in turn boosting the need for auto components. To meet this demand, global automakers are increasingly localizing their production operations in India and sourcing more and more components from local suppliers. This has benefited Indian auto component manufacturers, who are now supplying components to some of the world's leading automakers. Indian auto component manufacturers are also focusing on exports, sending their products to a variety of countries, including developed markets like the United States and Europe. This has helped to further fuel the industry's growth.

Under the automated route, 100% FDI is permitted in the auto components business. PLI schemes on automobiles and auto components are estimated to generate a capex of Rs. 74,850 crore (US$ 9.58 billion) over the next five years. The Bharat New Car Assessment Programme (BNCAP) will not only enhance the auto component value chain, but it will also push the production of cutting-edge components, inspire innovation, and nurture global excellence.

Major auto component from the revenue share is Engine component followed by suspension and breaking, drive transmission and steering etc.

### Auto component export trend in value terms over FY18-FY24 period

Auto component exports witnessed a strong growth at 11.3% CAGR during fiscal 2018-2023 period.

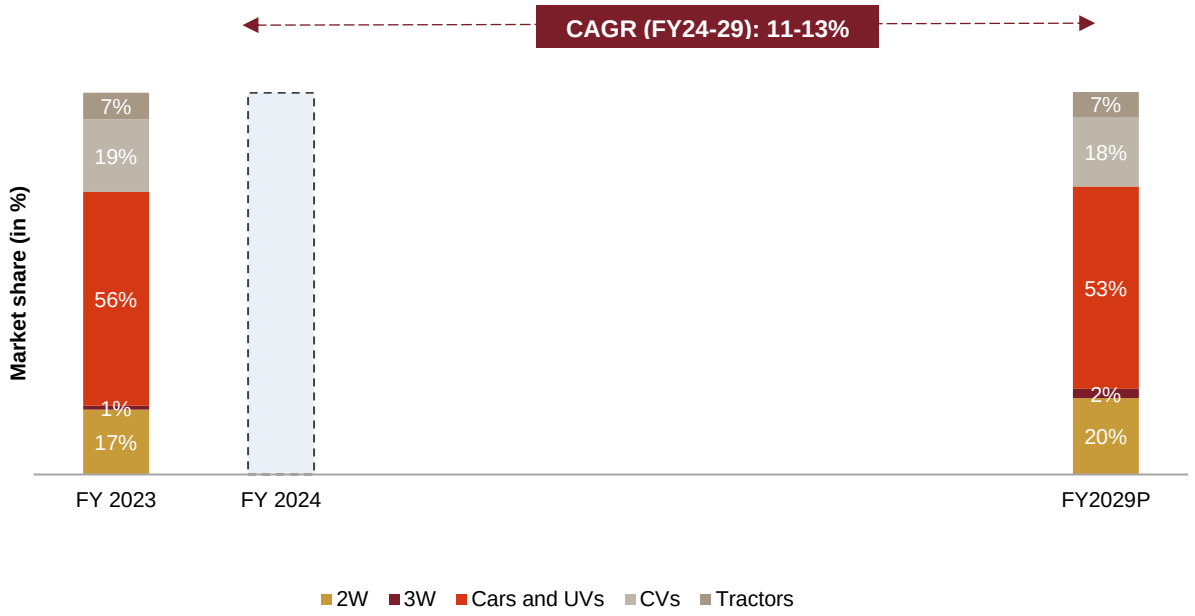



*Source: CRISIL MI&A*

## 5.2 Outlook of the Indian auto component sector in value terms (FY23-FY29)

### 5.2.1 OEM auto component industry split by vehicle categories in value terms

OEM auto component have the highest contribution to auto component revenues. In OEM auto component Passenger Vehicles (Cars and UVs) will continue dominating the industry in FY29 contributing to 53% followed by 2W at 20% and CVs at 18% respectively.




*Source: CRISIL MI&A*

### 5.2.2 Growth drivers for Indian auto component industry

**Demand side drivers:**

As middle class people gain employment, they buy more cars and other vehicles. In addition, an increasing number of people in India are purchasing electric vehicles. By 2025, India is predicted to be the third largest auto component market in the world.

The Indian auto component sector is the third largest in the world, and it is anticipated to develop much more in the future years. This is because more and more people in India are purchasing cars and other vehicles, and the popularity of electric vehicles is expanding.

**Supply side drivers:**

India has a cost advantage in auto component production since it has cheap labour costs, is the world's second largest producer of steel, and is close to important automotive markets. This makes it an ideal location for businesses to source vehicle components.

India exports a significant amount of car components, which is likely to increase in the future years. India excels at manufacturing particular types of vehicle components, such as shafts, bearings, and fasteners, giving it a competitive advantage over other countries.

**Policy support:**

PLI schemes on automobiles and auto components are estimated to generate a capex of Rs. 74,850 crore (US$ 9.58 billion) over the next five years. Under the automated route, 100% FDI is permitted in the auto components business. The Bharat New Car Assessment Programme (BNCAP) will not only enhance the auto component value chain, but it will also push the production of cutting-edge components, inspire innovation, and nurture global excellence.

115 companies applied for the Rs 25,938 crore Production Linked Incentive (PLI) scheme for the automotive and the auto component sector and 75 companies have been approved for the Component Champion Incentive scheme. Incentives are applicable for vehicles and auto components manufactured in India from 1st April 2022 onwards for a period of 5 consecutive years. The proposed incentives for original equipment manufacturers range from 13% to 18% of determined (incremental) sales value, while those for component manufacturers vary from 8% to 13%

The government has reaffirmed its support for EVs and its goal of achieving 30% electric transportation by 2030. Customs duty exemptions on the import of capital goods and machinery essential for the manufacture of lithium-ion batteries, which commonly power EVs, were announced in the budget.

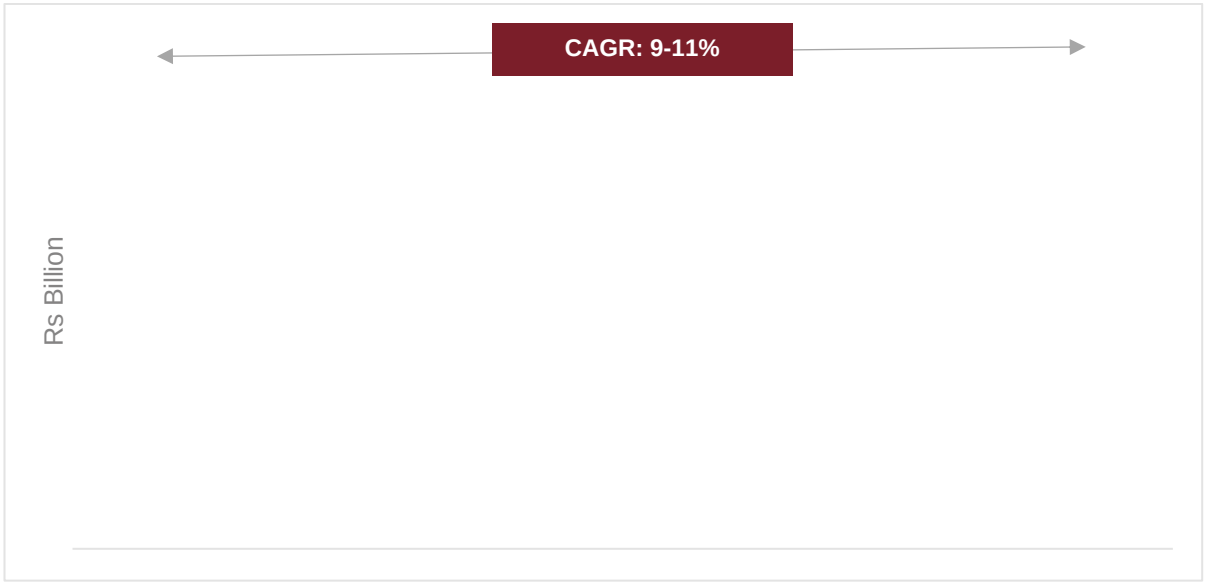
As FAME Scheme concluded on March 31, 2024, the EMPS 2024 (Electric Mobility Promotion Scheme) was introduced by Ministry of Heavy Industries with a total outlay of Rs. 500 crore for 4 months, w.e.f. 1st April 2024 till 31st July 2024, for faster adoption of electric two-wheeler (e-2W) and three-wheeler (e-3W) to provide further impetus to the green mobility and development of electric vehicle (EV) manufacturing eco-system.

**Auto component domestic production outlook (fiscals 2024-29P)**

CRISIL MI&A expects auto component market size to grow at 9-11% CAGR between fiscals 2024 and 2029 to reach Rs. 8,000-9,000 billion. This is more than 8% CAGR observed during fiscal 2018 to fiscal 2023. Long term growth to appear higher over a low base wherein the auto component industry witnessed a significant decline in the preceding two fiscals (FY20 and FY21). Demand from all segments is expected to grow further post fiscal 2023.

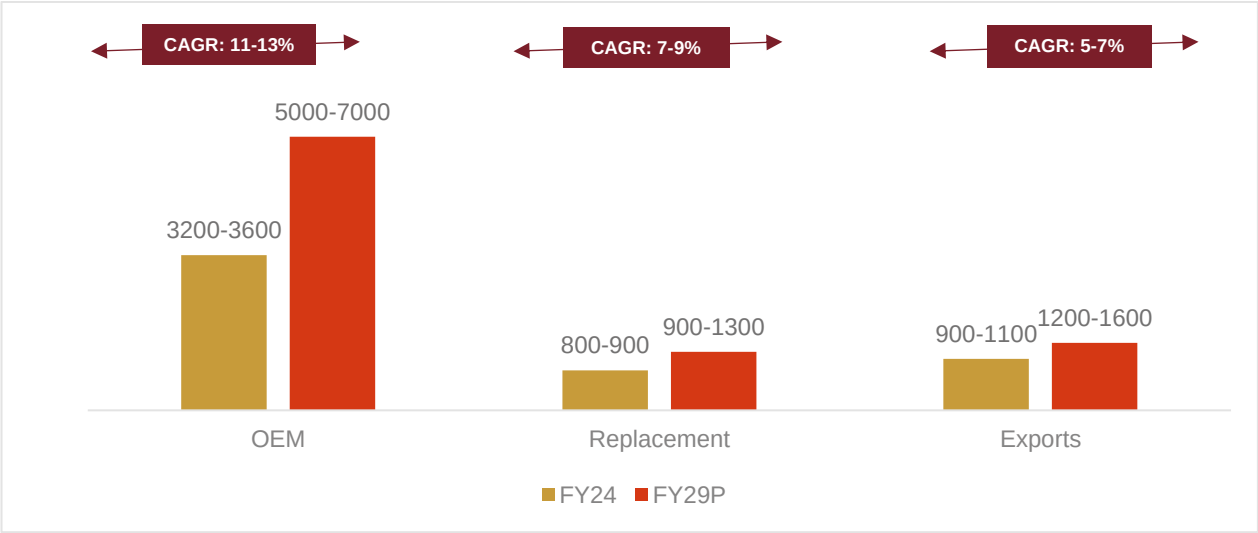
CRISIL MI&A projects that domestic auto component production revenue to grow in fiscal 2025, even on high base of fiscal 2024. Auto component revenue is expected to increase by 9-11% on-year after an estimated growth of ~9-10%% in fiscal 2024. This can be attributed to increase in OEM demand, driven by the recovery in commercial vehicles (CV) and passenger vehicle demand. On the export front, Auto component exports (accounting for 21% of the overall demand in fiscal 2024) are projected to witness growth going ahead post higher double-digit growth in fiscal 2024.

The growth in FY25 is expected to be aided by recovery in economy (GDP growth of ~6.8%), buoyant demand from OEM and replacement market.




*E: Estimated, P: Projected*
*Source: CRISIL MI&A*

**Outlook on domestic consumption of automotive components (fiscals 2024-29P)**




*E: Estimated, P: Projected*
*Source: CRISIL MI&A*

OEM demand is expected to clock 11-13% CAGR between fiscals 2024 and 2029 on the back of robust production growth across asset classes in the medium term (on a low base) and aided by realisation growth via OEM price increases.

- Commercial vehicle production is expected to grow by 2-4% CAGR between fiscal 2024 and 2029 on account of improvement in infrastructure expenditure and lower penetration in light commercial vehicles. Demand is expected to increase during the period with medium & heavy commercial vehicles leading the growth in the upcoming five years. The growth can be attributed to an improvement in industrial activity, rising replacement volume and government's thrust on rural transportation.
- The passenger vehicle production is expected to witness 6-8% growth between fiscal 2024 and 2029 on all-time highs in fiscal 2023. Demand is expected to pick up bolstered by moderate macroeconomic growth, increasing disposable income, improving semiconductor issue and shift towards personal mobility. Other factors that would aid demand are increasing urbanization, government support, and improved availability of finance. However, increasing congestion in metro cities and rising popularity of shared mobility services are likely to restrict car sales in the long term.
- Two-wheeler production is expected to grow by ~11-13% CAGR (between fiscal 2024 and 2029). 2W wholesales witnessed recovery in fiscal 2023 driven by pent-up demand, revival in both urban and rural demand and increasing EV adoption. In the medium term, demand is likely to be supported by improving rural infrastructure, especially as the government continues to invest in developing rural roadways. EV penetration in two-wheeler segment is ~5-7% in FY24. However, increasing shift towards EV two-wheelers to impact ICE two-wheeler sales in the long term. 2W segment has already witnessed significant EV adoption in the last 2 years, driven by government incentives, OEM product launches and customer interest. We expect a more rapid penetration of E-2W post fiscal 2023.
- Tractor production is expected to increase by 6-8% CAGR between fiscals 2024 and 2029 aided by a predicted normal monsoon boosted by the impact of La Nina in fiscal 2025. The increase is post a decline in fiscal 2024 due to lower domestic demand as poor distribution of monsoon, low reservoir levels, elevated inventory levels and impacted rural incomes had restricted demand in FY24.

The proportion of manufacturing activity outsourced to auto component makers is highest for cars and utility vehicles, explaining this segment's high contribution to OEM revenue. Outsourcing in the commercial vehicle segment is lower than for cars, but is expected to increase in the future, owing to growing technological spends by auto component

players due to BS VI and safety norms. We expect localization by certain OEMs to increase, in turn supporting growth in domestic OEM offtake.

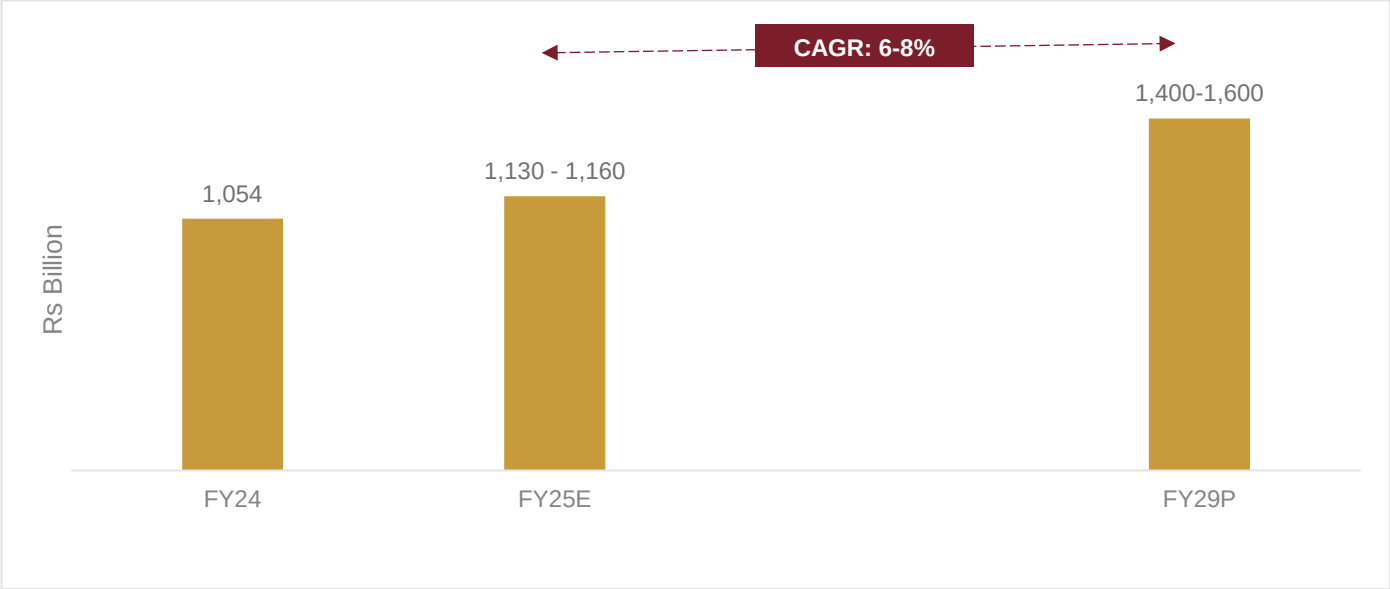
**Healthy replacement demand along with an increase in realisations, to support replacement demand**

The auto component replacement market is projected to increase by 7-9% CAGR between fiscal 2024 and 2029. This is expected to be driven by the increased OEM demand seen between fiscals 2017 and 2019, which is expected to contribute to the aftermarket segment going ahead. Moreover, auto component players undertook price hikes in recent months to offset the uptick in commodity prices. Besides, demand in the replacement market is expected to grow due to an increase in penetration of cab aggregator services in the overall stock of passenger vehicles. Nonetheless, increased durability of components (better quality), better road infrastructure and increase in service intervals would restrict the robust growth.

**'Make in India' push is likely to put brakes on import growth in the long term.**

Imports are expected to grow by 6-8% between fiscal 2024 and 2029, however government's high focus on electric vehicles (EVs) and imports of batteries and cells, battery management systems (BMS) is expected to drive indigenisation growth in the long term, although to be restricted by low EV penetration in the near term. Government's initiatives of production linked incentive scheme to provide Rs 18,100 crore for advanced chemistry cell batteries is expected to increase localization of battery manufacturing. This will in turn reduce such imports going ahead.

**Outlook on imports of auto components (fiscals 2024-29P)**




*E: Estimated, P: Projected*
*Source: CRISIL MI&A*

CRISIL expects growth in imports will be restricted by the growing research and development (R&D) efforts by local players, as well as anti-dumping and customs duties levied by the Government. Further, the Government lowering the tax rate for new manufacturing units in the country that start production before 2023, to 15% from 25% (effective tax rate of 17% including cess) is likely to boost production in India.

As Indian players focus on localization backed by better corporate tax rates and policies, growth in imports is expected to remain muted in the long run. However, localization increases only as volumes ramp up. Lower research and development capabilities of Indian auto component makers and long gestation periods for obtaining acceptance of parts (18-24 months) deter upfront localization. Moreover, CRISIL MI&A expects India to continue to depend on imports of high volume and low-value auto component products.

Further in the EV components front, government have introduced PLI and PMP schemes to boost local production and lower the import of components. Share of import as percentage of consumption to gradually come down in the long term with increased focus on localization. As per the production linked incentive scheme, the government has earmarked Rs 25,938 crore towards the auto and auto components industry. The move is initiated to reduce imports of auto components and promote exports from India. India imports mainly from China, South Korea, Germany, Japan, USA, and Thailand. Imports from South Korea, Germany, Japan, and USA mainly cater to OEM demand. Whereas imports from China and Thailand are primarily for the aftermarket. China and Thailand enjoy low-cost advantage, the countries' cost-competitiveness ranges from 20% for low-value parts (plastic components, springs, and fasteners) to 50% for critical components (pistons and other engine components).

### 5.2.3 Export potential for Indian auto components players

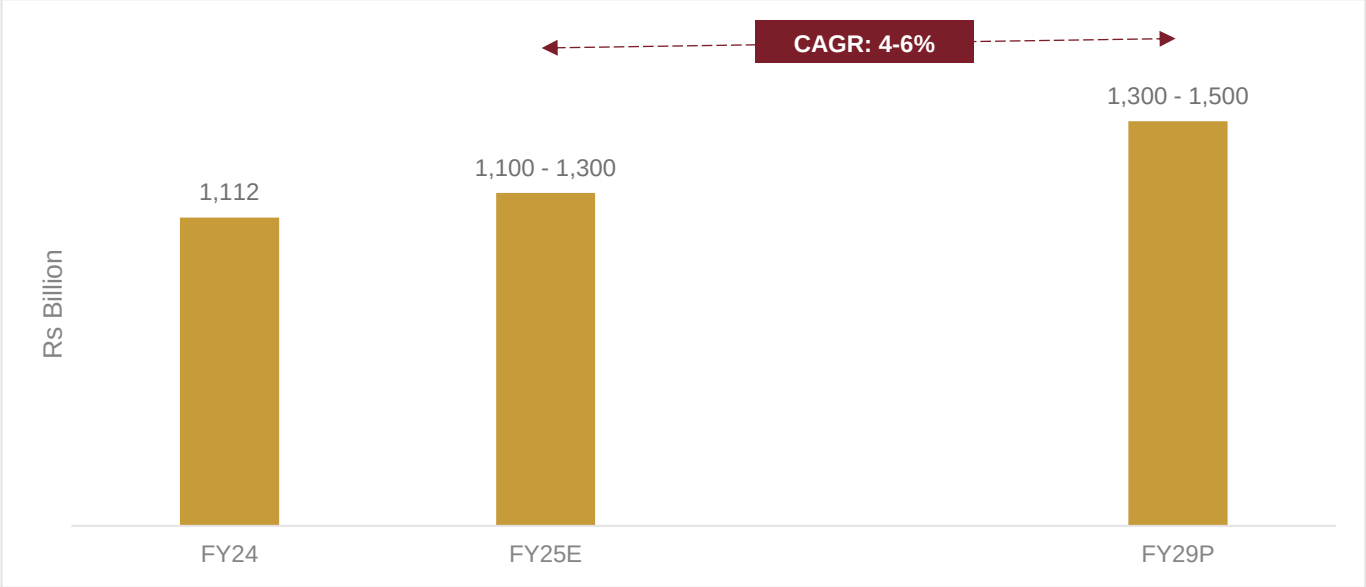
**Exports to grow in the long term despite near term headwinds**

Auto component exports are expected to grow by 4-6% between fiscal 2024 and 2029 driven by diversification strategies being adopted by auto component players to cater to larger geographies. Exports are expected to grow at a slower pace in short term due to recessionary pressure and global slowdown but are expected to grow over the long term. Implementation of PLI scheme remains a key monitorable.

Over the past decade, India emerged as an automotive component hub (particularly for small / compact cars) for global automakers, given its scale, and, hence, lower manufacturing cost. Superior product quality and shift to high-tech products have helped Indian component makers compete better with other low-cost destinations, thus giving a boost to exports. In the auto component industry, cost optimization remains a critical factor. The share of exports to total production has almost doubled from 11% in fiscal 2010 to 21% in fiscal 2024 and this increase in share is aided by increasing export contribution to foreign OEMs.

India's credibility has also driven global automakers to increasingly source components from the country The growth would be on the back of demand from North America and Europe which together contributed 58% to the export demand during fiscal 2023.

**Outlook of exports of auto components (fiscals 2024-29P)**




*E: Estimated, P: Projected*
*Source: CRISIL MI&A*

The spread of COVID-19 will impel OEMs across the world to diversify their supply chain and Indian auto component manufacturers may stand a chance to be a major automotive component supplier as global OEMs plan to diversify their dependence on single geographies.

In the next five years as well, exports will be majorly driven by the US heavy truck segment, German car industry, and demand from other key destinations such as Italy, Turkey, and Brazil. A certain proportion of growth will also be supported by the electric parts segment, as European countries gradually shift to electric / hybrid cars, which could offer a huge opportunity for low cost producing countries, such as India.

**Critical component mix is increasing in the auto component exports basket**

Critical components, such as engine parts, drive transmission and steering, and electrical, are technologically more complex compared with lower-margin components, which were earlier the preserve of Indian players. They offer higher margins to manufacturers, but require greater investment in research and development, as well as high-precision engineering to adhere to the stringent quality standards of global OEMs. Typically, automotive OEMs are highly selective in qualifying suppliers with respect to critical products given the risks of switching suppliers, especially where product reliability is critical. Thus, reliable suppliers who have industry credibility would be go-to for OEMs

Indian manufacturers have been able to gradually increase their proportion of exports of critical components as they faced relatively less competition from other low cost producing countries in this segment. Many of these countries supplied more basic components, which were not as cost and quality intensive. India stepped up its share of exports of critical components significantly. This was possible since the domestic automotive market is increasingly attaining

global technological intensity levels and component manufacturers continue to acquire greater technological prowess. Critical components are mainly exported to the US, Germany, Turkey, Italy, and Brazil. Also, off-late Indian safety and emission norms have been nearing global standards, and domestic companies have been gaining technology capabilities through joint ventures. Hence, critical component exports are projected to grow in the medium term.

# 6 Review and outlook of US Ductile Iron pipes Industry

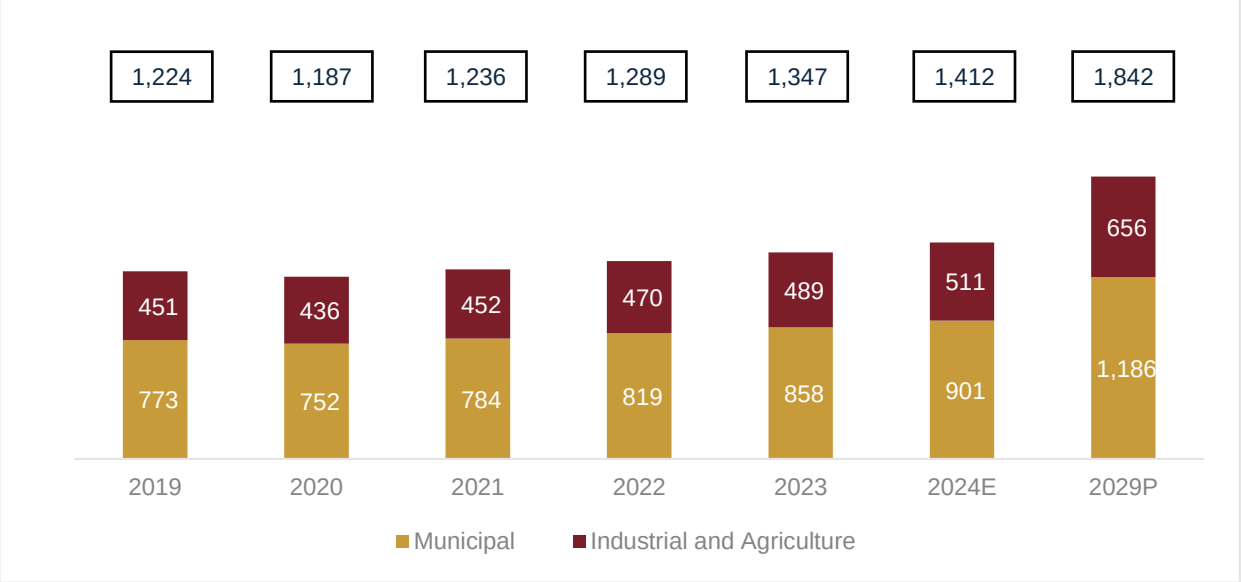
## 6.1 Review and Outlook of the Ductile Iron pipe market in value terms (CY19-CY24)

Ductile iron pipes are the most used pipes across the United States for water supply and pressure sewerage applications. These pipes have substantial pressure-bearing ability, impact resistance, and capacity to sustain external static/dynamic loading. Ductile iron pipes are used in multiple applications due to their impact resistance, high yield strength, ductility, pressure tightness, wear resistance, heat resistance, and corrosion resistance, among other properties.

The municipal application segment holds the major share of the market. Among the municipal application segment, transportation/water work pipes account for the largest market share of the US ductile iron pipes market. The use of ductile iron pipes has ensured the quality of drinking water supply to consumers for decades. They are majorly used in the transportation of potable water from surface water sources like rivers, lakes, reservoirs, etc., to households as rising mains, pumping mains, gravity mains, and distribution pipes.

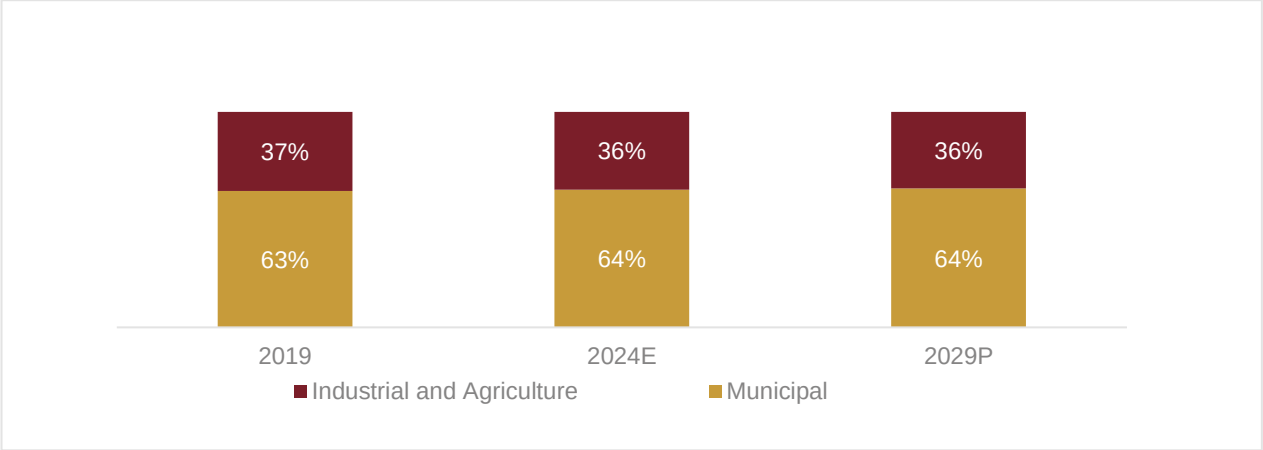
Some of the major players in the US ductile iron pipes market include McWane Ductile, U.S. Pipe, Electrosteel USA, C&B Piping Inc., and American Cast Iron Pipe Company. McWane Ductile holds the leading position in the market. The company has been the leader in manufacturing of water distribution and infrastructure products over the years.

**Fig: Ductile Iron Pipes Market, Revenue in USD Million, By Application, United States, CY 2019-2029P, CAGR (2024-2029): 5-6%**



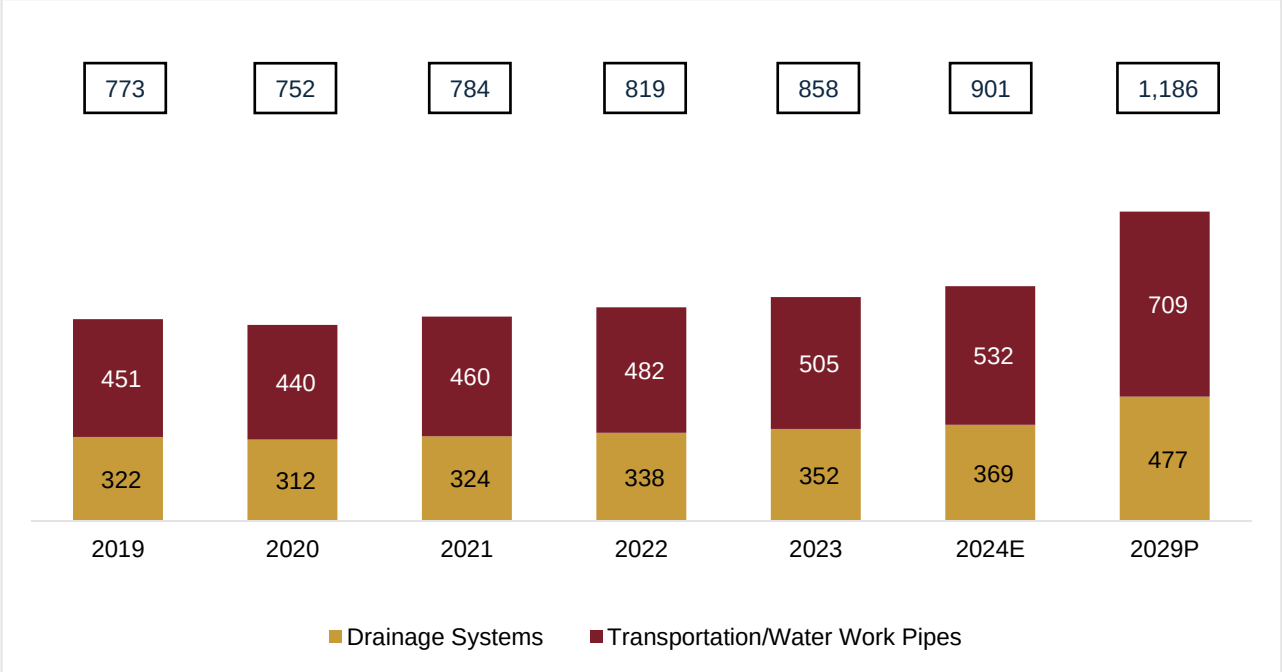

*Source: Mordor Intelligence*

**Fig: Ductile Iron Pipes Market, Revenue Share (%), By Application, United States, CY 2019-2029P**



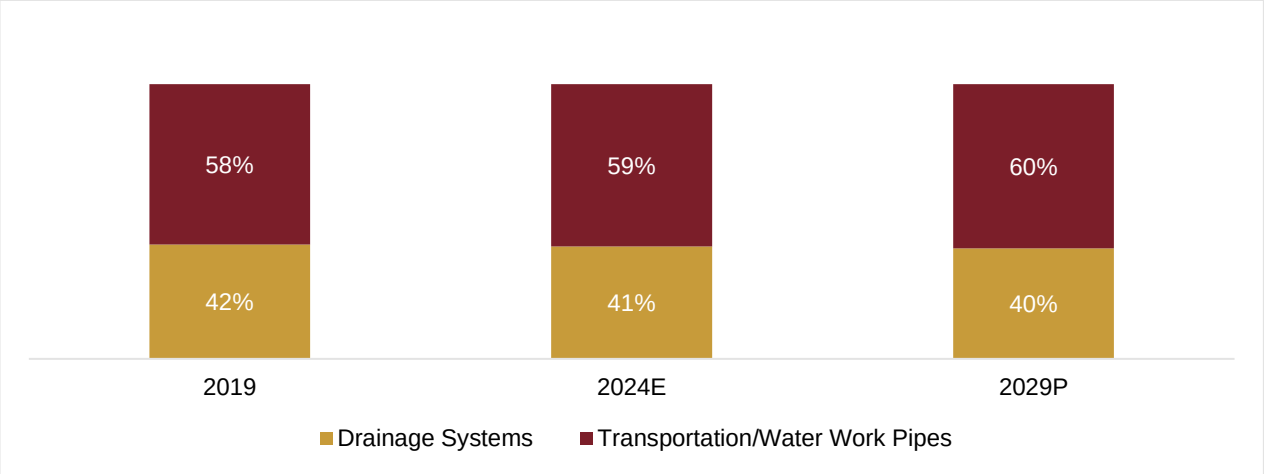

*Source: Mordor Intelligence*

**Fig: Ductile Iron Pipes Market, Revenue in USD Million, Municipal, United States, CY 2019-2029P, CAGR (2024-2029): 5-6%**




*Source: Mordor Intelligence*

**Fig: Ductile Iron Pipes Market, Revenue Share (%), Municipal, United States, CY 2019-2029P**




*Source: Mordor Intelligence*

## Drainage Systems (Wastewater)

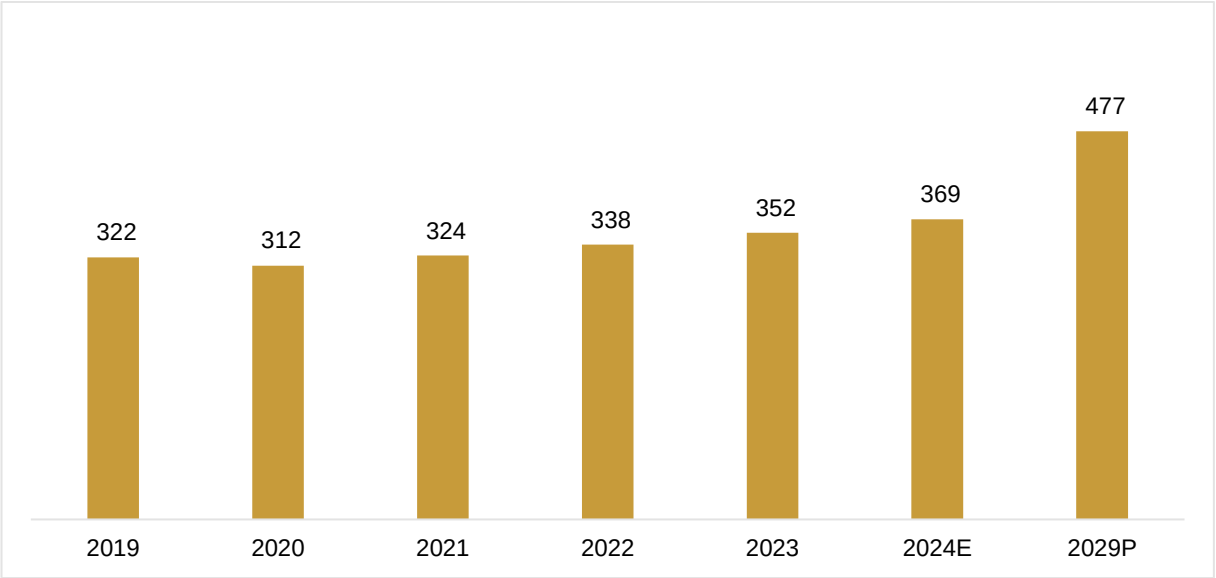
Ductile iron pipes are widely used in sewerage and wastewater systems, offering efficient and continuous flow with minimal internal blockages. These pipes find specific applications in wastewater treatment plants, industrial wastewater disposal, force mains, manholes, access points, and combined sewer systems.

**Properties, Applications, And Industry Trends**

- Ductile iron pipes are constructed with robust materials and provide exceptional reliability for all sewage and wastewater management systems. They also exhibit resistance to chemicals and are eco-friendly.
- With their smooth internal surfaces, these pipes enable efficient water passage and contribute to the smooth operation of sewerage and wastewater systems.
- Due to its durability and excellent flow characteristics, many treatment facilities utilize ductile iron pipes for effluent discharge. This use includes not only land-based outfalls but also outfalls into oceans.
- According to the US Census Bureau, the public sector in the United States spent approximately USD 32 billion on the construction of sewage and waste disposal projects in 2022, an increase of approximately 12.8% compared to the previous year.
- According to estimates from the US Environmental Protection Agency (EPA), roughly 23,000 to 75,000 sanitary sewer overflows happen each year. An estimated 3 billion to 10 billion gallons of untreated waste is released from sewage treatment plants annually.
- In addition, hundreds of municipalities across the United States have combined sewer systems and stormwater in one set of pipes rather than two separate pipelines. These systems can discharge untreated sewage into nearby water bodies during heavy rainfall or snowmelt.
- The upcoming wastewater projects in the United States are expected to boost the demand for ductile iron pipes in the market.
- In January 2023, the City of Irving began construction on the replacement of a 48-inch diameter wastewater line and a 36-inch diameter wastewater line that run along the east side of Riverside Drive between Northwest Highway and Las Colinas Boulevard. The construction work started in QI 2023 and is expected to be completed in 02 2024.

Such factors are projected to drive the demand for ductile iron pipes in drainage systems.

**Fig: Ductile Iron Pipes Market, Revenue in USD Million, By Application, Drainage Systems (Wastewater), United States, 2019-2029P**




*Source: Mordor Intelligence*

## Transportation/Water Works Pipes

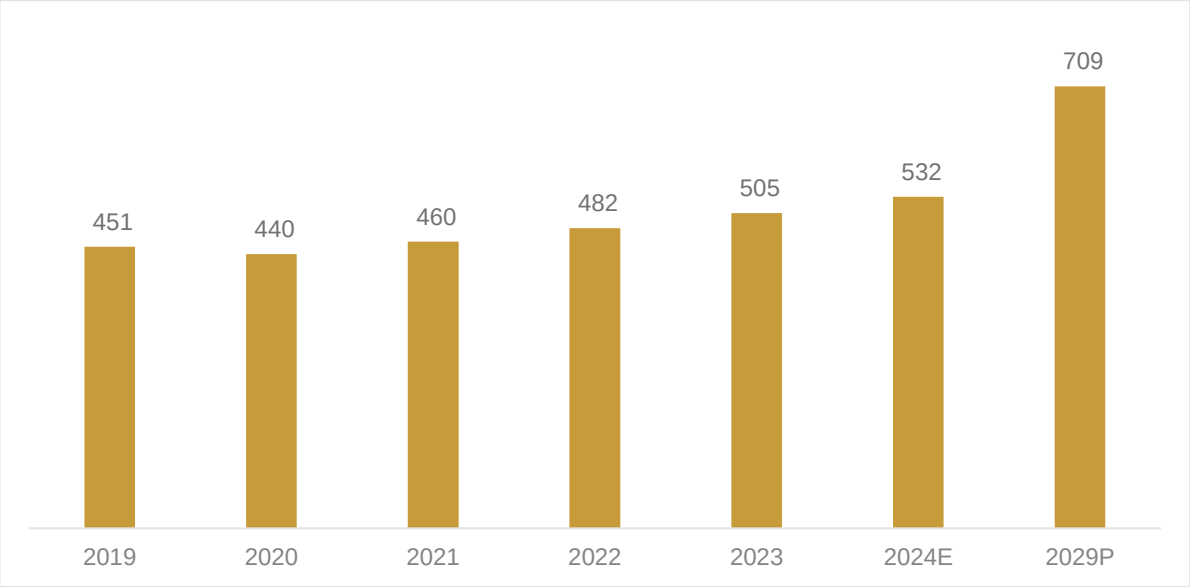
Water supply/transportation is one of the most common uses of ductile iron pipes. This is due to its high resistance to corrosion, which is essential for delivering clean drinking water. Ductile iron pipes are also known for their strength and durability, making them a reliable choice for underground water mains and fire hydrant systems.

**Properties, Applications, and Industry Trends**

- With their ability to endure high water pressure and resist corrosion and external impacts over prolonged periods, they are highly suitable for a diverse range of fluid transmission applications. These water transportation applications include transporting potable water, supplying municipal power, operating pumping stations, facilitating plumbing systems, storing water in tanks, supporting water irrigation, enabling crossings, transmitting water over long distances, serving water treatment plants, facilitating industrial water usage, and facilitating road drainage.
- According to a University of Michigan report, ductile iron pipe is the more cost-effective material over a pipeline's service life with lower operational and maintenance costs and lower energy costs. The United States is one of the highest water consumers in the world. Approximately 80% of the US water and wastewater treatment industry is owned and managed publicly.
- Approximately 152,548 publicly owned water systems provide piped water for human consumption in 2022, of which roughly 50,000 (33%) are community water systems (CWSs).
- The Drinking Water Infrastructure Needs Survey and Assessment 2023 found that the US water systems need USD 625 billion of investment by 2041 to continue providing clean, safe drinking water.
- In FY 2022-23, the Environmental Protection Agency (EPA) announced over USD 9 billion in funding for states, tribes, and territories to upgrade America's aging water infrastructure, sewerage systems, pipes, and service lines, and more through their State Revolving Fund (SRF) programs, including targeting resources to disadvantaged communities, making rapid progress on lead-free water for all, and tackling dangerous chemicals such as PFAS.
- The United States is one of the leading countries for wastewater treatment, along with Mexico, China, Japan, and Germany, which are among the top five countries. The development of water treatment plants in the United States is expected to boost the demand for ductile iron pipes in the coming years.

Therefore, the above-mentioned factors are projected to boost the demand for ductile iron pipes in water transportation applications.

**Fig: Ductile Iron Pipes Market, Revenue in USD Million, Transportation/Water Works Pipes, United States, 2019-2029P**




*Source: Mordor Intelligence*

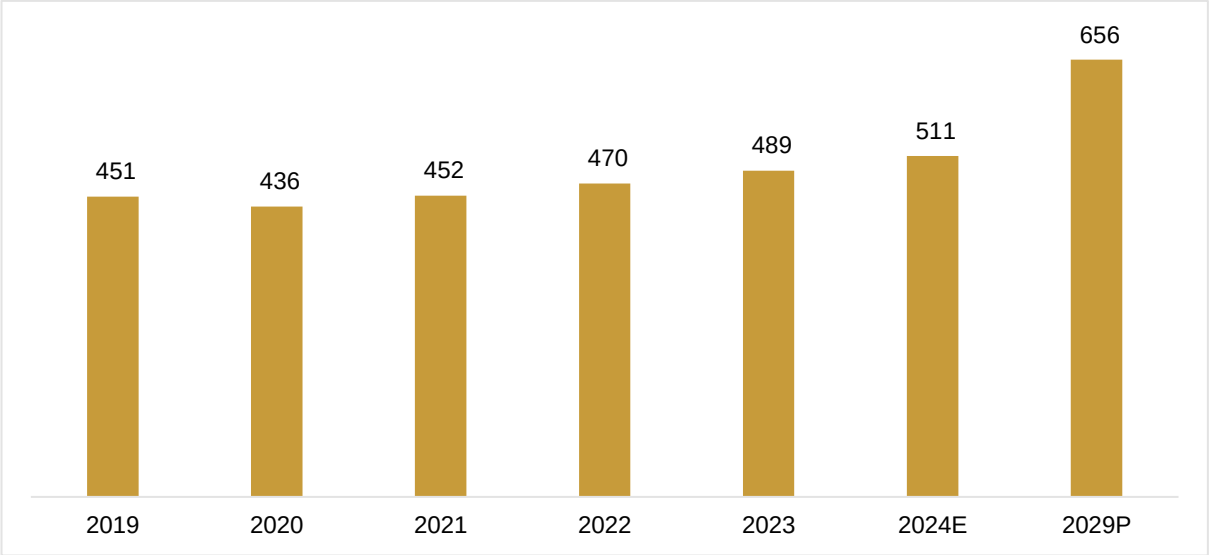
## Industrial and Agriculture

Ductile iron pipes find extensive use in industries such as manufacturing, chemical processing, mining, and power generation. These pipes facilitate the safe and efficient transfer of liquids, including water, chemicals, slurry, and wastewater. They are utilized in industrial cooling systems, fire protection networks, and process piping. With their ability to withstand high pressures, temperatures, and abrasive substances, ductile iron pipes are well-suited for the demanding conditions present in industrial operations. Their reliability and longevity significantly contribute to the smooth and uninterrupted functioning of industrial facilities.

**Properties, Applications, and Industry Trends**

- Ductile iron pipes are used as water distribution pipes and for various other uses in several industries and power plants as raw water intake pipelines and other in-plant piping solutions.
- Ductile iron pipes are utilized for transporting water and various materials, including slurries from mining and quarry sites composed of solid particles suspended in water. Since they demonstrate exceptional durability and resistance to corrosion, it makes them well-suited to handle abrasive substances and withstand the harsh environmental conditions typically encountered in mining operations. Ductile iron pipes are also used for pumping slurries and sewage and processing chemicals in the chemical industry. According to the American Chemistry Council (ACC), the chemical sector had one of its best years in a decade, and the United States strengthened its position as the world's leading manufacturer of chemical goods, although growth has slowed in recent months. After a strong start to the year 2022, chemical output in the United States increased by 3.9% in 2022.
- They are also extensively used in gas distribution systems due to their remarkable strength, durability, and resistance to external elements. These pipes play a crucial role in transporting and distributing natural gas, ensuring a safe and dependable supply of this vital energy source to residential, commercial, and industrial sectors.
- These pipes are specifically designed to withstand high-pressure environments and the corrosive nature of natural gas, making them ideal for gas mains, service lines, gas meters, and other components of the gas distribution infrastructure.
- Hence, ductile iron pipes are essential, as they are more cost-effective compared to other piping materials. They also offer ease of installation due to their flexibility and durability

**Fig: Ductile Iron Pipes Market, Revenue in USD Million, Industrial And Agriculture, United States, 2019-2029P**




*Source: Mordor Intelligence*

The gas industry is also a significant consumer of ductile iron pipes in the country. According to the US Energy Information Administration (EIA), dry gas production is expected to rise to 103.68 billion cubic feet per day (bcf/d) in 2023 and 105.12bcf/d in 2024, up from a record 99.60bcf/d in 2022. With the increase in gas production, the demand for ductile iron is also expected to surge in the coming years.

- The increasing application of ductile iron pipes in power plants is also expected to drive the market demand. As per the International Energy Agency report, nearly 4,243 billion kilowatt hours (kWh) of electricity was generated at utility-scale electricity generation facilities in the United States in 2022. Around 61% of this electricity generation comes from fossil fuels, such as coal, natural gas, petroleum, and other gases. Nearly 19% came from nuclear energy, and around 20% came from renewable energy sources. Ductile iron pipe is used in the renewable energy sector, particularly in the transportation of geothermal fluids. Geothermal power plants use hot water or steam to generate electricity, and ductile iron pipe's high temperature resistance and durability make it a reliable choice for transporting these fluids over long distances
- Currently, there are 93 commercial nuclear reactors that are operating in the United States at 55 locations in 28 states. Most nuclear reactors are in the eastern portion of the United States and 25 reactors are in the phase of decommissioning. Furthermore, the US Environmental Protection Agency revised the existing regulations on wastewater discharge from thermal power plants. This new rule, which sets the first federal limits on the level of toxic metals and other harmful pollutants in wastewater discharged from power plants, considers zero discharge as the preferred option for pollutants in fly ash transport water, bottom ash transport water, and wastewater from flue gas mercury control systems. Compliance with these stringent wastewater discharge standards provides new regulatory incentives for wastewater treatment plant installations in United States power plants. Therefore, this is likely to propel the demand for ductile iron pipes in water transportation.
- Ductile iron pipe is widely used for irrigation systems due to its durability and resistance to corrosion. Irrigation systems typically involve long stretches of underground piping and the toughness and strength of ductile iron pipe make it a reliable choice for this application.
- The United States addresses agricultural and food policy through a variety of programs, including commodity support subsidies, nutrition assistance, and conservation. Such factors are responsible for driving the agriculture industry in the country. The growing demand for mineral nutrients and high-performance fertilizers to boost productivity is expected to drive the market for ductile iron pipes for irrigation during the forecast period.
- According to the US Department of Agriculture (USDA), the Biden-Harris administration is increasing US-made fertilizer production to counteract and counter the rising prices caused by the war in Ukraine for the

farmers. In September 2022, the government announced that it would offer a grant of USD 500 million to boost domestic fertilizer production. The administration's fertilizer expansion program is part of a government-wide effort to increase competition in the agricultural market.

All the above-mentioned factors are expected to impact on the growth of the market studied during the forecast period.

## Market Ranking Analysis

The US ductile iron pipe market has a presence of established ductile iron pipe manufacturers that have been operating in the country for a long time. The market is consolidated with the presence of key players, including McWane Ductile, U.S. Pipe, Electrosteel USA, C&B Piping Inc., and American Cast Iron Pipe Company, holding a strong position in the market. McWane Ductile holds the topmost position in the US ductile iron pipe market.

The company has been the leader in manufacturing of water distribution and infrastructure products over the years.

US Pipe is the second largest player in the market studied. The company offers water and wastewater products and is supported by local governments, municipalities, water departments, and businesses across the United States and the world. Electrosteel USA holds the third position in the market studied. It has a widespread distribution network spread across the United States.

C&B Piping Inc. ranks fourth in the market studied and offers ductile iron pipes that cater to the water and wastewater treatment plant construction industry. AMERICAN (American Cast Iron Pipe Company) ranks fifth in the market and offers ductile iron pipe and fittings for the waterworks industry.

# 7 Market sizing and outlook of Shivalik's specific auto components

## 7.1 Overview of Ferrous casted components

Casting involves pouring hot liquid metal into a mold with a hollow cutout or cavity to create the desired geometric design. Melted iron poured into a mold, is then allowed to cool, and solidify in ferrous casting. The end products are strong, resilient, and able to survive challenging working environments, which qualifies them for usage in automobiles. This method makes use of low melting point alloys to produce massive, complicated components in huge quantities. Sand Casting, Gravity Casting, High-Pressure Die Casting (HPDC), Low-Pressure Die Casting (LPDC) are the different types of processes by which ferrous components are cast.

The casting industry is growing due to the government's implementation of strict emission regulations. The production of pollution control systems, which reduce vehicle emissions, relies heavily on iron castings for components such as exhaust manifold and turbocharger housings.

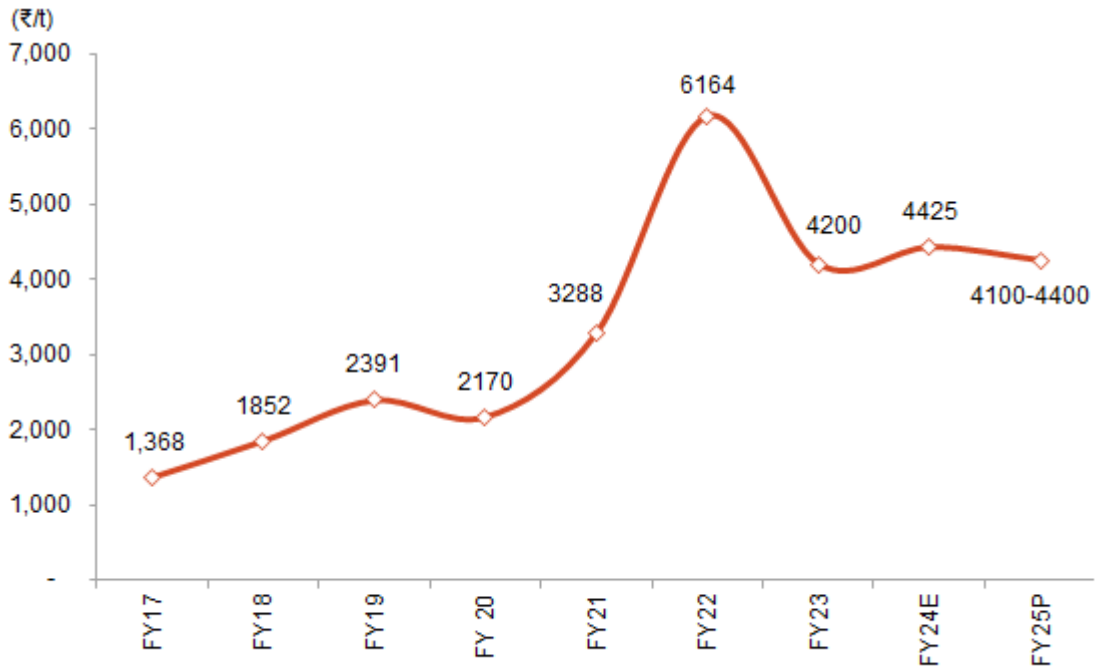
Automotive iron castings are becoming more effective and of higher quality because of developments in casting technologies, such as automated molding and high-pressure molding. These developments enable the creation of elaborate and complicated designs with increased dimensional accuracy.

Global Iron ore prices: Iron ore prices in CY 2023 average around in the range of $115-125 per tonne and are expected to moderate marginally to $110-120 per tonne in 2024. Lower Chinese iron ore imports are the major contributors to this correction. Anticipated positive sentiments at the start of calendar year 2023 turned down with realty hitting. From Jan'23 to Aug'23 prices corrected by 11%. With government's intervention in boosting property sector in second half of the year, the iron ore demand to likely see pick up. Jan'23 to Aug'23 months saw crude steel production rising by 2.6% y-o-y.

Domestic Iron ore prices: In FY25, iron-ore prices are expected to stabilize to touch Rs 4100-4400 per tonne amid moderation in steel demand growth and anticipated increase in global and domestic iron-ore output as new mines are in progress.

In FY24, iron-ore prices are expected to have increased on low base averaging around ~Rs 4425 per tonne, a rise of 9% on year. After export duty removal, iron-ore prices started rising. But due to falling global iron-ore prices and weak steel markets prices started falling since May'23. However, prices started rising in H2FY24 due to strong domestic and export steel demand.

**Fig: Outlook on domestic iron ore prices**



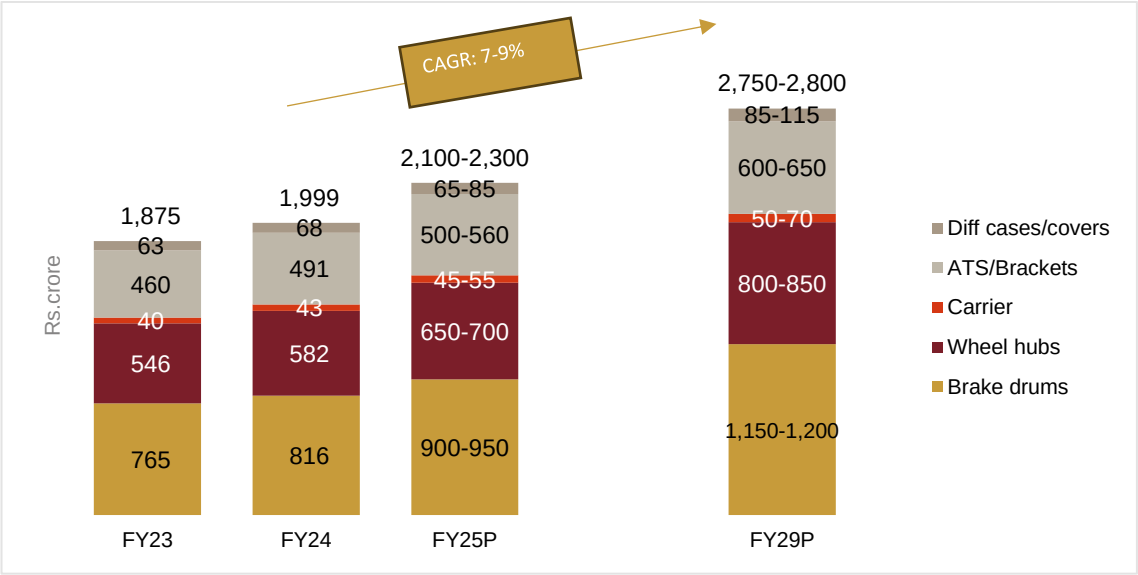

*Source: CRISIL MI&A | E:Estimated , P:Projected*

In FY24, iron-ore prices are expected to rise on low base to touch Rs 4200-4500 per tonne, a rise of 7-9% on year. After export duty removal, iron-ore prices started increasing. However, due to falling global iron-ore prices and weak steel markets prices started falling since May'23. Prices started rising since in the month of September due to strong domestic steel demand and 8MFY24 prices would have touched Rs 4200-4400 per tonne (IBM prices). Prices are expected to be strong in the near term amid healthy steel demand. In FY25, iron-ore prices are expected to stabilize to touch Rs 4100-4400 per tonne amid moderation in steel demand post elections and anticipated increase in global and domestic iron-ore output as new mines are in progress.

The specific ferrous cast auto components covered in this report includes Brake drum, Wheel Hub, Carrier, Nodo brackets, ATS Brackets, Differential cases and covers for commercial vehicles; Trumpet, Transmission housing, Gear Box housing, Clutch housing, Front axle support for Tractors; Fitted back ring, End cap cover, Adaptor in Railways segment; and Steering axle, Modular axle, King post, Gear Case/front case in Off-highway vehicles.

## 7.2 Ferrous casted components: Commercial vehicles

**Fig: Market size of ferrous casting industry for MHCVs`**




*Source: CRISIL MI&A consulting*

## Brake drum

The function of a drum brake is to use friction caused by a set of shoes or pads that press and grip the rotating cylinder-shaped part called a brake drum. Drum brake components include the backing plate, brake drum, shoe, wheel cylinder, and various springs and pins. The brake drum is generally made of a special type of cast iron that is heat conductive and wear resistant. The main activity involved is to cast the metal of suitable grade and machining to specifications. It rotates with the wheel and axle. This braking friction generates substantial heat.

For commercial vehicles, brake drums are widely used due to their capability to deliver strong braking forces, cost-effectiveness, and lightweight nature compared to disc brakes.

*Source: Shivalik*

The automotive industry has been experiencing a gradual transition towards disc brakes, primarily driven by the safety features they offer. However, disc brakes are preferred in passenger cars segment than in commercial vehicles due to their light weight and higher stopping power. In commercial vehicles, that frequently face heavy loads and continuous braking, drum brakes offer better heat dissipation than disc brakes due to their larger surface area. The demand for drum brakes is driven by their widespread usage in commercial vehicles. The growth of the commercial vehicle sector, encompassing trucks, buses, and trailers, directly contributes to the increasing demand for drum brakes. For each axle in the commercial vehicle typically there are two brake drums. For example, a 42 tonner (5-axle / 14 wheel) vehicle would have 10 brake drums.

With manufacturers focused on extending the driving range of their EVs and lowering production costs, drum brakes may gain some merit in the world of electrification, however no immediate changes are expected.

## Wheel Hub

Wheel hubs are located between the drive axle and the brake drums or discs. The hubs house the individual components that keep the wheels securely fastened to the vehicle and running smoothly, including the spacers, seals, and nuts. Wheel hubs are heavily stressed by vertical, lateral, and braking forces and hence cast iron is best suited for manufacturing wheel hubs. Nevertheless, to reduce weight, wheel hubs made of ductile iron have forayed into the market, designed with special gaps and ribs - to enable lower fuel consumption and a higher payload of the vehicle.

*Source: Shivalik*

For each axle in the commercial vehicle typically there are two wheel-hubs. For example, a 42 tonner (5-axle / 14 wheel) vehicle would have 10 wheel-hubs.

## Carrier

The differential carrier is essential for distributing torque between the front and rear wheels, allowing for smooth and efficient operation, especially in vehicles with rear-wheel or all-wheel drive configurations. The carrier assembly is designed to accommodate a range of ring and pinion gear ratios for various tire sizes and vehicle applications, ensuring optimal performance and efficiency. The rear differential carrier is a crucial component of a commercial vehicle's drivetrain system. It is responsible for housing the rear differential gears and bearings, which allow the wheels to rotate at different speeds while receiving torque from the engine. The forward differential carrier, also known as the center carrier assembly, is responsible for transmitting the power and torque coming out of the transmission to the front and rear carrier assemblies, also known as the transfer case. The central carrier assembly handles torque distribution between the front and rear axles, while the rear differential carrier distributes torque between the rear wheels.

*Source: Shivalik*

A commercial vehicle typically has one carrier irrespective of the vehicle tonnage.

## Nodo /ATS Brackets

Nodo ATS brackets are used in commercial vehicles to mount various components such as running boards, awnings, steering stabilizers, driver assistance systems, air compressors, ABS, stability systems, air dryers, and exhaust after-treatment devices. These brackets are designed to provide a secure and stable mounting solution for the specific components.

*Source: Shivalik*

Commercial vehicles typically have five carriers on an average, to mount various components as mentioned above.

Similar to Carrier, Brakes component contributed a Rs 52 cr worth of sales in fiscal 2024 for the commercial vehicle segment with ~120,000 units sold

## Differential cases / covers

A differential case in its most basic form comprises two halves of an axle with a gear on each end, connected by a third gear making up three sides of a square. This is usually supplemented by a fourth gear for added strength, completing the square. This basic unit is then further augmented by a ring gear being added to the differential case that holds the basic core gears – and this ring gear allows the wheels to be powered by connecting to the drive shaft via a pinion.

*Source: Shivalik*

This gearing arrangement makes up the open type - differential and is the most common type of automotive differential from which more complicated systems are derived. The locked or locking differential is a variant found on some vehicles, primarily those that go off road. It is essentially an open differential with the ability to be locked in place to create a fixed axle instead of an independent one. This can happen manually or electronically depending on technology in the vehicle. The benefit of a locked differential is it can gain a considerably greater amount of traction than an open differential. Limited slip differential, viscous slip differential, Torque sensing differential, active, torque vectoring differential are some other types of differentials based on the method of torque being transferred

Every commercial vehicle typically has one differential cover irrespective of the vehicle tonnage.

## Review and outlook of ferrous casting components in commercial vehicle industry FY23-FY29

As mentioned above, ferrous casting components in this report include Brake drums, Wheel hubs, Carrier, ATS/Brackets, Differential cases/covers catering to commercial vehicle segments.

**Table : Components considered in commercial vehicle segment**

| Product | Market | Channel |
|---|---|---|
| Brake drums | Domestic | OEM |
| Wheel hubs | Domestic | OEM |
| Carrier | Domestic | OEM |
| ATS/Brackets | Domestic | OEM |
| Differential cases | Domestic | OEM |

The CV market is expected see a constant rise in vehicle tonnage, which is expected to significantly change the industry's landscape. Market dynamics are changing significantly as the industry's average payload rises, especially in the ferrous casting market for CV trucks.

The driving force behind this transformation is the escalating demand for higher tonnage vehicles. Heavy-duty trucks, weighing 42-tonne or 48-tonne, are becoming more commonplace on the roads. Unlike their lighter counterparts, these massive vehicles require a greater number of parts and components to operate. This fundamental shift translates into a notable increase in production costs for these CV trucks. To put this into perspective, a typical 19-tonne or 28-tonne truck may consist of 2-3 axles, while a 42-tonne or 48-tonne truck can have as many as five axles.

A crucial component of a truck is the brake drum. It provides a strong braking effect due to its large contact area and high friction surface, contributing to the vehicle's safety and control. Moreover, they are long-lasting and durable, requiring less frequent replacement compared to other braking systems which is crucial for heavy duty applications. The market size of brake drums used in trucks was ~Rs 800-850 crore in fiscal 2024.

The wheel hub assembly is integral to the vehicle's braking system, as it houses the wheel speed sensor that controls the anti-lock braking system (ABS) and the traction control system. The hub keeps the wheel securely attached to the vehicle, enabling the wheels to turn freely, which is essential for safe steering and vehicle control. The wheel hub market was valued at ~Rs. 550-600 crore in fiscal 2024

Wheels hubs are followed by brackets which serve various purposes, such as mounting heavy items, saving bumpers from getting damaged, and providing a stable attachment for different components. Brackets mount various components including running boards, awnings, steering stabilizers, driver assistance systems, air compressors, ABS, stability systems, air dryers, and exhaust after-treatment devices. Typically, there are five brackets used in a commercial vehicle for engine mount, exhaust system mount, suspension system, bumper mount and other parts like awning, air compressor etc. The market for brackets used in commercial vehicles was valued at Rs 480-520 crore last fiscal.

The carriers' market in commercial vehicle segment is estimated at Rs. 40-45 crore as of fiscal 2024. This market is expected to grow at 5-7% CAGR.

The differential cases market in commercial vehicle segment is estimated at Rs. 60-80 crore as of fiscal 2024. The market size for each of these components is expected to grow at 5-7% CAGR in the next 5 years.

**Electrification would not impact goods segment of MHCV brake drum market**

Typically, electric vehicles would require light weight braking solutions and hence disc brake is preferred over drum brake.

However, the electrification in commercial vehicle segment currently is limited within buses segment driven by the State transport Undertakings owing to government subsidy and to some extent in the SCV segment.

The key growth driver in SCV segment has been the launch of Tata Ace EV in FY23 post which there is has been a pickup in electric vehicles in SCV segment.

Going ahead, there is expected to be a gradual adoption of EV in LCV segment, while MHCV segment is expected to lag the LCV segment, primarily on account of the cost and range constraints of the electric powertrain.

Although most of the modern EVs uses regenerative braking systems, traditional braking systems, which are compatible with these new technologies, are expected to play a major role. Advanced braking systems in the CV segment include brake lining and body (modulator/park relay). Intensity of brake linings used in each vehicle changes with the number of axles. A single axle would have eight brake linings and one body (modulator/park relay). CVs in the Indian market is equipped with a drum brake assembly on all axles and, penetration of Disc brake pads (DBPs) in the Indian market is negligible. However, R&D activities are underway by various OEMs in this space to check the viability of DBPs in CVs used in the Indian market. In CVs, unlike in cars and two-wheelers, brake linings can be replaced once worn out without replacing the entire brake shoe, hence drum brakes make more sense in CVs. In contrast, if disc brakes are used in CVs, brake linings are combined with brake shoe/brakes pads and if worn out, entire unit is to be replaced which would incur higher cost to the vehicle owner.

Of late, brake drum manufacturers are innovating the component to the extent that it matches the performance offered by a disc brake. For example, at the Auto Expo 2023 on January 12, Brakes India, introduced their newly designed and developed Motor on Drum brakes specifically for the passenger car segment. In Nov 2022, Continental launched the innovative lightweight design of the drum brake reducing its overall mass by approximately 35%. This significant reduction brings the EPB-Si with a Lightweight Drum brake system closer in mass to a caliper and disc brake assembly.

**Developed economies:** CVs in developed economies such as Europe and North America use DBPs, whereas in India, the use of disc brakes is yet to pick up. CVs in export markets are equipped with four DBPs in the front axle. Adoption of DBPs is increasing slowly and is majorly by large fleets. Higher upfront cost is one hinderance for the wide adoption of DBPs; however, lower cost of maintenance and resistance to brake fade are added advantages of DBPs.

**Upcoming trends and impact on Ferrous casted components**

**Integrated sensors for wheel hubs**: The relatively recent development of sensor technology in wheel hub bearings built into wheel hub bearings, manufacturers and service providers can monitor and identify variations in temperature, vibration, and other factors that may indicate possible bearing issues. This development is expected to drive manufacturers to customise wheel hub designs in line with the OEM requirements.

**Growing shift towards lightweight**: The demand for lightweight and fuel-efficient vehicles has increased the usage of cast components, is especially being seen in engine blocks, cylinder heads, and transmission systems. However, the demand for components such as wheel hubs, carriers, brackets, or differential cases is expected to remain intact since, the sum weight of the components put together, contribute to a small portion of lower single digit share compared to the overall kerb weight of an HCV.

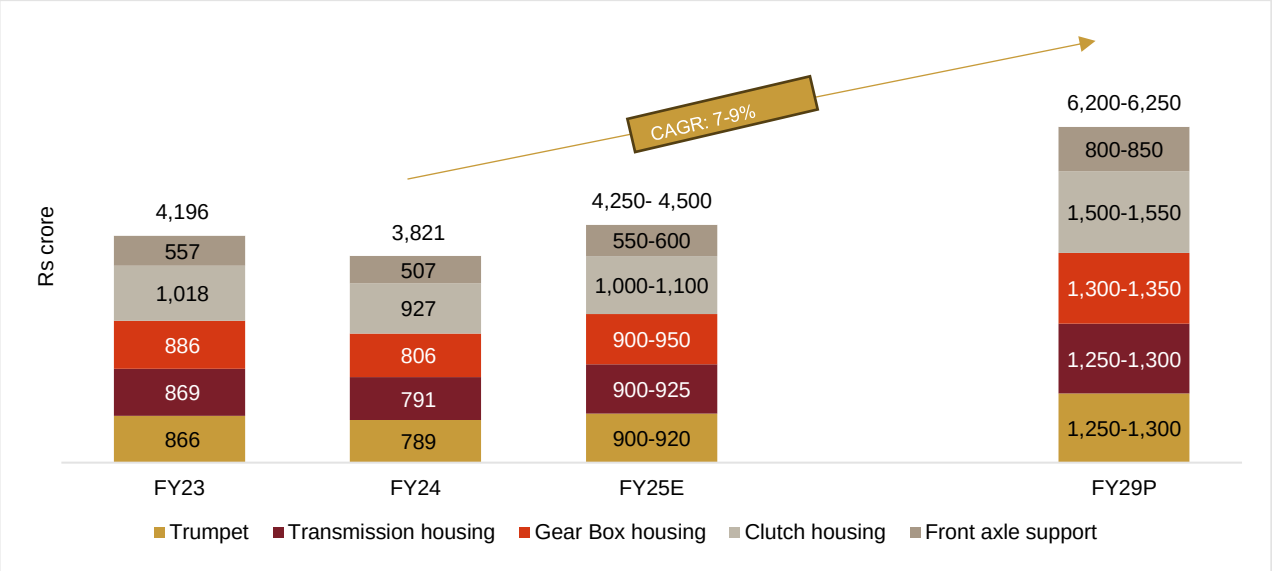
**Advanced materials and alloys**: Casting players are looking to develop of advanced materials and alloys which are expected to enhance the properties of iron castings. These materials can offer improved strength, corrosion resistance, and thermal stability. The integration of lightweight materials, such as magnesium alloys, with iron castings can lead to components with higher performance and fuel efficiency.

**Technological Advancements:** The casting industry has witnessed technological advancements that improve the production process, enhance product quality, and reduce costs. Advanced casting methods, such as investment casting and precision casting, allow to produce intricate and complex components with high accuracy. Additionally,

the use of computer-aided design (CAD) and simulation software helps optimize the casting process and minimize defects.

## 7.3 Ferrous casted components: Tractors

**Market size of ferrous cast components: Tractors**




*Source: CRISIL MI&A Consulting*

Ferrous casting is commonly used in tractors rather than aluminium due to its strength, durability, and cost-effectiveness. Castings used in agriculture have a specific product size. When producing complex or massive parts in medium- and high-volume numbers, this is the most economical way. Galling resistance, machinability, weldability, fatigue properties, resistance to cracking, electrical conductivity, magnetic properties, thermal conductivity, are some of the key factors considered while casting components specific to Tractors. Sand casting is the primary process used by a casting Foundry to create agricultural castings.

### Trumpet

A trumpet in a tractor typically refers to a component of the tractor's driveline, specifically the part of the axle assembly that houses the differential and gear components. The trumpet is located at the rear of the tractor and houses the differential and gear components, which is responsible for transmitting power from the engine to the wheels.

*Source: Shivalik*

The trumpet is an essential part of the tractor's transmission system, ensuring smooth and efficient operation of the gears and the differential.

## Transmission housing

The transmission housing in tractors is a critical component that encases the transmission system, providing protection and support to the transmission's internal components. It is typically made of durable materials such as cast iron to withstand the rigors of tractor operation. The transmission housing serves the following key functions.

*Source: Shivalik*

- Encasement: It houses and encloses the transmission gears, shafts, and other vital components, protecting them from external elements and impacts.
- Support: The housing provides a stable and secure mounting structure for the transmission, ensuring proper alignment and reducing vibration during tractor operation.
- Sealing: It incorporates sealing elements to prevent the leakage of transmission fluid, maintaining the lubrication and proper functioning of the transmission.
- Attachment Points: The housing often includes attachment points for other tractor components, such as the engine, driveline, and hydraulic systems.

The integrity of the transmission housing is crucial for the reliable and efficient operation of the tractor.

## Gear Box housing

The gearbox housing encases the transmission gears, shafts, and other vital components, protecting them from external elements and impacts, while also providing support and attachment points for other tractor components. On the other hand, the transmission housing encases the entire transmission system, including the gearbox, and provides protection, support, and sealing to the transmission's internal components. The transmission housing is typically larger and more complex than the gearbox housing, as it encases the entire transmission system, while the gearbox housing is specific to the gearbox components.

*Source: Shivalik*

## Clutch housing

The clutch housing in tractors is a component that encases the clutch assembly, providing protection and support to the clutch's internal components. The clutch housing is a vital component that safeguards the clutch assembly, provides support, and ensures the proper functioning of the tractor's drivetrain. While all three housings are integral to the tractor's transmission system, they serve distinct purposes, with the gearbox housing and transmission housing

focusing on the broader transmission components, and the clutch housing specifically addressing the clutch assembly and flywheel of the engine.

*Source: Shivalik*

## Front axle support

Front axle support in tractors is a crucial component that provides support and stability to the front axle assembly, ensuring smooth and efficient operation of the tractor. There are different types of front axle supports are designed to accommodate various farming needs and field conditions, providing versatility and functionality for different tractor applications. For example: Standard Front End, also known as "regular" or "wheatland," this front end features an axle with a fixed distance between the front wheels. It is well-suited for serious pulling tractors and industrial tractors, as well as for the demands of loader work. High Crop Front End type of front-end features tall spindles on the front axle and drop-down rear axles, allowing the tractor to navigate high crop fields. Tricycle Front End, also known as "narrow," this front end is designed for row-crop tractors, enabling the tractor to work typically for cultivating. It features either a single front wheel or two front wheels narrowly set together, with the front wheels usually angled towards each other in a 'V' shape.

*Source: Shivalik*

The front axle support typically consists of the following components:

- Axle Housing: The axle housing encloses and protects the front axle assembly, which includes the axle, hub, and other related components.
- Axle Assembly: The axle assembly is responsible for transmitting power from the engine to the wheels, providing steering and stability to the tractor.
- Bearings and Bushings: Bearings and bushings are essential components of the front axle support, as they reduce friction and wear on the axle assembly, ensuring smooth and efficient operation.
- Steering System: The front axle support is an integral part of the tractor's steering system, which relies on components such as the steering box, gear, and linkage to provide responsive and precise steering control.
- Tie Rods and Kingpin: Tie rods and kingpins are used to connect the front axle support to the tractor's frame, ensuring proper alignment and stability during steering and operation.

## Review and outlook of ferrous casting components in Tractor industry FY24- FY29

As mentioned above, ferrous casting components for tractors industry in this report include Trumpet, Transmission housing, Gear Box housing, Clutch housing and Front axle support catering to tractor segments.

**Table : Components considered in Tractors segment**

| Product | Market | Channel |
|---|---|---|
| Trumpet | Domestic | OEM |
| Transmission housing | Domestic | OEM |
| Gear Box housing | Domestic | OEM |
| Clutch housing | Domestic | OEM |
| Front axle support | Domestic | OEM |

Farm productivity has been greatly impacted by mechanization since the dawn of modern agriculture. Owing to the agricultural sector's suggestive element, tractors must be improved and enhanced technologically.

Because tractors with more horsepower are more effective for various tasks including rotavating, plowing, and hauling, the demand for high horsepower tractors has grown significantly during the past ten years. A large portion of the tractor system is made up of the gear box and clutch housings, which enclose the mechanical parts of the transmission, including the clutch assembly, gears, and shafts. Additionally, it offers the internal components protection from the outside environment, mechanical support for the moving parts, and a fluid-tight container to keep the lubricant. Tractor housing is impacted by many static and dynamic transmission load types. Therefore, a tractor's strength and lifespan can be significantly increased by employing an efficient clutch housing and gear box housing design. Given this significance, clutch housing, gearbox housing and transmission housing together contribute to ~10% of the overall value of the tractor. The market size for ferrous casted components considered for tractors segment in FY24 is estimated at Rs. 3,500- 4,000 crore.

The market size of clutch housing and gear box housing is estimated at Rs.900-950 crore and Rs.800-850 crore respectively as of fiscal 2024. The market is expected to rise in fiscal 2025 after the slight decline in tractor production in FY24. Transmission housing and Trumpet market size is around the similar range of Rs.750-800 crore as of fiscal 2024. All the product segments are expected to grow at a CAGR of 7-9%, taking the overall ferrous casted components of tractors industry market size to Rs.6,200-6,250 crore by fiscal 2029.

## Trends in Tractor’s transmission system

Tactors' transmission systems used to have only sliding or constant mesh gear boxes with a limited number of speeds. However, some manufacturers currently incorporate gear boxes with multiple speeds, either fully or partially synchronized, into their tractors. As such, the transmission represents a tradeoff between what is intended and what can be achieved at a fair cost with current technology.

Transmission systems that were not synchronized were substituted with either synchronization or continuously variable transmissions (CVTs). When matching the engine speed to the intended terminal drive speed, a CVT or synchronized manual gearbox with sufficient available gear ratios—typically with two ranges, high and low—allows the engine to run within the proper speed range for power output. Bajaj Tempo launched fully synchronized gear box technology in their OX-35 & 45 models. A synchronized transmission has the benefit of allowing for simple gear changes—even while the tractor is in motion—without endangering the transmission. The partially engaged synchronized gear box in new Holland tractors allows for speed equalization at greater speeds.

Certain local manufacturers also provide four-wheel drive (4 WD) technology as an optional feature. A 4 WD tractor has a higher net tractive coefficient and tractive efficiency than a 2 WD tractor. As a result, tractors with four wheels

may generate greater drawbar power. Indian tractors are increasingly commonly equipped with dual clutch and live Power take off.

Except for such advancements within transmission segments, the tractor industry is not expected to foresee any major changes with respect to the existing internal combustion technology and electrification in this segment is negligible. Consequently, the demand for ferrous cast components contributing to the overall assembly will remain intact.

### EV effect

Even though electric tractors were gaining attention as a potential alternative to conventional diesel-powered tractors, there are several factors that could influence whether electric tractors overtake conventional tractors in the agricultural sector:

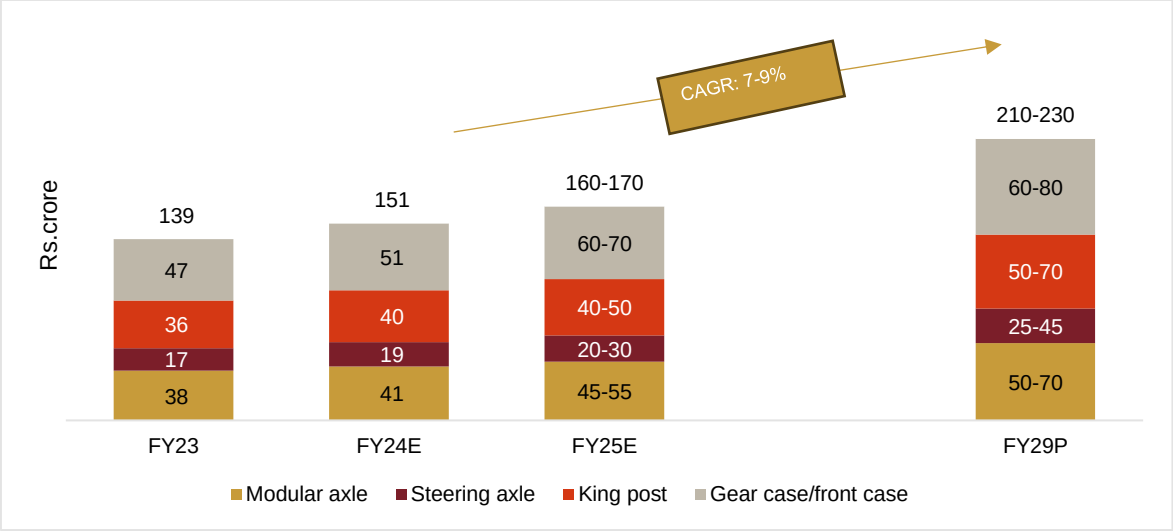
- Technological Advancements: The advancement of battery technology and charging infrastructure will play a significant role in the widespread adoption of electric tractors. Improvements in battery energy density, charging speed, and cost could make electric tractors more competitive with conventional tractors.
- Cost Considerations: The initial cost of electric tractors is typically higher than that of conventional tractors. However, over the long term, lower operating costs and potential government incentives or subsidies for electric vehicles could make them more economically attractive.
- Infrastructure: The availability of charging infrastructure in rural areas where tractors are used is crucial for the adoption of electric tractors. Without a reliable charging infrastructure, farmers may be hesitant to switch to electric tractors.
- Range and Battery Life: The range of electric tractors and the lifespan of their batteries are important factors to consider. Farmers need tractors that can operate for long hours without frequent recharging and batteries that last for many years.
- Performance: Electric tractors need to demonstrate comparable performance to conventional tractors in terms of power, torque, and efficiency to be widely accepted in the agricultural industry.
- Regulatory Environment: Government regulations and policies regarding emissions, energy efficiency, and incentives for electric vehicles can also influence the adoption of electric tractors.

## 7.4 Ferrous castings for Offload vehicles: Market size (fiscals 2023-29P)

Construction equipment sales in India have experienced a nearly 20% increase since April. The sales are projected to reach a record high of 125,000-130,000 units by the end of the fiscal year. This surpasses the previous peak of 107,779 units recorded in FY23. India currently ranks as the world's third-largest market for construction equipment, following the US and China. The strong double-digit growth is attributed to increased government spending on infrastructure development. This performance follows the industry's record sales of 98,000 units in the pre-pandemic year of FY19.

The market size for the ferrous casted components for offload vehicles segment including construction equipment, which includes which include Modular axle, Steering axle, King post and Gear case/front case is estimated at Rs. 150-170 crore as of fiscal 2024, of which gear case market contributes the highest at ~30-35% owing to the high value of the component. Kingpost contributes ~25% of the total size. Overall market is expected to grow by 8-10% in fiscal 2025 driven by demand for offload vehicles. In the next 5 years, CRISIL expects the market size to grow at 6-8% taking the value to Rs.210-230 crore by fiscal 2029.

**Fig: Market size of ferrous casting components: Offload vehicles**




*Source: CRISIL MI&A Consulting*

Even though OHVs can have very different designs, they often have several things in common. To prevent sinking into soft ground, they require low ground pressure, good ground clearance, and the ability of their wheels or tracks to remain in touch with the ground to maintain traction. Wheeled vehicles use high and flexible suspension and big or extra tires to maintain traction. Track vehicles, like half-tracks, use broad tracks and flexible suspension on any wheel to maintain ground contact. Many off-highway vehicles also have low gearing, which allows the engine to continue to produce most of its power even when traveling slowly over challenging terrain. Some vehicles are also including torque converters to further lower the gearing. Hence, though Modular axle and steering axle are standardized designs to some extent, the gears and associated gearbox design for offload vehicles is customized as per the OEM needs.

Globally, many heavy machine manufacturers are currently developing entirely or partially equipped electric equipment. More models are being developed and are starting to be sold commercially. Heavy machine OHV producers are also looking at robotics and autonomy, and some of these products are only now making their way onto the market. Being at inception phase globally, the current penetration in India remains negligible.

Urbanization and mining activities are expanding quickly, which is propelling the off-highway vehicle market in India. Off-road vehicle use is expanding across several industries, including mining, construction, and infrastructure. Off-highway vehicles are identified with large tires with open and deep treads, a flexible suspension, providing them with higher ground clearance and higher power. These features enable these vehicles to access trails and roads that have rough and low-traction surfaces and maintenance of their wheels or tracks on the ground to maintain traction. Additionally, these vehicles require specially designed engines for high power and high load carrying capacities. Due to the need for high load carrying capacity, the components of an off-highway vehicle are largely ferrous casted, providing the durability and reliability for use in heavy-duty off-highway equipment applications. The components considered for market size assessment for offload vehicles segment in this report include Steering axle, Modular axle, King post and Gear Case/front case.

## Modular Axle

The function of a modular axle in off-highway vehicles, is to provide stability, load capacity, and manoeuvrability for transporting oversized and heavy cargo. Modular axles are designed to be part of a hydraulic wheel bogie, which consists of the bogie frame, hydraulic cylinder, axle, tire, and rocker arm. They are equipped with a hydraulic suspension system that allows for optimal lengthwise and crosswise leveling, even when the axles have equal loads. This ensures balance and stability, especially when navigating uneven or off-road terrains. The axles are managed and controlled to keep balance when on such terrains, and they can be steered electronically or mechanically to navigate various road and off-road conditions. Additionally, the modular axles can be part of a self-propelled modular

transporter (SPMT), which is used for transporting massive objects, such as large bridge sections, oil refining equipment, and cranes.

*Source: Shivalik*

The axles in an SPMT are individually controllable, allowing for even weight distribution and accurate steering. Furthermore, the modular axles can be part of a series of combinable transport modules with 2-6 axle lines for off-road and on-road operations, equipped with twin tires and available in various trailer modes, including trailer mode, assist-propelled mode, and self-propelled mode.

## Steering axle

The steering axle in off-highway vehicles, such as heavy-duty trucks and off-road transport vehicles, serves the essential function of enabling directional control. When the driver turns the steering wheel, the steering axle allows the vehicle to change direction. This is achieved through various steering systems, such as hydraulic steering, electric power steering, and intelligent steering functions. The steering axle is a critical component for providing stability and manoeuvrability, especially when navigating uneven or off-road terrains. Additionally, the steering axle contributes to the vehicle's directional stability and minimizes the impact of external forces on the vehicle's steering.

*Source: Shivalik*

Some of the common types of steering axles used in off-highway vehicles:

**Manually Controlled Hydraulic Steering System**: This type of steering system is used in off-road trailers, tankers, and mobile equipment. It provides accurate steering response, better load distribution, stability, and lower deck heights when compared with straight axles on turntable type steering.

**Planetary Steering Axles**: These axles are used in heavy-duty and commercial vehicles for agriculture, construction, and forestry applications. They allow the wheels to be moved specifically to enable cornering. The axle beam and steering knuckle are connected via steering pins with thrust bearings.

**Crossover Steering System**: This type of steering system is found on many live-axle Fords, Dodges, and Jeeps. The pitman arm on the steering box rotates in a horizontal plane, or parallel to the ground. The drag link runs parallel to the axle housing and connects the pitman arm to a point on the tie rod or to an arm on the knuckle itself.

**FlexTrac Axle**: This type of steering axle is used in harvesters and can be adjusted in width. The track width is adjusted via a telescoping mechanism in the axle beam, allowing different tire sizes and widths to be used on the vehicle.

**Drive Axles**: Drive axles are connected to the driveshaft and gearbox and propel the vehicle forwards or backward. They are usually located at the rear of heavy transportation vehicles.

### King post

The kingpost provides a stable base for the gantry crane, ensuring that it remains upright and can safely handle cargo during the offloading process the kingpost supports one end of a gantry crane, contributing to the offloading operation.

*Source: Shivalik*

The kingpost provides a stable base for the gantry crane, ensuring that it remains upright and can safely handle cargo during the offloading process such as offloading a vehicle onto a floating causeway or unloading cargo from a cargo ship or oiler. By preventing the gantry crane from tipping or swaying under the weight of the cargo being unloaded it helps ensure the safety of the operators and the cargo during the offloading process.

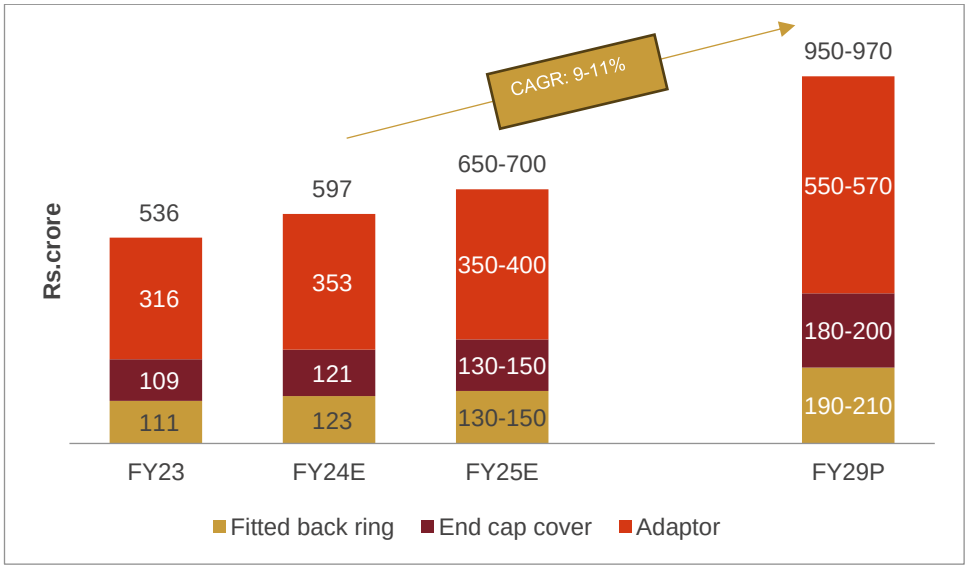
### Gear Case/front case

The gear case and front case provide a protective enclosure for the transmission and front axle components, help maintain a balanced weight distribution within the vehicle protect the transmission and front axle components from dust, debris, and other potential damage caused by off-road terrain.

*Source: Shivalik*

## 7.7 Ferrous casting industry for Railways (fiscals 2023-29P)

**Fig: Market size of ferrous casting components: Railways**



*Source: CRISIL MI&A Consulting*

The market size of ferrous casting components for railways segment (which include Fitted back ring, End cap cover and adaptor) is estimated at Rs.650-700 crore as of fiscal 2024 with ~60% of the share contributed by the Adaptor module due to relatively higher value of the component compared to back ring or end cap cover. This is expected to grow at 10-12% in fiscal 2024 driven by wagon additions planned by Indian railways. The market is expected to see a CAGR of 9-11% in the next five years taking to ~Rs.950-970 crore as of fiscal 2029.

Indian Railways (IR) has been focusing on the 'Make in India' initiative to enhance local manufacturing and procurement of materials, including wagons. Currently, around 85% of the components for the manufacture of Vande Bharat trains are procured locally, with the dependence on imports limited to less than 15% (*Source: Ministry of Railways*) Indian Railways has been working on capacity augmentation in its own units and roping in the private sector to meet its deliverables. The Integral Coach Factory (ICF) is manufacturing 78 Vande Bharat trains along with Punjab-based Medha Engineering. The railway ministry has floated a ₹26,000 crore tender last fiscal, for 200 additional trains and received encouraging responses from major players such as Alstom, Stadler in collaboration with Medha, Siemens-BEML consortium, BHEL-Titagarh Wagons consortium, and Russian major Tranmashholding. Hence the component players supplied to railway wagons are expected to see a demand surge in the coming years. For this report, the ferrous casted components considered under railway segment include Fitted back ring, end cap cover and Adaptor.

## Fitted back ring

A backing ring for railcar axles is a part that serves to back an antifriction bearing on the journal of a rail car axle. It includes an annular body that seats against a fillet that is part of the axle structure. The backing ring helps provide a stable and secure base for the axle.

*Source: Shivalik*

## End cap cover

The end cap cover in railway wagons serves as a protective component for the axle bearing. It is designed to fasten the inner ring of the bearing, providing support and protection for the bearing assembly. The end cap cover helps to secure the bearing and prevent the ingress of contaminants, ensuring the proper functioning and longevity of the bearing. Additionally, it contributes to the safe and efficient operation of the railway wagon by maintaining the integrity of the bearing assembly.

*Source: Shivalik*

## Adaptor

An adapter in railway wagons is a component that connects the wheelset and side frame on the bogie, transforming the rolling of the wheels on the track through the side frame into the rolling of the vehicle.

*Source: Shivalik*

There are different types of adapters used in railway wagons, such as:

- Bearing Adapter: This adapter is an essential part of railway car bogie accessories. During the operation of the vehicle, the bearing adapter bears the pressure from the vehicle body and the torsional force during the rotation of the vehicle body
- Adapter Plus Steering System: This system improves curving and rolling resistance and reduces wear on the side frame pedestal roof, thrust lug, bearing adapter crown, and the bearing adapter thrust lug area. The patented elastomer pedestal pad-liner-bearing adapter design allows controlled motion of the wheelset lowering forces in a curve, enhancing the performance of the railway wagon
- Customized Material Railway Spare Parts: These adapters are customized to fit specific railway wagons, ensuring optimal performance and compatibility with the vehicle's design

# 8 Basic profiling of the peer companies

## Bharat Forge Limited

| Key facts | Brief profile |
|---|---|
| **Year of incorporation**: 1961<br><br>**HQ**: Pune, Maharashtra | Key product segments<br>The company is involved in metal forming and serves industrial and automotive business. Industrial business segment includes power, oil and gas, construction & mining, rail, marine and aerospace sector. Within the automotive business, the company serves PV and CV segment.<br>Key business segments include forging and others. The forging segment includes the manufacture of forged products comprising forging and machined components for automotive and industrial sectors. Others include various new initiatives which the company is carrying out other than forging related activities.<br>The company manufactures brakes, Gearboxes, Axles, Road Wheels, Suspension Shock Absorbers, Radiators, Silencers, Exhaust Pipes, Catalysers, Clutches, Steering Wheels, Steering Columns and Steering Boxes. |

**Plant locations**

It has 15 manufacturing plants spread across India, Europe, and North America with eight, five and two manufacturing plants in each region.

**Key clients**

The company's customer base includes virtually every global automotive OEM and Tier-1 supplier. John Deere, Dana, Cummins, Ashok Leyland, Caterpillar, and DAF Trucks among others.

**Key sustainable initiatives** ***(in power cost savings)***

In FY 2023, Bharat Forge sourced 29% of the energy requirement, from renewable sources – which includes 74,906.640 MWh from solar energy and 30,986.885 MWh from wind energy. The Company has subscribed to 26% of paid-up share capital of Avaada MHVidarbha Private Limited ("Avaada") in April 2022, as a condition precedent to purchase of solar power on a Single Captive User basis.

Mundhwa Plant – Present Solar Power Capacity is 45.65 MW; Wind Power Capacity is 16.26 MW. An additional Solar Capacity of 10 MW commissioned in January 2023 for Mundhwa Plant.

Baramati Plant – Present Solar Power Capacity is 15 MW and Wind Power capacity is 8.2 MW. 15 MW Solar Power Plant commissioned in January 2023 for Baramati Plant.

## Endurance Technologies Limited

| Key facts | Brief profile |
|---|---|
| **Year of incorporation**: 1990<br><br>**HQ**: Aurangabad, Maharashtra | Key product segments<br>The company is a leading manufacturer and supplier of aluminium die casting components (ADCC) for automobiles.<br>Its business segment includes aluminium die casting, suspension, transmission, braking systems, and aftermarket.<br>The company manufactures suspension, transmission, steering columns, clutches, catalysers, silencers, and braking products, which are supplied to two- and three-wheeler OEMs. |

**Plant locations**

The company has manufacturing presence in India, Germany and Italy and has more than 30 manufacturing facilities. Its overseas operations are primarily through two direct subsidiaries, Endurance Amann GmbH (Germany) and Endurance Overseas Srl (Italy). They supply casting and machining products to leading four-wheeler OEMs in Europe.

**Key clients**

Kia Motors India, Honda Motorcycle & Scooter India, and Royal Enfield.

**Key sustainable initiatives** ***(in power cost savings)***

The company generated 21,320 MWh units of electricity from solar power plants and 9,087 MWh unit from wind power plants during Fiscal 2023 which is 15.4% of total electrical energy used.

In Fiscal 2023, the Company has invested Rs. 65.85 million in TP Green (which is 26% of its paid-up equity share capital). TP Green is a special purpose vehicle incorporated by TATA Power Renewable Energy Limited and is engaged in the business of solar power generation with a capacity of 12.5 MW. This investment enables the Company to qualify itself as a captive consumer of TP Green.

During the same year, the company installed solar power plants of 3.87 MW.

# Ramakrishna Forging Limited

| Key facts | Brief profile |
|---|---|
| **Year of incorporation**: 1995<br><br>**HQ**: Kolkata, West Bengal | Key product segments<br>The company majorly supplies to automotive, railways, farm equipment, bearings, oil and gas, Power and construction, earth moving and mining both in India and overseas.<br>It is also a critical safety item supplier for screw coupling, bolster suspension, side frame keys and draw gear assembly for railway coaches and wagons.<br>The product category includes Rolled product-crown wheel/ring gear, forged product includes crankshaft, connecting rod, diff case, knuckle, steering arm, and machined product includes rear axle shaft, Knuckle, diff case, coupling flange |

**Plant locations**

The manufacturing facilities located in Jamshedpur and Sairakela-kharsawan in Jharkhand, Howrah in west Bengal and warehouse located in Mexico, Detroit, and USA.

**Key clients**

Tata Motors, Ashok Leyland, VE Commercial and Daimler in India and overseas clients includes Volvo, Mack Trucks, Iveco, Ford. It also caters globally to Tier1 axle manufacturer such as Dana, Sisamex, Meritor and American Axles.

**Key sustainable initiatives** ***(in power cost savings)***

The Company initiated installation of Solar Projects (PV Solar Plants) of 7.82 MW capacity roof-top solar project at its existing forging plants

# Nelcast Ltd

| Key facts | Brief profile |
|---|---|
| **Year of incorporation**: 1985<br><br>**HQ**: Alwarpet, Chennai | Key product segments<br>The Company is involved in manufacturing ductile iron casting and grey iron casting. Key product segment includes commercial components (Bogie suspension bracket, steering/cab mounting bracket, rear differential carrier, differential case, wheel hub, bearing cap, Brake drum, Brake Disc Rotor) Tractor and farm equipment's (Hydraulic lift cover, Axle housing, Four wheel drive, Front axle Housing, Transmission clutch housing, differential housing, front engine support) off highway and Army components (Transmission case, converter housing, Axle housing, differential case )Railways(base plate for Ballastless tack system, Brake Disc) ,SUV and car components (case body, case cap, drive head) and Powertrain components (Gearbox housing, Flywheel housing, exhaust manifold)<br>The company serves majorly to commercial vehicle, Tractor, Railways, and off highway vehicle segments spread across India, Europe, North America and Southeast Asia |

**Plant locations**

The company has three manufacturing facilities located in Chennai. Plants are located close to both Krishnapatnam & Chennai seaport to reach out the customer in USA, Italy, Belgium, Sweden, France, Germany and Thailand easily.

**Key clients**

TAFE, Tata Motors, Ashok Leyland, Volvo-Eicher Commercial Vehicles, Same Deutz-Fahr India, Daimler, Automotive Axles, Dana, American Axles & Manufacturing, Comer Industries, Meritor, Wabtec, ZF.

# CIE Automotive India Limited

| Key facts | Brief profile |
|---|---|
| **Year of incorporation**: 1999<br><br>**HQ**: Mumbai, Maharashtra | Key product segments<br>CIE Automotive manufacture crankshaft and stub axles, HPDC &GDC Aluminum casting, ductile iron casting, stamping &stamped assembles, gears and shafts. These product segments focus majorly on utility vehicles cars, tractors, and two-wheeler.<br>Other products like Thermoset composite focus electrical and switchgear industry. Pioneer in ferrite manufacturing in India and global supplier of Automotive magnets recent entrant in induction lamps.<br>The product caters to different segments such as Cars and Utility vehicles, Medium and heavy vehicles, Agriculture & offroad vehicles, Two-wheeler, Electrical four-wheeler, Electric two-wheeler and electric vehicle portfolio. |

**Plant locations**

Manufacturing plant located in Haridwar (forging), Rajkot (Gears), Aurangabad (Aluminum), Nashik (stamping) Mangaon (Composites) Pune (forging, casting, stamping, gears, Magnetic, composite, Aluminum) Patnagar (Stamping, Aluminum) Rudrapur & Zaheerabad (Stamping), Bangalore (forging), Coimbatore (Forging) for respective components. Overseas presence in Europe -Spain (Forging), Italy (gears) and Lithuania(forging) for respective components.

**Key clients**

Hero, Bajaj, Maruti, Mahindra, MAN, Renault, Daimler, Fiat, Ford, Hyundai, Ford, GKN, CAT, Bosch, JLR-TATA, KOBENSCHMIDT, SAF, NTN, NIDEC, Nexteer

**Key sustainable initiatives** ***(in power cost savings)***

During CY22 the company's captive solar power plants with capacity of 52.5 MW commissioned supply with the entire capacity. The proportion of the renewable energy consumption to the total energy consumption was about 51% in CY22. The Company has signed firm agreements to source an additional 16 MW power from captive solar power plants from CY23.

# Craftsman Automation Limited (CAL)

| Key facts | Brief profile |
|---|---|
| **Year of incorporation**: 1986<br><br>**HQ**: Coimbatore, Tamil Nadu | Key product segments<br>Craftsman Automation Limited (CAL) is a leading player in the auto engineering and contract manufacturing sector. It has three business segments: auto powertrain, aluminum product and industrial and engineering.<br>The auto-power train segment caters to CVs, PVs, farm equipment, construction, and mining equipment segments of the auto industry. The aluminum products division supplies aluminum components to two-and-four-wheeler and power transmission manufacturers. The industrial and engineering segment offers goods and services such as gears, material handling equipment, storage products, special purpose machines and other general engineering products to various industries.<br>The company also has a non-ferrous sand foundry catering to power transmission equipment manufacturers. Its industrial and engineering segment has a wide range of products, including industrial gears, storage solutions, material handling and locomotive engine components. CAL has a |

| | |
|---|---|
| | tool room that supplies dies for injection moulding and mould base. Moreover, it manufactures special-purpose machines for metal and non-metal cutting.<br>In February 2023, CAL acquired 76% stake in DR Axion, is the major supplier of cylinder blocks and heads for leading PV OEMs such as Hyundai Motor India Ltd, Kia Motors, and Mahindra & Mahindra Ltd. The acquisition has helped CAL increase the share of revenue from the PV segment |

**Plant locations**

Manufacturing plant located at Coimbatore, Chennai, Pune, Indore, Jamshedpur, Faridabad, Bangalore in India. Overseas presence through wholly owned subsidiary Craftsman Europe B.V Netherland

**Key clients**

Tata Motors, Tata Cummins, Mahindra & Mahindra, TAFE, Escorts, Ashok Leyland, Mahindra & Mahindra Ltd, Daimler India, TVS Motors, Royal Enfield, Perkins, Mitsubishi Heavy Industries, Siemens, Simpson & Co. Limited, John Deere and JCB India

**Key sustainable initiatives** ***(in power cost savings)***

Company implemented 823 KW Solar energy power system and it is being produced in house.

## GNA Axles

| Key facts | Brief profile |
|---|---|
| **Year of incorporation**: 1993<br><br>**HQ**: Hoshiarpur, Punjab | Key product segments<br>World's leading manufacturers of automotive transmission components for the Medium & Heavy Commercial Vehicles (M&HCV) as well as Off Highway Vehicles (OH) axle shafts and spindles having dominant share of ~60-65% in domestic market and significant presence in leading economies globally (North America, South America, Europe, Asia, and Australia)<br>The company offers rear axle shafts, spindles, and other shafts for light and heavy commercial vehicles, off-highway vehicles, and SUV segments. It serves tractor manufacturers, commercial vehicle manufacturers, and SUV vehicle manufacturers |

**Plant locations**

Two units of manufacturing plants located at Unit –I at Mehtiana & Unit-II at VPO Gulabgarh Jattan (Phagwara-Hoshiarpur Road)

**Key clients**

Mahindra & Mahindra, John Deere, Tractors and Farm Equipment (TAFE) and tier 1 suppliers to OEMs such as Automotive Axles, Meritor HVS AB and Dana

## Shivalik Engineering

| Key facts | Brief profile |
|---|---|
| **Year of incorporation**: 2007<br><br>**HQ**: Raipur, Chhattisgarh | **Key product segments**<br>Shivalik Engineering is a prominent precision engineering company in India,<br>The company has a focus on manufacturing casting components and within the casting segment the company focuses on producing high-quality metal components for use in the Automotive, Agriculture, Railways, Off-Highway, Water Works & General Engineering industries.<br>Shivalik Engineering limited has one of the largest foundries and machine shops in India and produces a wide range of casting products with a production capacity of 8000+ MT./Month<br>The company has a dedicated foundry for Ductile Iron grades, Foundry with HPML and CNC Machining facilities, State of Art the machine shop HMC, VMC, VTL, Dynamic Balancing, Stud |

| | |
|---|---|
| | Pressing Machines with advanced quality control facilities CMM, MPI, Leak Testing, Contour Pressing, along with inspection facility,<br>The company manufactures wide range of casting products serving to Automotive, Agriculture, Railways and Off-Road Applications in domestic segment and exports products to Water work & Pipe Fitting industry in United states |

**Plant locations**

Four units of manufacturing plants located at Chhattisgarh:

- Works: I, Bhilai
- Works: II, Bhilai
- Works: III, Bhilai
- Works: IV, Mahasamund

**Key clients**

Eicher, Tata Motors, Tata Cummins, Mahindra & Mahindra, TAFE, Escorts, Ashok Leyland, Daimler India, BharatBenz, Meritor, Gunite, Automotive Axles, Sonalika, Timken, Delhi Metro Rail corporation, Indian Railways, Navistar, Caterpillar, VE commercial vehicles etc.

**Key sustainable initiatives**

As per the company's website, the company has installed a solar power plant at their facility to generate clean, renewable energy to help power their operations and reduce their reliance on fossil fuels. The solar power plant is expected to generate 50 MW of clean energy per year.

**Table 1: Key financial indicators for fiscal 2023**

| Company | Operating income | Operating EBITDA | PAT | EBITDA margin | PAT margin | ROCE | ROE | Debt to Equity |
|---|---|---|---|---|---|---|---|---|
| | *(Rs crore)* | | | *(%)* | | | | *Times* |
| Automotive Axles Ltd | 2,324 | 258 | 162 | 11.09 | 6.97 | 31.80 | 23.52 | 0.01 |
| Bharat Forge Limited | 12,943 | 1,800 | 508 | 13.91 | 3.92 | 8.78 | 7.90 | 1.07 |
| Craftsman Automation Limited | 3,183 | 688 | 251 | 21.61 | 7.88 | 20.90 | 21.12 | 0.94 |
| Endurance Technologies Limited | 8,804 | 1,041 | 480 | 11.82 | 5.44 | 15.64 | 12.68 | 0.13 |
| Nelcast Ltd | 1,264 | 92 | 30 | 7.27 | 2.35 | 9.03 | 6.50 | 0.64 |
| Ramkrishna Forgings Ltd | 3,195 | 695 | 248 | 21.73 | 7.76 | 17.99 | 20.78 | 0.99 |
| GNA Axles | 1,583 | 233 | 130 | 14.70 | 8.23 | 21.43 | 19.88 | 0.28 |
| CIE Automotive India Limited | 9,305 | 1,448 | 1,125 | 15.56 | 12.09 | 39.02 | 41.89 | 0.26 |
| Shivalik Engineering Industries Limited | 551 | 57 | 26 | 10.40 | 4.73 | 22.82 | 16.34 | 0.79 |

*Note:*

1. *The financial statements for Bharat Forge, Craftsman Automation, Endurance Technologies, Ramkrishna Forgings, GNA Axles, and CIE Automotive are consolidated.*
2. *CIE Automotive financial statements are Calendar Year (CY). For ex: CIE automotive financials are for CY 2023 in above table*
3. *EBITDA: Earnings before depreciation, interest, tax and amortization*
4. *PAT: Profit After Tax*
5. *Operating EBITDA margin = EBITDA/ operating income*
6. *PAT margin = profit after tax/operating income*
7. *RoCE = profit before interest and tax (EBIT) / [total debt + adjusted net worth + deferred tax liability]*
8. *Gearing = adjusted total debt/adjusted net worth*
9. *RoE = Profit after Tax(PAT)/Tangible Net Worth*
10. *Financials are reclassified as per CRISIL standards*

**Table 2: Key financial indicators for fiscal 2022**

| Company | Operating income | Operating EBITDA | PAT | EBITDA | PAT margin | ROCE | ROE | Debt to Equity |
|---|---|---|---|---|---|---|---|---|
| | *(Rs crore)* | | | *(%)* | | | | *Times* |
| Automotive Axles Ltd | 1,491 | 135 | 74 | 9.03 | 4.98 | 17.21 | 12.67 | 0.02 |
| Bharat Forge Limited | 10,515 | 2,037 | 1,067 | 19.37 | 10.14 | 13.26 | 17.93 | 0.86 |
| Craftsman Automation Limited | 2,217 | 537 | 163 | 24.22 | 7.35 | 18.05 | 15.57 | 0.65 |
| Endurance Technologies Limited | 7,549 | 966 | 461 | 12.79 | 6.10 | 15.01 | 13.22 | 0.11 |
| Nelcast Ltd | 927 | 65 | 14 | 7.00 | 1.53 | 6.19 | 3.24 | 0.62 |
| Ramkrishna Forgings Ltd | 2,321 | 517 | 198 | 22.29 | 8.53 | 14.16 | 20.32 | 1.50 |
| GNA Axles | 1,270 | 181 | 89 | 14.24 | 7.00 | 17.21 | 15.95 | 0.37 |
| CIE Automotive India Limited | 8,794 | 1,213 | -136 | 13.80 | -1.50 | 4.10 | -7.20 | 0.40 |
| Shivalik Engineering Industries Limited | 313 | 20 | 4 | 6.47 | 1.30 | 10.16 | 6.31 | 1.08 |

*Note:*

1. *The financial statements for Bharat Forge, Craftsman Automation, Endurance Technologies, Ramkrishna Forgings, GNA Axles, and CIE Automotive are consolidated.*
2. *CIE Automotive financial statements are Calendar Year (CY). For ex: CIE automotive financials are for CY 2023 in above table*
3. *EBITDA: Earnings before depreciation, interest, tax and amortization*
4. *PAT: Profit After Tax*
5. *Operating EBITDA margin = EBITDA/ operating income*
6. *PAT margin = profit after tax/operating income*
7. *RoCE = profit before interest and tax (EBIT) / [total debt + adjusted net worth + deferred tax liability]*
8. *Gearing = adjusted total debt/adjusted net worth*
9. *RoE = Profit after Tax(PAT)/Tangible Net Worth*
10. *Financials are reclassified as per CRISIL standards*

**Table 3: Key financial indicators for fiscal 2021**

| Company | Operating income | Operating EBITDA | PAT | EBITDA margin | PAT margin | ROCE | ROE | Debt to Equity |
|---|---|---|---|---|---|---|---|---|
| | *(Rs crore)* | | | *(%)* | | | | *Times* |
| Automotive Axles Ltd | 906 | 66 | 23 | 7.26 | 2.51 | 6.28 | 4.19 | 0.03 |
| Bharat Forge Limited | 6,376 | 872 | -135 | 13.68 | -2.11 | 0.59 | -2.55 | 0.92 |
| Craftsman Automation Limited | 1,560 | 444 | 97 | 28.48 | 6.24 | 14.55 | 11.63 | 0.73 |
| Endurance Technologies Limited | 6,547 | 1,029 | 520 | 15.71 | 7.93 | 17.89 | 17.04 | 0.19 |
| Nelcast Ltd | 615 | 48 | 9 | 7.77 | 1.46 | 4.32 | 2.11 | 0.49 |
| Ramkrishna Forgings Ltd | 1,276 | 224 | 21 | 17.57 | 1.61 | 5.38 | 2.37 | 1.40 |
| GNA Axles | 890 | 144 | 71 | 16.17 | 7.94 | 15.43 | 14.65 | 0.38 |
| CIE Automotive India Limited | 8,425 | 1,055 | 392 | 12.50 | 4.70 | 24.10 | 29.40 | 0.80 |
| Shivalik Engineering Industries Limited | 189 | 17 | 1 | 9.25 | 0.54 | 16.66 | 1.96 | 1.49 |

*Note:*

1. *The financial statements for Bharat Forge, Craftsman Automation, Endurance Technologies, Ramkrishna Forgings, GNA Axles, and CIE Automotive are consolidated.*
2. *CIE Automotive financial statements are Calendar Year (CY). For ex: CIE automotive financials are for CY 2023 in above table*
3. *EBITDA: Earnings before depreciation, interest, tax and amortization*
4. *PAT: Profit After Tax*
5. *Operating EBITDA margin = EBITDA/ operating income*
6. *PAT margin = profit after tax/operating income*
7. *RoCE = profit before interest and tax (EBIT) / [total debt + adjusted net worth + deferred tax liability]*
8. *Gearing = adjusted total debt/adjusted net worth*
9. *RoE = Profit after Tax(PAT)/Tangible Net Worth*
10. *Financials are reclassified as per CRISIL standards*

**Table 4: Key financial indicators for fiscal H12024**

| Company | Operating income | Operating EBITDA | PAT | EBITDA | PAT margin | ROCE | ROE | Debt to Equity |
|---|---|---|---|---|---|---|---|---|
| | *(Rs crore)* | | | *(%)* | | | | *Times* |
| Automotive Axles Ltd | 1,116 | 125 | 83 | 11.17 | 7.43 | 28.04 | 20.90 | 0.01 |
| Bharat Forge Limited | 7,651 | 1,217 | 429 | 15.90 | 5.60 | 13.04 | 12.20 | 1.01 |
| Craftsman Automation Limited | 2,217 | 452 | 185 | 20.38 | 8.36 | 21.88 | 23.17 | 0.86 |
| Endurance Technologies Limited | 4,995 | 640 | 318 | 12.80 | 6.37 | 16.76 | 13.85 | 0.14 |
| Nelcast Ltd | 651 | 51 | 24 | 7.85 | 3.66 | 12.07 | 9.70 | 0.59 |
| Ramkrishna Forgings Ltd | 1,874 | 398 | 161 | 21.22 | 8.58 | 18.78 | 20.81 | 0.99 |
| GNA Axles | 778 | 114 | 61 | 14.69 | 7.80 | 18.15 | 15.68 | 0.26 |
| CIE Automotive India Limited | 4,761 | 751 | 434 | 15.78 | 9.11 | 19.20 | 15.48 | 0.15 |
| Shivalik Engineering Industries Limited (9MFY24) | 521 | 103 | 56 | 19.82 | 10.67 | 37.98 | 26.03 | 0.51 |

*Note:*

1. *Financials for all players except Shivalik are for H1 of FY24 / CY 23 as applicable as balance sheet items are reported at 6 monthly frequencies*
2. *Financials for Shivalik Engineering are for Apr2023-Dec 2023, the same have been shared by the company with CRISIL with balance sheet items*
3. *The financial statements for Bharat Forge, Craftsman Automation, Endurance Technologies, Ramkrishna Forgings, GNA Axles, and CIE Automotive are consolidated.*
4. *CIE Automotive financial statements are Calendar Year (CY). For ex: CIE automotive financials are for CY 2023 in above table*
5. *EBITDA: Earnings before depreciation, interest, tax and amortization*
6. *PAT: Profit After Tax*
7. *Operating EBITDA margin = EBITDA/ operating income*
8. *PAT margin = profit after tax/operating income*
9. *RoCE = profit before interest and tax (EBIT) / [total debt + adjusted net worth + deferred tax liability]*
10. *Gearing = adjusted total debt/adjusted net worth*
11. *RoE = Profit after Tax(PAT)/Tangible Net Worth*
12. *Financials are reclassified as per CRISIL standards*

# 9 Threats and Challenges

## 9.1 Demand Side Challenges

### Economic Slowdown and Industrial Output Decline

- Impact on Sales and Production: The Automotive Industry and within it the commercial vehicles Industry are very closely linked to the performance of the Economy. Economic slowdowns result in reduced industrial activities and lower consumer spending, directly affecting commercial vehicle sales. When the economy contracts, businesses often delay or reduce investments in new commercial vehicles, leading to a drop in orders for automotive castings. The downturn in FY2020 saw a drastic 28.75% decline in commercial vehicle sales (SIAM), which translated to lower demand for cast parts. This contraction forced casting manufacturers to cut back on production, affecting their revenue streams and profitability.
- Profit Margins and Cash Flow: With lower sales volumes, manufacturers face squeezed profit margins due to fixed operational costs and reduced economies of scale. This squeeze is in turn passed on to component manufacturers, including casting players. Due to this, Cash flow issues can arise, impacting the ability to invest in new technologies or maintain existing equipment. Smaller players in the market may struggle to survive prolonged economic downturns.
- We have projected real GDP growth to be 6.8% for fiscal 2025. Any moderation to GDP growth may have an impact on Industrial output and investment and consequentially on the Automotive and auto-component Industry.

### Above or below normal monsoons

Within the Economic spectrum, the Commercial vehicle Industry is very closely linked to the output of the Agricultural and manufacturing sectors. While the Agricultural sector has a direct dependence on the normalcy of monsoon, the manufacturing sector too, is indirectly impacted by monsoon performance both on demand as well as supply side across various sub-segments on manufacturing.

We have considered a normal monsoon scenario while forecasting the outlook for the Automotive Industry. If rains are not normal and there is a scenario like El Nino or La Nina impacting farm activities on the rural side, then that could impact farm related incomes as well as sentiments which in turn can affect the demand side factors for commercia vehicles and in turn for casting players.

### Inherent cyclicity of Commercial vehicle dependent Industries

The demand for commercial vehicles is closely tied to economic growth. During periods of robust economic expansion, there is an increase in industrial output, infrastructure projects, and logistics activities, driving higher demand for commercial vehicles. Conversely, during economic slowdowns, demand plummets as businesses reduce capital expenditures and transportation needs decline. For instance, the CV industry has seen 3 business cycles in the past 2 decades :

- FY04 to FY09 (peak in FY08)
- FY 09 to FY15 (peak in FY12)
- FY15 to FY 21 (peak in FY19)
- FY21 to ongoing

It has been seen that there can a swing of more than 20-25% between the peaks and throughs of the business cycles of the CV Industry which in turn can makes business planning complicated for players involved in supply of components to the commercial vehicle Industry

# 9.2 Supply Side Challenges

## Raw Material Availability and Cost

- Cost Management : Fluctuating prices of raw materials like iron and steel pose significant challenges to managing costs. A sudden spike in prices, such as the increase in iron ore prices, can erode profit margins and make it difficult to offer competitive pricing to customers. Casting manufacturers must either absorb these costs, reducing profitability, or pass them on to customers, potentially losing business to cheaper alternatives.
- Supply Chain Disruptions Volatile raw material prices can also lead to supply chain disruptions if suppliers are unable to secure consistent and affordable supplies. This inconsistency can result in production delays and missed deadlines, damaging relationships with OEMs and other key clients.

For instance, the outbreak of the Russia-Ukraine war sent the commodities market into a frenzy, as regions that sourced materials from these countries went into panic mode, with surge in input costs and finished product prices for steel products. The surge in export realizations sent domestic prices on a rally as well, thus impacting procurement prices for domestic consumption.

Furthermore, the conflict of Gaza and Israel could escalate further into the wider region, which produces about 35% of the world’s oil export and 14% of gas exports, which in turn can have a wider impact on commodity prices and inflation which can impact manufacturing costs

## Skilled Labor Shortage

Skilled labor is one of the most important supply side aspects in the manufacturing sector. Training and retaining skilled workers in precision engineering Industry is a key driving factor for success of any segment of the Industry including Automotive castings.

Thus, inadequate availability of skilled labor can be one of the significant challenges impacting the automotive casting Industry in India. This shortage can span across various facets, from production to maintenance and innovation, ultimately affecting the industry's growth and global competitiveness.

- Nature of the Shortage: The automotive castings sector requires a workforce proficient in precision engineering, machining, and modern manufacturing technologies. The gap between demand and supply of such skilled labor is a monitorable for the success of the Industry going forward
- Educational and Training Gaps: The Indian education system and vocational training programs often lag in providing industry-relevant skills. Engineering graduates and technical diploma holders frequently lack hands-on experience with advanced machinery and technologies used in casting segment
- Attrition and Retention Issues: Skilled workers tend to migrate to sectors offering better compensation and working conditions, such as IT or international opportunities. The high attrition rates further exacerbate the skill shortage within the industrial sector.
- Demographic and Geographic Disparities: There can be a geographical mismatch in the availability of skilled labor. Industrial hubs may struggle to attract talent from regions with a higher concentration of educational institutions due to relocation issues and urban-rural divide.

## Technological Obsolescence

Technological obsolescence refers to the phase-out of technologies as newer, more efficient, and advanced technologies emerge. In India's manufacturing sector, technological obsolescence can be a potential challenge, affecting competitiveness, productivity, and innovation capacity.

Traditional casting processes often involve manual labor and older machinery, which can result in longer production times and higher labor costs. In contrast, advanced automated casting systems and additive manufacturing technologies offer greater precision, speed, and efficiency. For example, while many global

competitors have adopted automated robotic casting cells that enhance productivity and reduce human error, a considerable portion of the smaller Indian foundries (MSMEs) still rely on manual operations.

Furthermore, techniques such as computer-aided design (CAD) and computer-aided manufacturing (CAM) allow for the production of components with tight tolerances and consistent quality. Without these technologies, smaller Indian casting manufacturers may struggle to meet the stringent quality standards required by original equipment manufacturers (OEMs), particularly in export markets.

The adoption of advanced technologies requires substantial capital investment, which can be a significant barrier for small and medium-sized enterprises (SMEs) in the Indian casting industry. Upgrading to state-of-the-art equipment such as automated casting machines, 3D printing for molds, and advanced material handling systems involves high upfront costs that many SMEs cannot afford.

# 9.3 Policy and Regulatory Challenges

## Changes in tax and duties regime

Changes in duties and tax structures present significant threats to the automotive casting industry, particularly for manufacturers of commercial vehicle parts. These changes can have multifaceted impacts on cost structures, supply chains, and overall competitiveness.

This threat is particularly significant due to India's evolving tax landscape and the government's periodic adjustments to import duties and other taxes.

For instance, the initial phase of GST implementation saw significant disruption. Many businesses faced challenges adapting to the new tax structure, leading to temporary slowdowns in the manufacturing value chain.

The Indian government periodically revises import duties on raw materials such as steel and aluminum, which are essential for casting manufacturing. Increased costs due to higher import duties are often difficult to pass on to customers, especially in a highly competitive market. This squeeze on profit margins forces manufacturers to absorb the additional costs, potentially reducing their financial health and capacity to invest in new technologies or expansion.

Hence, changes in duty and tax structures across the automotive casting value chain pose significant threats by increasing costs, complicating compliance, and creating market instability.

## Environmental Regulations

Environmental regulations present a significant challenge for the Automotive castings Industry in India, impacting manufacturing processes, costs, and compliance requirements. These regulations aim to mitigate environmental degradation and ensure sustainable industrial practices, but they also introduce complexities for manufacturers such as

**Stringent Emission Standards :** India has implemented several stringent emission standards that directly affect industrial operations. For instance, the Ministry of Environment, Forest and Climate Change (MoEF&CC) has established norms for emissions from industrial plants, including those involved in automotive castings. Industries are required to adhere to standards for pollutants such as particulate matter, sulfur dioxide, and nitrogen oxides. Failure to comply with these regulations can result in heavy fines and even plant shutdowns. Central and State pollution control boards are generally the nodal agencies/enforcement agencies for compliance of the said norms.

**Waste Management and Resource Utilization :** Industries are also required to manage their waste effectively. The Hazardous Waste Management Rules mandate that industries properly handle, treat, and dispose of hazardous waste. This includes waste generated during the manufacturing of castings, which may contain lubricants and other harmful substances.

**Energy Efficiency and Carbon Footprint Reduction :** India's National Action Plan on Climate Change (NAPCC) includes missions focused on enhancing energy efficiency and reducing carbon footprints. The Perform Achieve and Trade (PAT) scheme, part of the National Mission for Enhanced Energy Efficiency (NMEEE), covers industries like steel that supply materials for automotive castings. The PAT scheme sets energy consumption targets and encourages industries to adopt energy-efficient technologies.

Compliance and adherence to all of these regulations (as well as a few others) often requires significant investments in new technologies and processes by the Industry, which if not undertaken in a timely manner can be a challenge for the Industry.

## Adhoc changes in policies

A challenge that the industry is facing is frequent changes in policies which makes it difficult for auto industry stakeholders not only to ensure adherence but also commit investments. Overall policy stability and transparency will be required going forward to ensure smooth technology transition and localization in the country.

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