CareEdge ANALYTICS & ADVISORY
A subsidiary of CARE Ratings Ltd.

Industry Research Report on Electronics & Electronics Manufacturing Services Industry

August 2025

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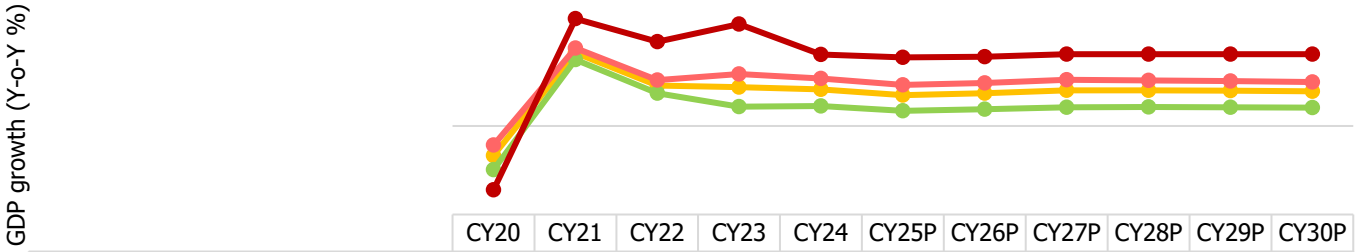
1 Economic Outlook

1.1 Global Economy

The sharp contraction in global growth in CY20 reflects the severe economic disruptions caused by the COVID-19 pandemic, followed by a strong rebound in CY21 as economies reopened and stimulus measures took effect. Global growth, which reached 3.5% in CY23 and 3.3% in CY24, projected to stabilize around 3.2% over the medium term. Global trade is expected to be disrupted by new US tariffs and countermeasures from trading partners, leading to historically high tariff rates and negatively impacting economic growth projections. The global landscape is expected to change as countries rethink their priorities and policies in response to these new developments. Central banks priority will be to adjust policies, while smart fiscal planning and reforms are key to handling debt and reducing global inequalities.

Chart 1: Global Growth Outlook Projections (Real GDP, Y-o-Y change in %)



	CY20	CY21	CY22	CY23	CY24	CY25P	CY26P	CY27P	CY28P	CY29P	CY30P
World	-2.7%	6.6%	3.6%	3.5%	3.3%	2.8%	3.0%	3.2%	3.2%	3.2%	3.1%
Advanced Economies	-4.0%	6.0%	2.9%	1.7%	1.8%	1.4%	1.5%	1.7%	1.7%	1.7%	1.7%
Emerging Market and Developing Economies	-1.7%	7.0%	4.1%	4.7%	4.3%	3.7%	3.9%	4.2%	4.1%	4.1%	4.0%
India	-5.8%	9.7%	7.6%	9.2%	6.5%	6.2%	6.3%	6.5%	6.5%	6.5%	6.5%

Source: IMF – World Economic Outlook, April 2025;
Note: P-Projection,
Advanced Economies: Euro Area, G7 countries (Major Advanced Economies), other advanced economies outside the G7 and Euro Area, the European Union, and ASEAN-5. Emerging Market and Developing Economies: Includes regions such as Emerging and Developing Asia, Emerging and Developing Europe, Latin America and the Caribbean, the Middle East and Central Asia, and Sub-Saharan Africa.

Despite the turmoil in the last 2-3 years, India bears good tidings to become a USD 5 trillion economy by CY27-CY28. According to the IMF dataset on Gross Domestic Product (GDP) at current prices, the nominal GDP projected to be at USD 4.2 trillion for CY25 and is projected to reach USD 5.1 trillion by CY27 and USD 6.8 trillion by CY30. India's expected GDP growth rate for coming years is almost double compared to the world economy. The Indian economy shows resilience amid global inflation, supported by a stable financial sector, strong service exports, and robust investment driven by government spending and high-income consumer consumption, positioning it for better growth than other economies.

Besides, India stands out as the fastest-growing economy among the major economies. The country is expected to grow at a range of 6.2%-6.5% in the period of CY25-CY30, outshining China's growth rate. By CY27, the Indian economy is estimated to emerge as the third-largest economy globally, hopping over Japan and Germany. Currently, it is the third largest economy globally in terms of Purchasing Power Parity (PPP) with a ~7.9% share in the global economy, with China on the top followed by the United States.

Table 1: GDP growth trend comparison - India v/s Other Economies (Real GDP, Y-o-Y change in %)

			Real GDP (Y-o-Y change in %)										
	CY18	CY 19	CY 20	CY 21	CY 22	CY 23	CY 24	CY 25	CY 26	CY 27	CY 28	CY 29	CY30
India	6.5	3.9	-5.8	9.7	7.6	9.2	6.5	6.2	6.3	6.5	6.5	6.5	6.5
China	6.8	6.1	2.3	8.6	3.1	5.4	5.0	4.0	4.0	4.2	4.1	3.7	3.4
Indonesia	5.2	5.0	-2.1	3.7	5.3	5.0	5.0	4.7	4.7	4.9	5.0	5.1	5.1
Saudi Arabia	3.2	1.1	-3.6	5.1	7.5	-0.8	1.3	3.0	3.7	3.6	3.2	3.2	3.3
Brazil	1.8	1.2	-3.3	4.8	3.0	3.2	3.4	2.0	2.0	2.2	2.3	2.4	2.5
Euro Area	2.3	2.0	-6.0	6.3	3.5	0.4	0.9	0.8	1.2	1.3	1.3	1.2	1.1
Middle East	2.7	1.9	-2.2	4.4	5.5	2.2	2.4	3.0	3.5	4.0	3.7	3.7	3.7
Japan	0.6	-0.4	-4.2	2.7	0.9	1.5	0.1	0.6	0.6	0.6	0.6	0.5	0.5
United Kingdom	1.4	1.6	-10.3	8.6	4.8	0.4	1.1	1.1	1.4	1.5	1.5	1.4	1.4
ASEAN countries	5.0	4.2	-4.4	4.1	5.5	4.1	4.6	4.0	3.9	4.2	4.3	4.5	4.5
United States	3.0	2.6	-2.2	6.1	2.5	2.9	2.8	1.8	1.7	2.0	2.1	2.1	2.1

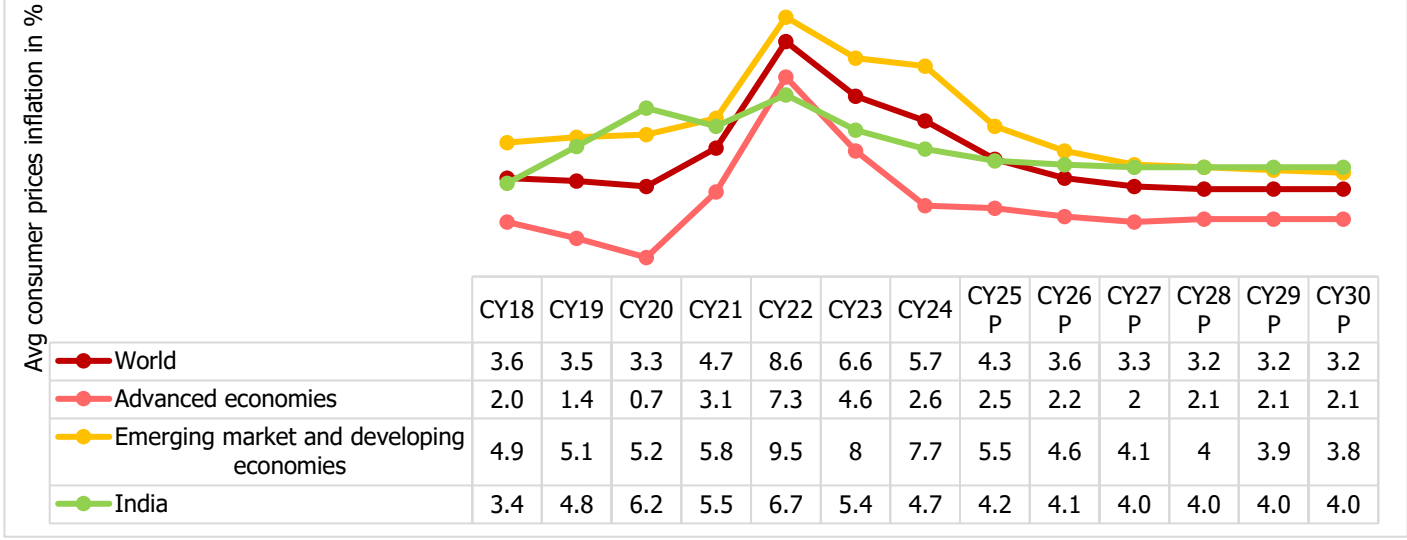
Source: IMF- World Economic Outlook Database (April 2025)

Note: P- Projections, CY25-CY30 is projected data; India's fiscal year (FY) aligns with the IMF's calendar year (CY). For instance, FY24 corresponds to CY23.

Global Inflation Outlook

According to IMF, global inflation is expected to decline at a more gradual pace than expected. It is forecasted to be 4.3% in CY25 and 3.6% in CY26. While inflation is projected to rise slightly in advanced economies, emerging markets may see a small decline in CY25. The ongoing global trade tensions can be one of the contributing factors for the projections for global inflation. Central banks are expected to adjust policies, while smart fiscal planning and reforms are going to be the key to handling debt and reducing global inequalities.

Chart 2: Global inflation outlook (Average consumer prices)



	CY18	CY19	CY20	CY21	CY22	CY23	CY24	CY25 P	CY26 P	CY27 P	CY28 P	CY29 P	CY30 P
World	3.6	3.5	3.3	4.7	8.6	6.6	5.7	4.3	3.6	3.3	3.2	3.2	3.2
Advanced economies	2.0	1.4	0.7	3.1	7.3	4.6	2.6	2.5	2.2	2	2.1	2.1	2.1
Emerging market and developing economies	4.9	5.1	5.2	5.8	9.5	8	7.7	5.5	4.6	4.1	4	3.9	3.8
India	3.4	4.8	6.2	5.5	6.7	5.4	4.7	4.2	4.1	4.0	4.0	4.0	4.0

Source: IMF – World Economic Outlook, April 2025; Note: P-Projection

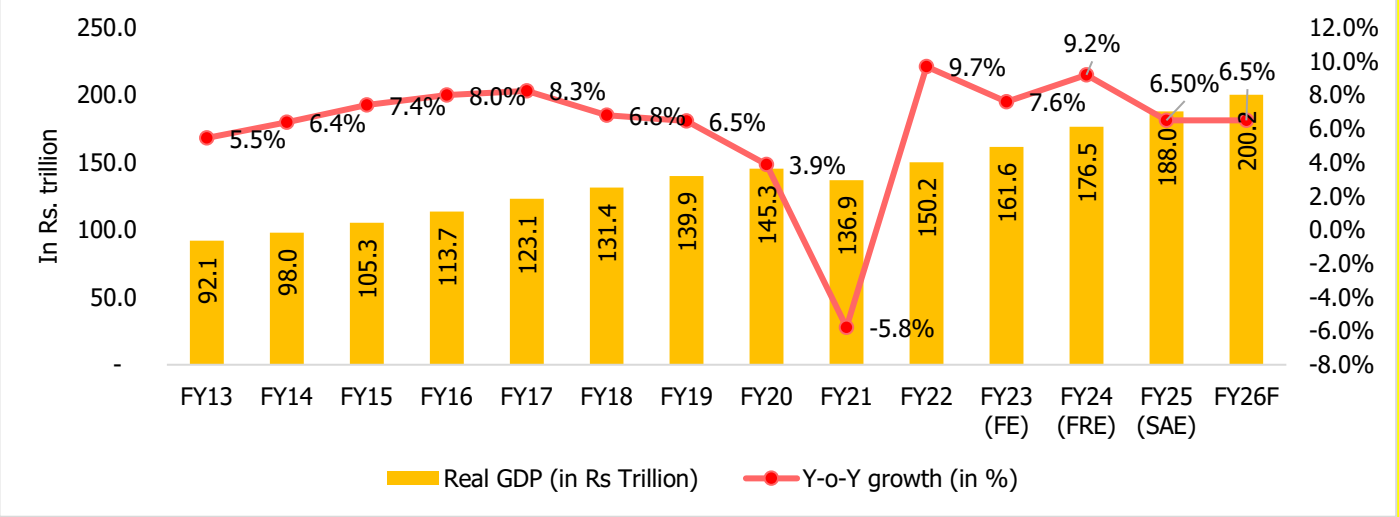
1.2 Indian Economic Outlook

1.2.1 GDP Growth and Outlook

Resilience to External Shocks remains Critical for Near-Term Outlook

India's real GDP grew by 9.2% in FY24 (Rs. 176.5 trillion) which is the highest in the previous 12 years (excluding FY22 being 9.7% on account of end of pandemic) and is estimated to grow by 6.5% in FY25 (Rs. 188 trillion), driven by double digit growth particularly in the Manufacturing sector, Construction sector and Financial, Real Estate & Professional Services. This growth is also led by private consumption increasing by 7.6% and government spending increasing by 3.8% Y-o-Y. Real GDP growth is projected at 6.5% in FY26 as well, driven by strong rural demand, improving employment, and robust business activity.

Chart 3: Trend in Real Indian GDP growth rate



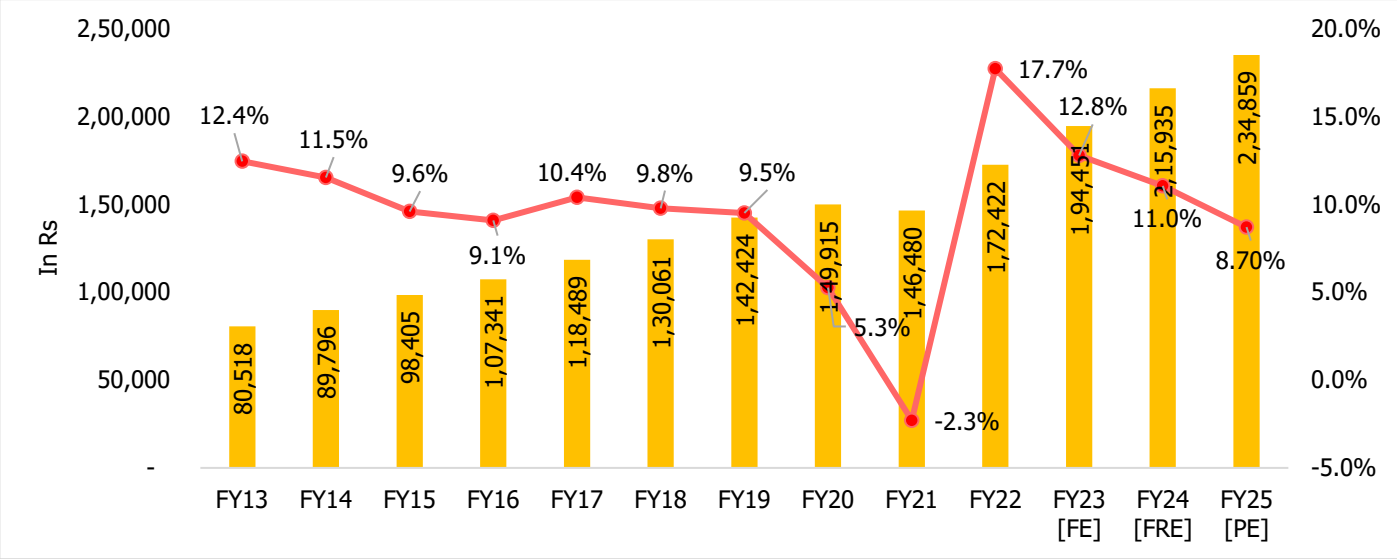
Source: MOSPI, Reserve Bank of India;

Note: FE – Final Estimate, FRE- First Revised Estimates, SAE – Second Advance Estimates, F – Forecasted

1.2.2 India's GDP Per Capita

India's per capita GDP has shown a consistent upward trend over the past decade, reflecting steady economic growth. Rising per capita income, driven by robust economic development, enhances consumer confidence and discretionary spending, reflecting a higher standard of living and overall prosperity. From FY13 to FY25, the per capita GDP is expected to increase from Rs 80,518 to Rs 234,859, with an average growth rate of around 9.5% annually. Key drivers of this growth include structural reforms, digitalization, rising domestic consumption, and increased foreign investment. However, there was a slight dip in FY20, primarily due to the economic impact of the COVID-19 pandemic. Despite this, the country has rebounded with strong growth rates in subsequent years, supported by economic recovery and continued expansion in various sectors.

Chart 4: Per capita GDP (current prices)



Source: MOSPI; Note: SAE – Second Advance Estimates, FE – Final Estimate, FAE- First Advance Estimates

1.2.3 Gross Value Added (GVA)

India's growth is led by the industrial and services sectors. In FY25, the agriculture sector is expected to grow by 4.6%, upward trend from 2.7% in FY24. The services sector remains the leading contributor to GVA growth with a projected 7.2% rise in FY25, supported by continued strength in public administration, defence, and professional services. The industrial sector is expected to grow at 5.9%. Manufacturing has shown a strong rebound post-pandemic, with notable growth in FY22 and FY24, supported by rising domestic demand, policy support, and increased industrial activity. The services sector grew 7.2%, supported by public administration, defence & other services.

Table 2: Sectoral Growth (Y-o-Y % Growth) - at Constant Prices

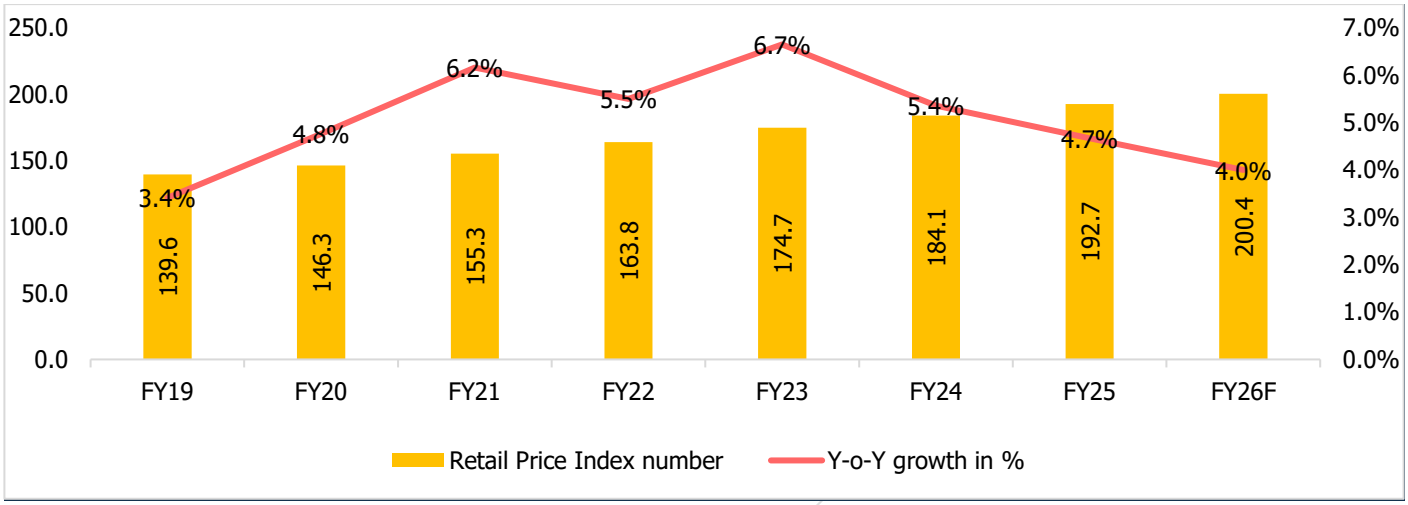
At constant Prices	FY19	FY20	FY21	FY22	FY23 (FE)	FY24 (FRE)	FY25 (PE)
Agriculture, Forestry & Fishing	**2.1**	**6.2**	**4.1**	**3.5**	**5.1**	**2.7**	**4.6**
Industrials	**5.3**	**-1.4**	**-0.9**	**11.6**	**2.0**	**10.8**	**5.9**
Mining & Quarrying	-0.9	-3.0	-8.6	7.1	2.8	3.2	2.7
Manufacturing	5.4	-3.0	2.9	11.1	-3.0	12.3	4.5
Electricity, Gas, Water Supply & Other Utility Services	7.9	2.3	-4.3	9.9	11.5	8.6	5.9
Construction	6.5	1.6	-5.7	14.8	10.0	10.4	9.4
Services	**7.2**	**6.4**	**-8.2**	**8.8**	**11.3**	**9.0**	**7.2**
Trade, Hotels, Transport, Communication & Broadcasting	7.2	6.0	-19.7	13.8	14.4	7.5	6.1
Financial, Real Estate & Professional Services	7.0	6.8	2.1	4.7	10.7	10.3	7.2
Public Administration, Defence and Other Services	7.5	6.6	-7.6	9.7	8.2	8.8	8.9
GVA at Basic Price	**5.8**	**3.9**	**-4.2**	**8.8**	**7.4**	**8.6**	**6.4**

Source: MOSPI; Note: FRE – First Revised Estimates, FE – Final Estimates, PE- Provisional Estimates

1.2.4 Consumer Price Index

The year-on-year CPI and food inflation rate for April 2025, recorded at 3.2%, representing the lowest level observed since July 2019. This moderation in inflation is a favorable development for the consumption-driven segments of the economy, as improved purchasing power among consumers is likely to support demand and contribute positively to manufacturing activity.

Chart 5: Retail Price Inflation in terms of index and Y-o-Y Growth in % (Base: 2011-12=100)



Source: MOSPI, RBI, CareEdge Research; Note: F - Forecasted

The CPI is primarily factored in by RBI while preparing their bi-monthly monetory policy. At the bi-monthly meeting held in April 2025, RBI projected inflation at 4.0% for FY26 with inflation during Q1FY26 at 3.6%, Q2FY26 at 3.9% and Q3FY26 at 3.8% and Q4FY26 4.4%.

Considering the current inflation situation, RBI has cut the repo rate to 6.00% in the April 2025 meeting of the Monetary Policy Committee.

Further, the central bank shifted its policy stance from 'accomodative' to 'neutral'. With a decline in food inflation, the headline inflation moderated to a six-year low to 3.2% in April 2025, well within the RBI's medium-term inflation target range of 2–6%.

The economic growth outlook for India is expected to maintain momentum, supported by private consumption and continued growth in fixed capital formation. The uncertainty regarding the global outlook has reduced given the temporary tariff stay and optimism with trade negotiations.

The RBI has adopted for a non-inflationary growth with the foundations of strong demand and supply with a good macroeconomic balance. The domestic growth and inflation curve require the policies to be supportive with the volatile trade conditions.

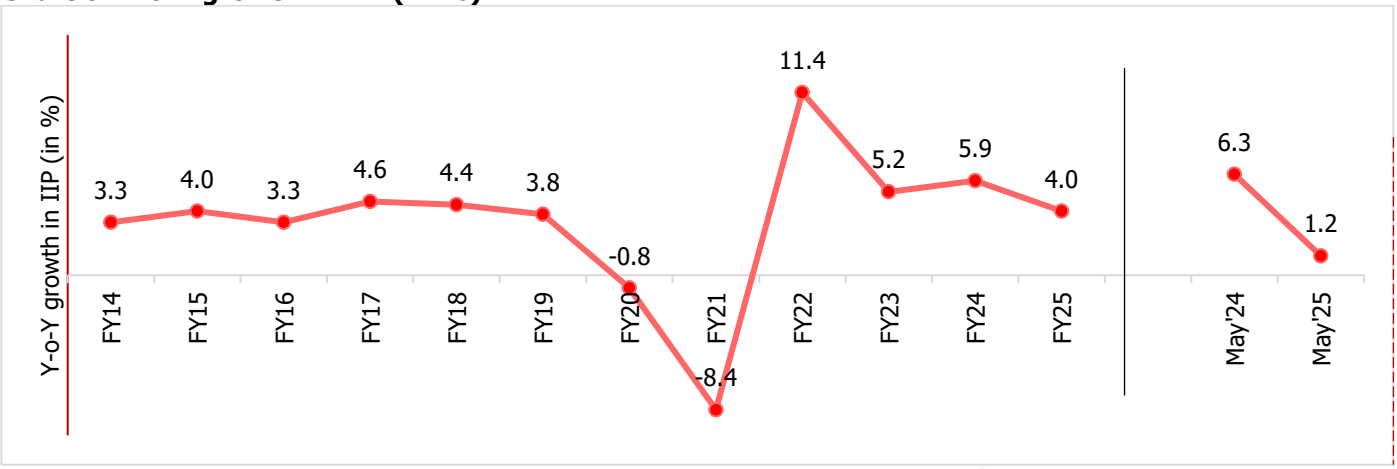
1.2.5 Industrial Growth

The Quick Estimates of the Index of Industrial Production (IIP) for May 2025 show a growth of 1.2%, compared to 2.7% in April 2025. The year-on-year moderation reflects weakness across major segments, primarily due to contractions in electricity, mining, and consumer non-durables.

In May 2025, industrial growth was supported by Manufacturing (2.6%), while Electricity declined by 5.8% and Mining contracted marginally by 0.1%. Within manufacturing, notable growth was recorded in basic metals, machinery and equipment, and non-metallic mineral products. Specifically, these segments helped offset broader weakness.

Use-based indices reflected mixed trends, with strong growth in Capital Goods (14.1%) and Infrastructure Goods (6.3%), but declines in Consumer Durables and Non-Durables indicating subdued consumption.

Chart 6: Y-o-Y growth in IIP (in %)

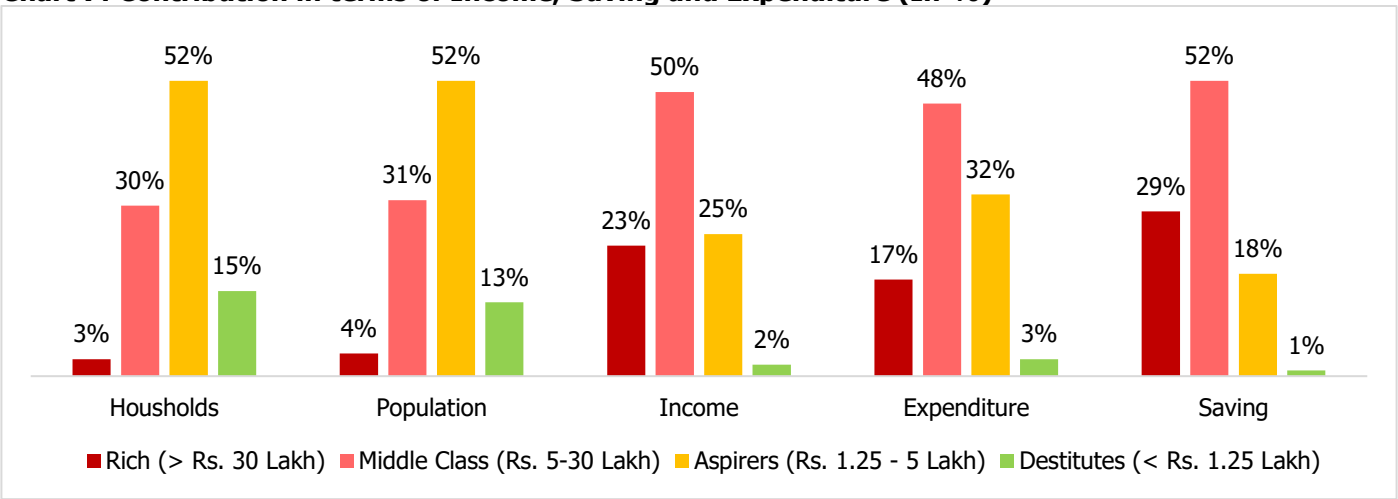


Source: MOSPI

1.2.6 Growth of the middle class in India

India's middle-class population is set to grow from 432 million in FY21 to 715 million in FY31, reaching 1,015 million by FY47, surpassing the U.S. and China within this decade. Rising income levels are evident as middle-class households grew at a 4% CAGR from FY16 to FY21 and are projected to represent 47% of households by FY31. High-income households are also expected to grow significantly. This expanding middle and high-income population boosts demand in the hospitality sector, with increased preference for midscale and upscale hotels driven by lifestyle changes and aspirations.

Chart 7: Contribution in terms of Income, Saving and Expenditure (In %)



Source: EMIS, People Research on India's Consumer Economy (PRICE), CareEdge Research

The Indian economy is showing signs of gradual recovery in FY 2024–25, with early indicators suggesting a positive shift in overall economic activity. According to the RBI, a rebound supported by resilient domestic demand, easing inflation, and an uptick in both urban and rural consumption. Public and private investments in infrastructure, manufacturing, and transportation are also contributing to a more favorable business environment. For companies operating across fast-moving electrical goods (FMEG), consumer durables, and industrial sectors such as transportation

and railways, these macroeconomic tailwinds present opportunities for growth across both B2B2C and B2B2B verticals. This boost is supported by a rise in rural savings, marked by growing numbers of savings bank accounts and balances, and a reduction in inflationary pressures, which has allowed rural consumption to catch up with urban areas, complemented by increased government spending on rural development and infrastructure.

The expansion of middle-income households in India is transforming the country's economic landscape. This growth is driven by rising incomes, increased discretionary spending, a shift towards online and omnichannel shopping, and advancements in payment and logistics infrastructure. India's middle class, characterized by significant income variability, exhibits diverse spending patterns. Lower-middle-class households allocate much of their income to private healthcare, education, and essential consumer goods, such as motorbikes and basic appliances. In contrast, the upper-middle-class invests in luxury items, entertainment, property, and personal services, with a higher propensity to own assets like cars, computers, and air conditioners. Both segments of the middle class are substantial and emerging as key drivers of consumption and economic growth in India. Recent policies, including the Mahatma Gandhi National Rural Employment Guarantee Act, have increased rural incomes, enabling more rural households to enter the middle class. The growing, more inclusive, and politically engaged middle class reflects broader economic growth.

Despite higher absolute incomes among the wealthy, the sheer size of India's middle class indicates it will become a major force in the economy, creating one of the world's largest markets. This burgeoning middle class, with its growing discretionary spending power, is poised to drive investment, generate employment, and spur further economic growth. Assuming effective reforms are implemented, and the middle class expands to over one billion people, its role will be pivotal in India's economic and social fabric, influencing a wide range of activities from consumption to employment and political change.

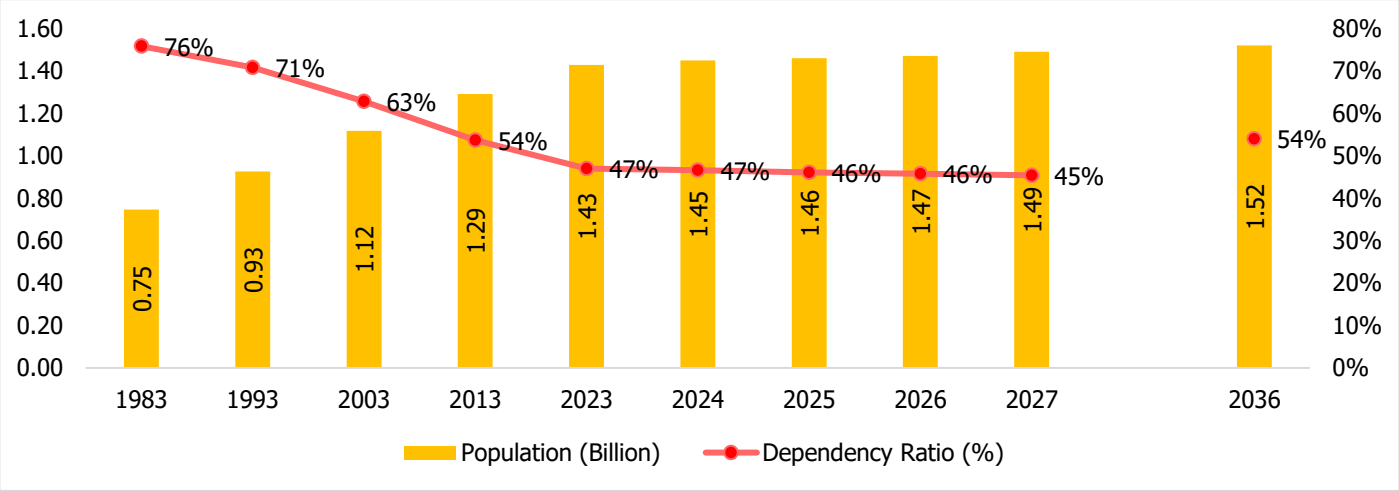
1.2.7 Overview on Key Demographic Parameters

- **Population growth and Urbanization**

The trajectory of economic growth of India and private consumption is driven by socio-economic factors such as demographics and urbanization. According to the world bank, India's population in 2022 surpassed 1.42 billion, slightly higher than China's population (1.41 billion) and became the most populous country in the world.

Age Dependency Ratio is the ratio of dependents to the working age population, i.e., 15 to 64 years, wherein dependents are population younger than 15 and older than 64. This ratio has been on a declining trend. Declining dependency means the country has an improving share of working-age population generating income, which is a good sign for the economy. It was as high as 76% in 1983, which has reduced to 47% in 2023. However, this ratio is expected to rise again to 54% by 2036, driven by an increase in the elderly population as life expectancy improves.

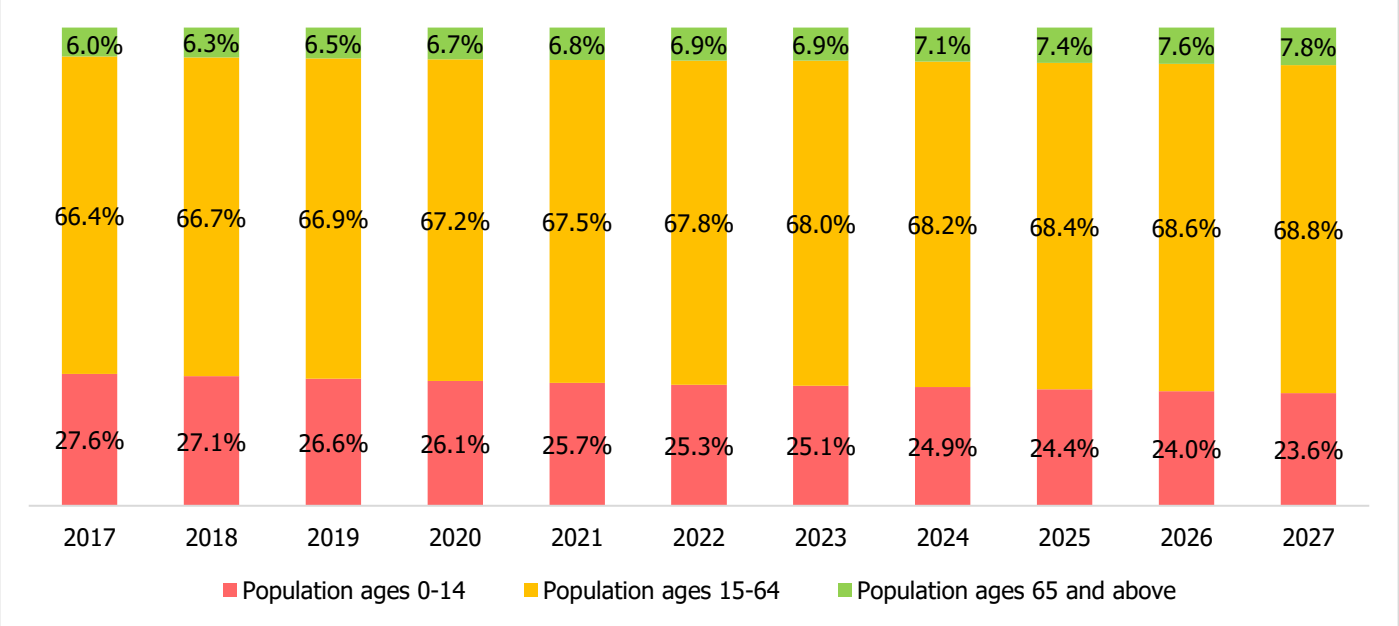
Chart 8: Trend in Population growth vis-à-vis dependency ratio in India (in Billion)



Source: World Bank Database, MOSPI

Despite a projected rise in the dependency ratio to 54% by 2036, India's young and growing workforce, especially in newly urbanized towns, will continue to drive income growth and consumer demand. This presents strong opportunities for sectors like consumer electronics, transportation, and railways. Rising employment, urbanization, and government investment in rural development and digital infrastructure will further boost demand, while increased tech adoption supports long-term consumption growth across both urban and rural markets.

Chart 9: Age-Wise Break Up of Indian population (% of working-age population)

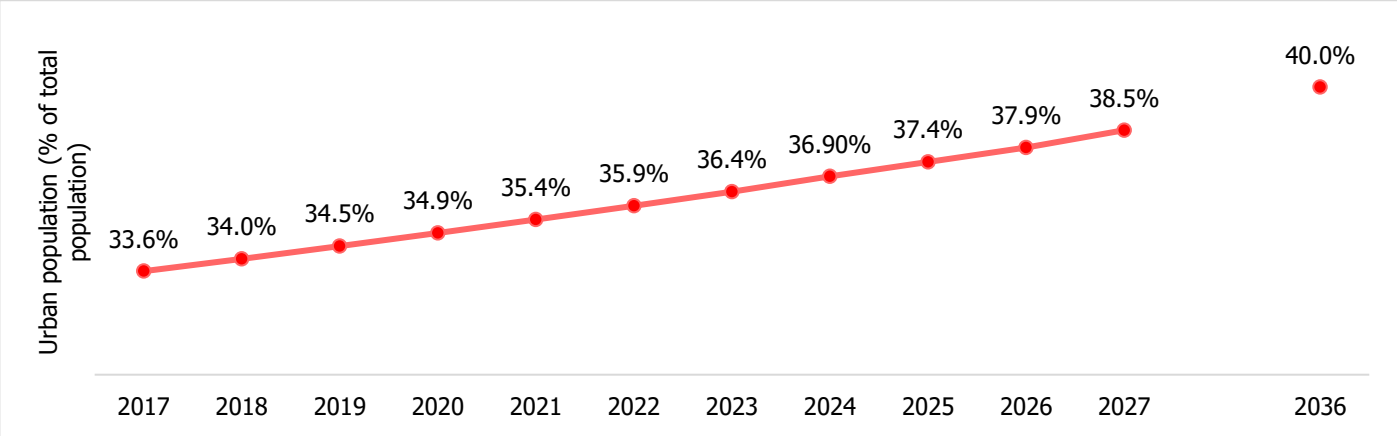


Source: World Bank Database

The urban population is significantly growing in India. The urban population in India is estimated to have increased from 413 million (32% of total population) in 2013 to 519.5 million (36.4% of total population) in the year 2023. India is undergoing a significant urban transformation, with the urban population projected to rise to 40% by 2036. This shift is driven by factors such as improved living standards, increased employment opportunities in urban areas, and

government initiatives aimed at urban development. This rapid urbanization might necessitate substantial investments in infrastructure, housing, and transportation.

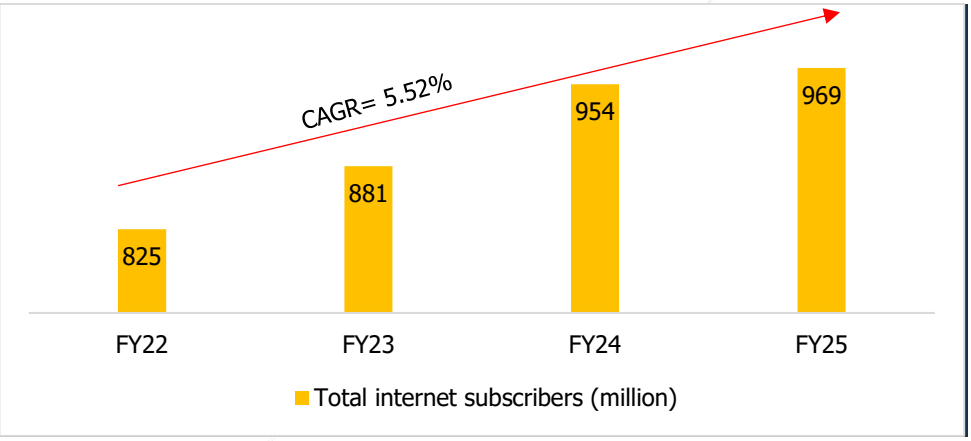
Chart 10: Urbanization Trend in India



Source: World Bank Database

- **Internet penetration**

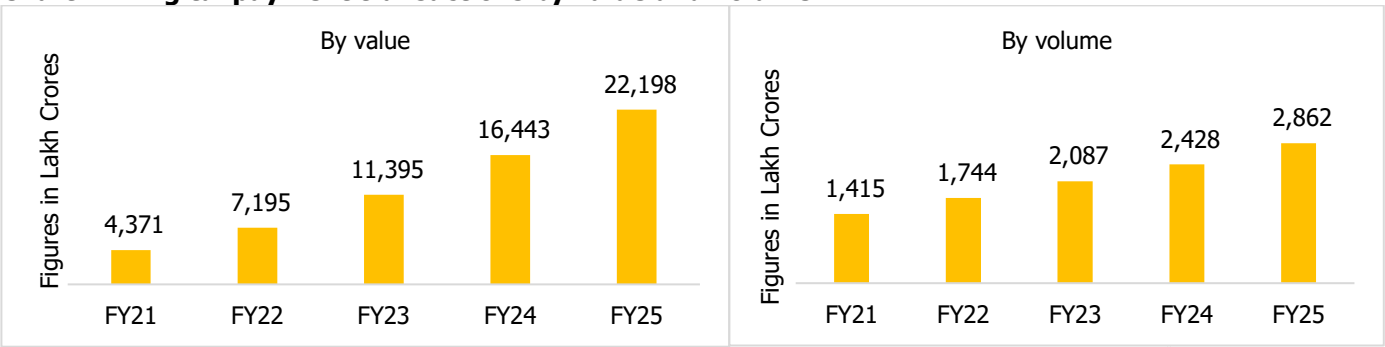
India's internet subscriber base grew from 824.9 million in FY22 to 969.1 million in FY25, reflecting a steady CAGR of 5.5%. This growth was driven by expanding digital infrastructure, rising smartphone usage, and affordable data plans. Government initiatives like BharatNet and Digital India further improved access, especially in rural areas. However, the pace of growth moderated in FY25, indicating market saturation in urban regions.



- **Digitalizing of payments**

Digital payments in India grew in volume from 4,371 lakh crores in FY21 to 22,198 lakh crores in FY25, with a 50.1% CAGR. Digital payments in value grew from Rs 1,415 lakh crores in FY21 to Rs 2,862 lakh crores in FY25, with a CAGR of 19.3%.

Chart 11: Digital payment transactions by value and volume



Source: RBI

India's digital transformation is driven by factors like expanding broadband, affordable data, and government initiatives. The launch of UPI revolutionized payments in turn enhancing financial inclusion. With over 647 banks integrated and more than 350 million unique users, UPI has become the country's largest digital payment network BHIM further advanced cashless transactions, while platforms like COWIN showcased digital infrastructure's role in public health. Furthermore, DigiLocker improved paperless governance by securely storing documents and FASTag automated toll payments, supporting the cashless economy.

- **Increasing Disposable Income and Consumer Spending**

Gross National Disposable Income (GNDI) is a measure of the income available to the nation for final consumption and gross savings. Between the period FY14 to FY25, per capita GNDI at current prices registered a CAGR of 11.30%. More disposable income drives more consumption, thereby driving economic growth.

With increase in disposable income, there has been a gradual change in consumer spending behavior as well. While price sensitivity remains, consumers are increasingly prioritizing quality, driven by rapid urbanization, the growth of e-commerce, and greater exposure to global lifestyles through digital media. In response, businesses are adapting to these evolving preferences and the expanding consumer base. Per capita Private Final Consumption Expenditure (PFCE) which is measure of consumer spending has also showcased significant growth from FY14 to FY25 at a CAGR of 12.33%.

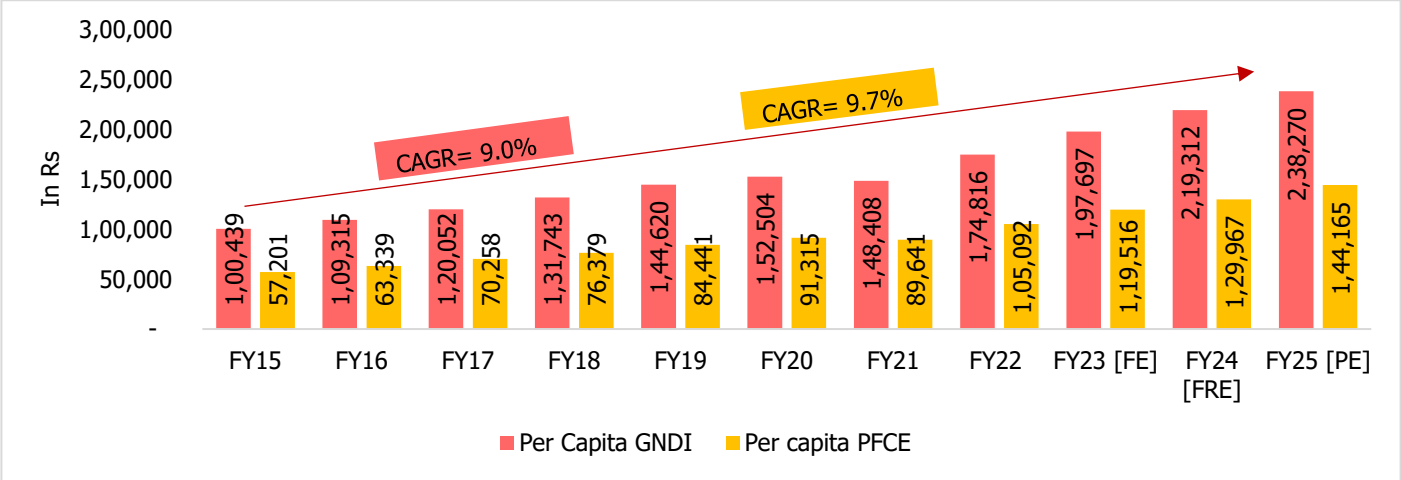
The expansion of middle-income households in rural India is transforming the country's economic landscape. This growth is driven by rising incomes, increased discretionary spending, a shift towards online and omnichannel shopping, and advancements in payment and logistics infrastructure. India's middle class, characterized by significant income variability, exhibits diverse spending patterns. Lower-middle-class households allocate much of their income to private healthcare, education, and essential consumer goods, such as motorbikes and basic appliances. In contrast, the upper-middle-class invests in luxury items, entertainment, property, and personal services, with a higher propensity to own assets like cars, computers, and air conditioners. Both segments of the middle class are substantial and emerging as key drivers of consumption and economic growth in India.

Job opportunities are steadily increasing in rural and tier-2 towns, supported by strong government focus on rural development, railways, and defence. These investments are not only improving infrastructure but also creating local employment, which in turn is driving economic activity in these regions. As incomes rise and connectivity improves, there is growing demand for consumer goods, especially electronics.

With better access to markets and digital services, rural and smaller towns can emerge as promising growth areas for the electronics sector. Households are now spending more on essentials and upgrading to appliances like televisions,

smartphones, and basic kitchen gadgets. This shift reflects a broader transformation in rural consumption, supported by targeted government policies and improving job prospects.

Chart 12: Trend of Per Capita GNDI and Per Capita PFCE (Current Price)



Source: MOSPI; Note: FRE – First Revised Estimates, FE – Final Estimates, PE- Provisional Estimates

1.3 Concluding Remarks

India's economy remains relatively strong, with an IMF forecast of 6.2% GDP growth in CY25 (FY26 according to the fiscal year), compared to the global economy which is projected to grow at 2.8%, and faces headwinds from geopolitical tensions, volatile commodity prices, high interest rates, inflation, financial market volatility, climate change, and rising public debt. Key drivers for India economy's growth include strong domestic demand, government capital expenditure and moderating inflation.

Public investment is expected to exhibit healthy growth as the government has allocated a strong capital expenditure of about Rs. 11.21 lakh crores for FY26. The private sector's intent to invest is also showing improvement as per the data announced on new project investments and resilience shown by the import of capital goods. The investment momentum is reinforced by the rapid growth of urban centres, rising middle-class incomes, and shifting consumer preferences toward premium products. As well as, strong urban demand and digital access, is driving a consumption-led growth cycle and supporting India's sustained economic expansion.

The impact of U.S. tariffs on India's export trade is anticipated to be minimal. The key sectors which will have a potential impact are engineering goods, electronics, gems and jewelry, pharmaceuticals, textiles, and automobiles, among others. The affected sectors represent a small fraction of India's total exports, with key industries such as steel industry affected by the 25% tariffs although the impact is expected to be minimal given the volume of goods exported is less.

India's lower tariff structure and ongoing trade negotiations with the U.S., EU, and ASEAN enhance its appeal as a global trade partner. As it positions itself as a competitive manufacturing hub in sectors like textiles, pharmaceuticals, electronics, and auto components, India offers a viable alternative to countries like China and Vietnam. The shift of iPhone production to India by Apple reflects rising U.S. interest, driven by cost advantages and growing capacity. On February 13, 2025, Prime Minister Modi and President Trump agreed to strengthen bilateral trade, aiming to increase it from USD 200 billion to USD 500 billion by 2030, with talks for a multi-sector trade agreement expected to begin later this year.

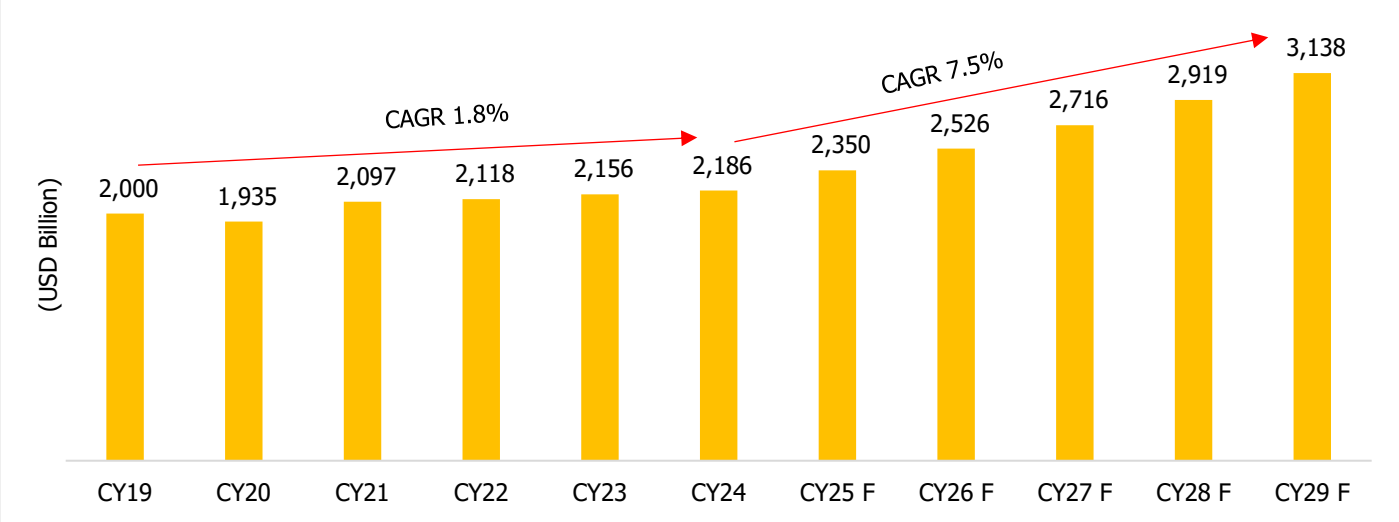
Thus, while U.S. tariffs may have a limited impact on India's exports, ongoing trade negotiations and India's competitive manufacturing advantage position it well for continued growth in global trade.

2 Overview of Global Electronics & Electronics Manufacturing Services Industry

2.1 Electronics Market Size & Segmentation

The electronics industry refers to the broad sector of the economy that designs, manufactures, and sells electronic equipment and components. It powers and supports key sectors including consumer electronics, automotive, telecommunications, healthcare, aerospace, and industrial automation. The global electronics market is undergoing a dynamic transformation, shaped by rapid technological advancements and evolving consumer expectations. From the rise of AI and smart devices to a growing focus on sustainability, the industry is continually innovating to meet modern demands. While the opportunities are vast, the sector also faces challenges such as supply chain complexities and shifting regulatory landscapes. As a result, the electronics market remains one of the most fast paced and resilient industries worldwide.

Chart 13: Global Electronics Market



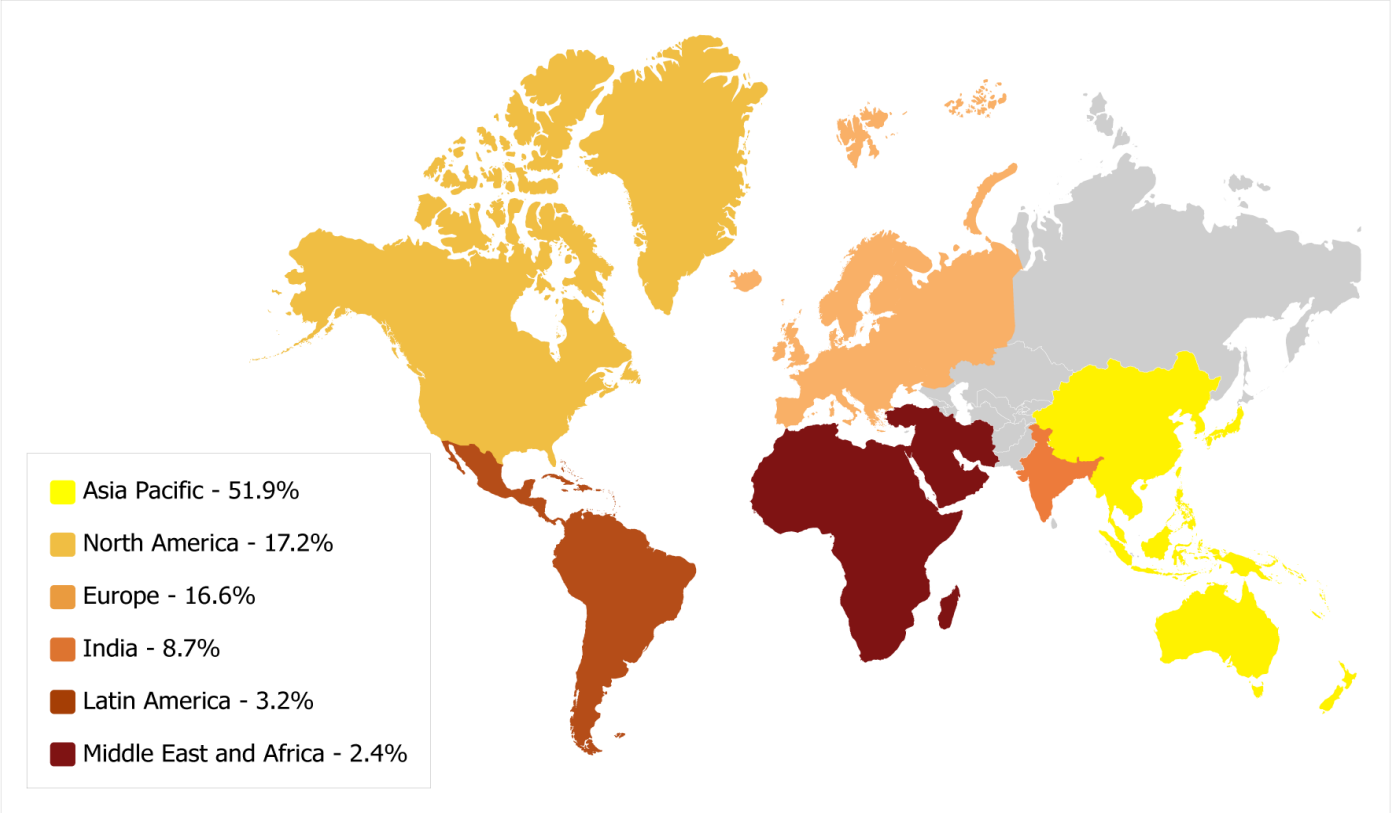
Source: IMARC Group, CareEdge Research
Note: Market size is: production + import – export of finished goods.

The global electronics market, valued at USD 2,186 billion in CY24, grew at a CAGR of 1.8% from CY19 to CY24 and is expected to reach USD 3,138 billion by CY29, driven by a projected 7.5% CAGR from CY24 to CY29. Growth will be fuelled by increasing demand for smart devices, electric vehicles, and renewable energy systems, boosting the need for advanced components such as power management chips and sensors. The rise of 5G and edge computing is accelerating innovation in communication and computing technologies, while regional expansion in manufacturing is improving supply chains and pricing. Continued digitalisation across sectors like automotive, healthcare, and retail, along with advancements in AI, machine learning, miniaturization, and sustainable design, is set to drive long-term industry growth.

2.1.1 Electronics Market by Geographies

The global electronics market is shaped by diverse regional factors, including economic development, manufacturing capabilities, consumer demand, and technological innovation. Over the coming decade, these influences will drive shifts in regional market shares, impacting industry dynamics worldwide.

Chart 14: Electronics Market: Breakup by Region (Market Share)



Source: IMARC Group, CareEdge Research. Note: Asia Pacific excludes India

Electronics Market: Breakup by Region (Market Size)

Region	CY24
Asia-Pacific	1,325
North America	376
Europe	363
Latin America	70.0
Middle East and Africa	52.5
Total	**2,186**

Asia Pacific	CY24
China	748
India	191
Japan	129
South Korea	107
Others	150
Total	**1,325**

Source: IMARC Group, CareEdge Research

In CY24, the Asia-Pacific region accounted for the largest share of the global electronics market, contributing USD 1,325 billion, or over 60% of the total global sales of USD 2,186 billion. Within the region, India contributed USD 191 billion, making up approximately 14.4% of Asia-Pacific's market and 8.7% of the global electronics market. This places India as the second-largest player in the region, following China.

India's growing share reflects its rapidly evolving electronics ecosystem. The country has seen a sharp rise in demand for consumer electronics, increased exports especially of smartphones and components—and growing interest from global manufacturers seeking to diversify their supply chains. India's cost competitiveness, expanding skilled workforce, and rising digital adoption have played a key role in attracting large-scale investments in electronics production and assembly.

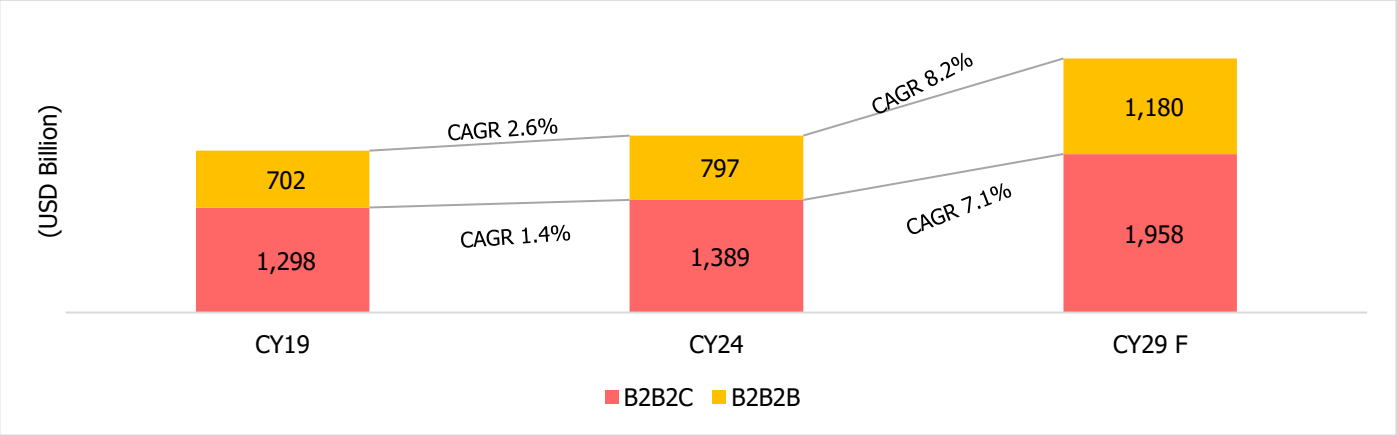
As global brands explore alternative manufacturing bases, India's scale, talent, and improving infrastructure are enabling it to emerge as a strong and reliable player in the global electronics value chain. This momentum signals India's transition from being a major consumption market to a leading contributor in global electronics production.

2.1.2 Electronics Market by Segmentation- B2B2B vs B2B2C

The B2B2B segment (36% of the industry during CY24) of the global electronics market is projected to grow from USD 797 billion in CY24 to USD 1,180 billion by CY29, with a CAGR of approximately 7%. This growth is driven by increased investments in aerospace and defence, railways, industrial automation, and the expansion of IT infrastructure and data centers. Additionally, the global focus on clean energy, electric mobility, and smart power systems is boosting demand for advanced electronic components in energy and infrastructure sectors.

The B2B2C segment (64% of the industry during CY24), comprising consumer electronics such as smartphones, televisions, wearables, and appliances, is expected to rise from USD 1,389 billion in CY24 to USD 1,958 billion by CY29, at a CAGR of around 8%. Growth is supported by increasing digital adoption, smart home trends, and higher consumer spending, though it remains more stable and mature compared to B2B2B.

Chart 15: Electronics Market: Breakup by Segments

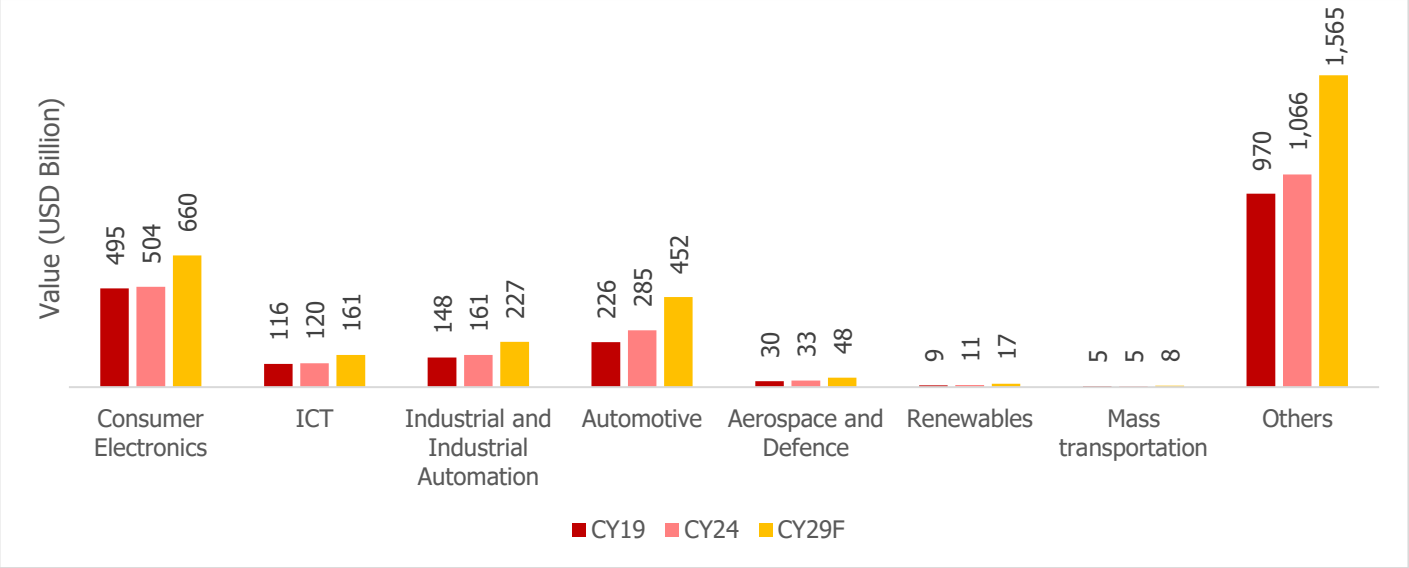


Source: IMARC Group, CareEdge Research

2.1.3 Electronics Market by End- User Industries

From CY19 to CY24, the global electronics market grew at a modest pace of 1.8% CAGR, with slower growth in segments like IT (0.7%) and consumer electronics (0.4%) due to global economic uncertainty and supply chain disruptions. The automotive segment stood out with a stronger 4.7% CAGR, supported by early adoption of electric vehicles and in-car electronics.

Chart 16: Global Electronics Market: Breakup by End- User Industries



Source: IMARC Group, CareEdge Research

Note:

1. ICT or Information and Communications Technology includes IT and Telecom
2. Automotive includes EVs as well
3. Aerospace and Defence includes Commercial, Defence and Space
4. Renewables include Solar, Wind and Hydro
5. Mass transportation includes Railways & Metros, Road-based Public Transportation
6. Others include the remaining industries other than mentioned above

Looking ahead, the market is expected to gain momentum, growing at a faster 7.5% CAGR between CY24 and CY29. Automotive electronics is projected to lead this growth with an 9.7% CAGR, driven by rapid electrification, connected vehicle technologies, and autonomous features. Consumer electronics is also set to rebound, growing at 5.5% CAGR, as demand rises for smart, connected, and 5G-enabled devices.

(CAGR)	CY19-24	CY24-29F
Consumer Electronics	0.4%	5.5%
ICT	0.7%	6.0%
Industrial and Industrial Automation	1.7%	7.1%
Automotive	4.7%	9.7%
Aerospace and Defence	2.3%	7.5%
Renewables	3.5%	8.7%
Mass transportation	2.1%	7.5%
Others	1.9%	8.0%

Other sectors like Industrial and Industrial Automation (7.1%), Aerospace and Defence (7.5%), and ICT (6.0%) are poised for steady growth, supported by increasing automation, digital transformation, security modernization, continued infrastructure upgrades and smart technology adoption.

Sector-wise Growth Drivers

- **Consumer Electronics**
  Revival in demand for connected, smart, and 5G-enabled devices.

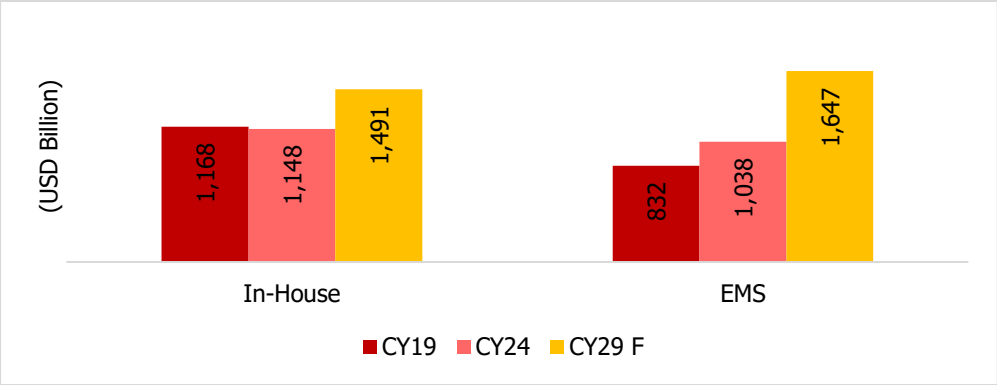
- **Automotive Electronics**
  Accelerated by electric vehicle adoption, advanced driver assistance systems, and autonomous tech.
- **Industrial and Industrial Automation**
  Propelled by industrial automation, IoT adoption, and smart factory initiatives.
- **Information and Communications Technology (ICT)**
  Driven by digitization, 5G rollout, edge computing, and rising data center demand, supported by higher investments and energy-efficient technology adoption.
- **Aerospace and Defence**
  Supported by modernization in defence systems, enhanced surveillance, and cybersecurity focus.
- **Others**
  Growth led by smart city development, and energy-efficient technologies.

2.1.4 Electronics Market by Manufacturing- In house vs EMS

From CY24 to CY29, the electronics manufacturing sector is expected to experience a significant shift toward outsourced production. Electronics Manufacturing Services (EMS) sales are projected to increase from USD 1,038 billion to USD 1,647 billion, with a CAGR of about 9.7%. This growth underscores the rising trend of companies outsourcing manufacturing to specialized EMS providers, enabling them to leverage their expertise, advanced resources, and scalable operations. Outsourcing allows companies to gain a competitive edge by focusing their internal efforts on core activities such as product development, marketing, and sales.

Meanwhile, in-house manufacturing is forecast to grow modestly from USD 1,148 billion to USD 1,491 billion, reflecting a CAGR of around 5.4%. This indicates that while some companies retain internal production capabilities for strategic or proprietary reasons, the overall industry is increasingly favouring EMS partnerships to enhance flexibility, reduce costs, and respond swiftly to changing market demands. The evolving balance between in-house and outsourced manufacturing highlights the impact of globalization and technological complexity on supply chain strategies.

Chart 17: Global Electronics Market: Breakup by Manufacturing



Source: IMARC Group, CareEdge Research

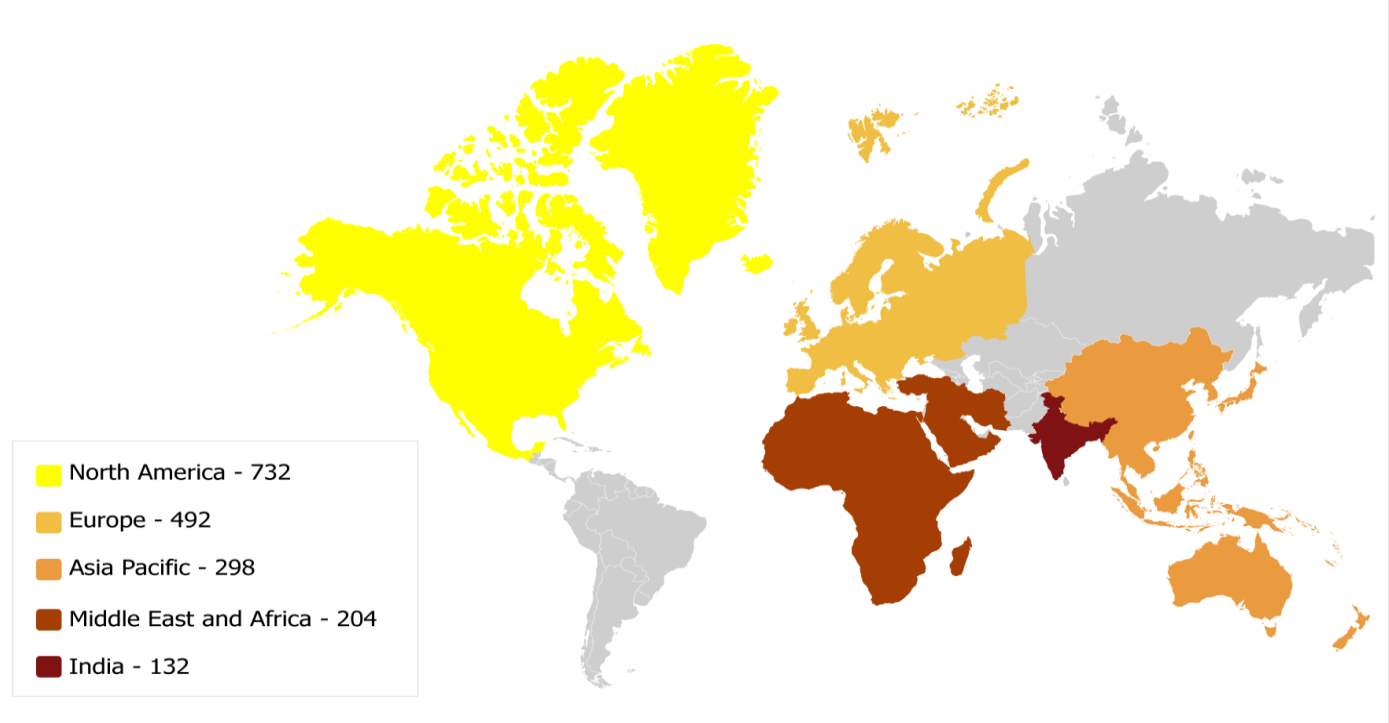
(CAGR)	CY19-24	CY24-29F
In-house	-0.3%	5.4%
EMS	4.5%	9.7%

2.1.5 Per capital Consumption of Electronics in Major Economies

In CY24, the global average per capita electronics consumption stood at USD 276, with notable differences across regions. North America led the chart with USD 732 per person, underscoring its advanced technology adoption and high

consumer spending on electronics. Europe followed at USD 492, supported by steady demand across both personal and industrial electronics. In contrast, the Asia-Pacific region, despite being the largest in total market size, had a lower per capita figure of USD 298—reflecting its large population base.

Chart 18: Per capital Consumption of Electronics in Major Economies (CY24)



Source: IMARC Group, CareEdge Research
Note: Asia Pacific excludes India

India's per capita electronics consumption was recorded at USD 132 in CY24 (well below both the global and regional averages) and is projected to touch USD 179 by CY29, meaning growing at the highest CAGR of 6.3%, whereas global average CAGR is estimated to be just 2.4%. While this highlights a current gap, it also signals significant scope for future growth. With increasing digital penetration, expanding access to electronic devices, and a young, tech-savvy population, India is well-positioned to see a steady rise in consumption levels. As affordability improves and demand spreads across urban and rural areas alike, India's electronics consumption is expected to grow substantially in the coming years.

India is projected to witness the fastest growth in per capita electronics consumption among major regions, rising from USD 132 in CY24 to USD 179 by CY29, driven by a robust CAGR of 6.3%. This surge reflects increasing digital adoption, rising disposable incomes, and supportive government initiatives aimed at expanding access to consumer electronics.

In contrast, North America, despite maintaining the highest per capita spending—from USD 732 to USD 948—is expected to grow at a slower CAGR of 5%, indicating a more mature and saturated market. Europe and Asia-Pacific show modest growth rates of approximately 2.7% and 2.4%, respectively, while the Middle East & Africa is projected to see a slight decline.

India's rapid growth, though from a lower base, highlights its rising importance as a key driver of global electronics demand in the coming years.

Globally, per capita electronics consumption is expected to rise from USD 276 in CY24 to USD 311 in CY29, growing at a CAGR of just over 2.4%.

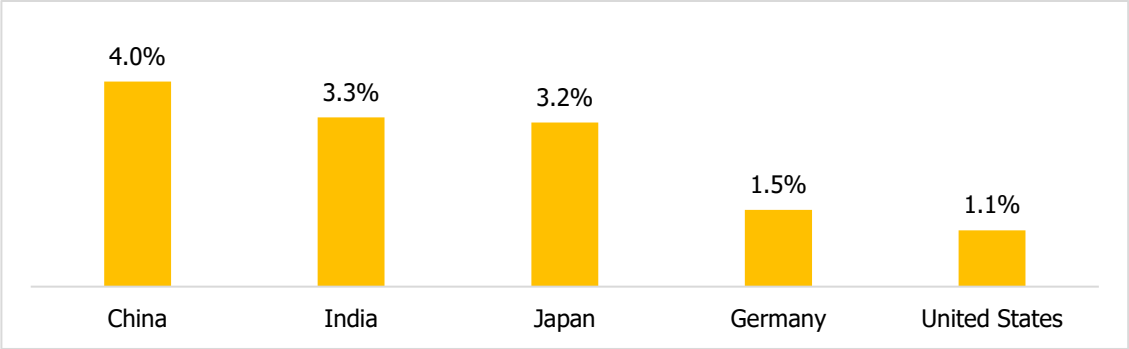
2.1.6 Electronics Manufacturing Contribution to GDP for Major Countries

Electronics manufacturing is becoming an increasingly significant contributor to the GDP of major global economies. Asia has long been a powerhouse in electronics manufacturing, with China dominating due to its scale, efficiency, and cost advantages. However, rising labour costs, environmental restrictions, and escalating geopolitical tensions—especially with the West—are pushing global companies to diversify their supply chains. This has led to a strong shift toward the "China+1" strategy, encouraging firms to explore alternative manufacturing destinations.

India is emerging as the top contender in this transition. With robust government initiatives like the Production Linked Incentive (PLI) scheme and the "Make in India" campaign, the country is attracting significant investments from major global players such as Apple and Foxconn. Its large talent pool, improving infrastructure, and supportive policy environment are positioning India as a growing force in electronics manufacturing.

Vietnam, too, is gaining momentum as a competitive and dependable manufacturing hub. Due to low labour costs, strategic trade agreements, and geographic proximity to supply chains, it is becoming a key destination for electronics assembly and component production. Together, India and Vietnam are steadily reshaping the electronics manufacturing map of Asia.

Chart 19: Electronics Manufacturing Contribution to GDP for Major Countries (CY24)



Source: IMARC Group, CareEdge Research

China +1 Strategy

The China+1 strategy involves global manufacturers diversifying their production by expanding operations beyond China to reduce overdependence. This shift is driven by rising costs, geopolitical tensions, and the need for more resilient and flexible supply chains.

The "China + 1" strategy has emerged due to:

- **Geopolitical Tensions**: Trade disputes and political issues have led companies to reconsider relying solely on China.
- **Supply Chain Disruptions**: COVID-19 exposed supply chain vulnerabilities, prompting diversification of manufacturing bases.
- **Rising Costs in China**: Increased labour costs in China have driven companies to seek alternative manufacturing locations.

2.2 Evolution of Global EMS Industry

The Electronics and Electronics Manufacturing Services (EMS) industry has undergone significant evolution, shifting from primarily performing assembly tasks to becoming an integral part of the global electronics supply chain. EMS providers now play a broader role, extending beyond manufacturing to include product design, development, testing, and supply chain support. This transformation has been driven by advancements in technology, changing consumer expectations, globalization, and the increasing complexity of electronic products. Below are key milestones in the industry's development.

Emergence of Electronics and EMS:
- EMS began in the 1960s, focusing on basic tasks like PCB assembly and product assembly.
- The goal was to reduce production costs for manufacturers by outsourcing manufacturing processes.

Globalisation and Outsourcing:
- In the 1980s-1990s, companies outsourced manufacturing to regions like Asia to reduce labor costs.
- This shift led to the rise of major EMS hubs in China, South Korea, and Taiwan.

Focus on Quality and Compliance:
- As electronics became more complex, EMS providers emphasized quality control and compliance.
- Adoption of standards like ISO 9001 and IPC and integration of sustainability practices to address environmental concerns.

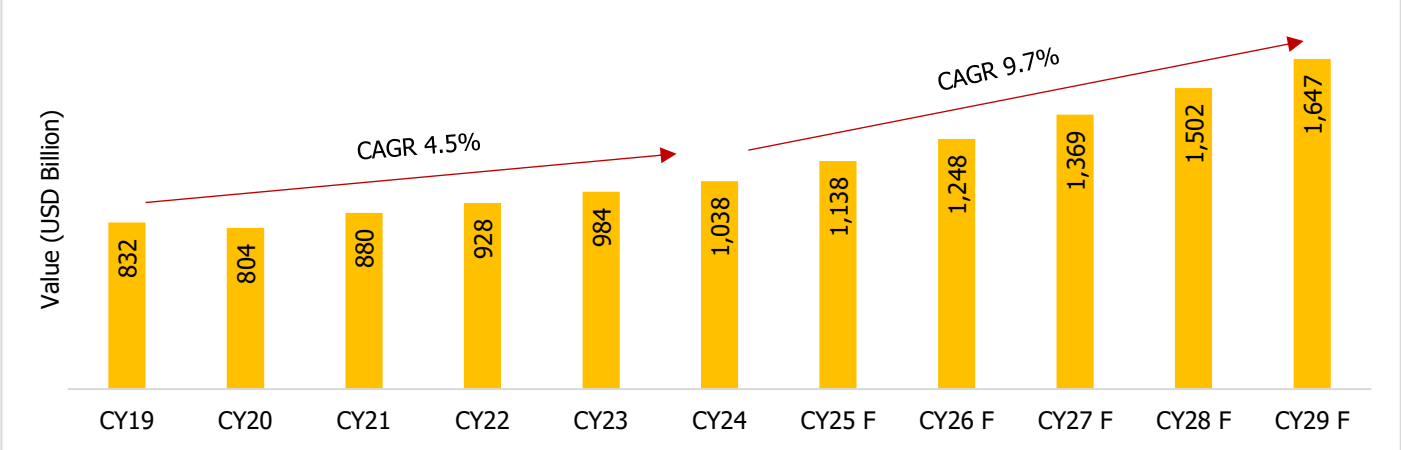
Industry 4.0 and Digital Transformation:
The adoption of IoT, cloud computing, automation, and big data analytics has revolutionized EMS operations, enabling the development of smart, interconnected factories.

EMS providers have moved beyond traditional manufacturing roles to offer end-to-end solutions, including product design, prototyping, testing, and supply chain management, as companies seek greater value and strategic collaboration.

2.3 EMS Industry Size & Segmentation

The global electronics manufacturing services (EMS) market was valued at USD 1,038 billion in CY24. The rise in outsourcing to reduce costs and improve efficiency is driving EMS adoption, with OEMs in industries like consumer electronics, automotive, healthcare, and telecommunications relying on EMS for design, prototyping, assembly, testing, and logistics. Regional manufacturing hubs, favourable trade policies, and demand for miniaturized, customized electronics are further expanding the market.

Chart 20: Global Electronics Manufacturing Services (EMS) Market



Source: IMARC Group, CareEdge Research

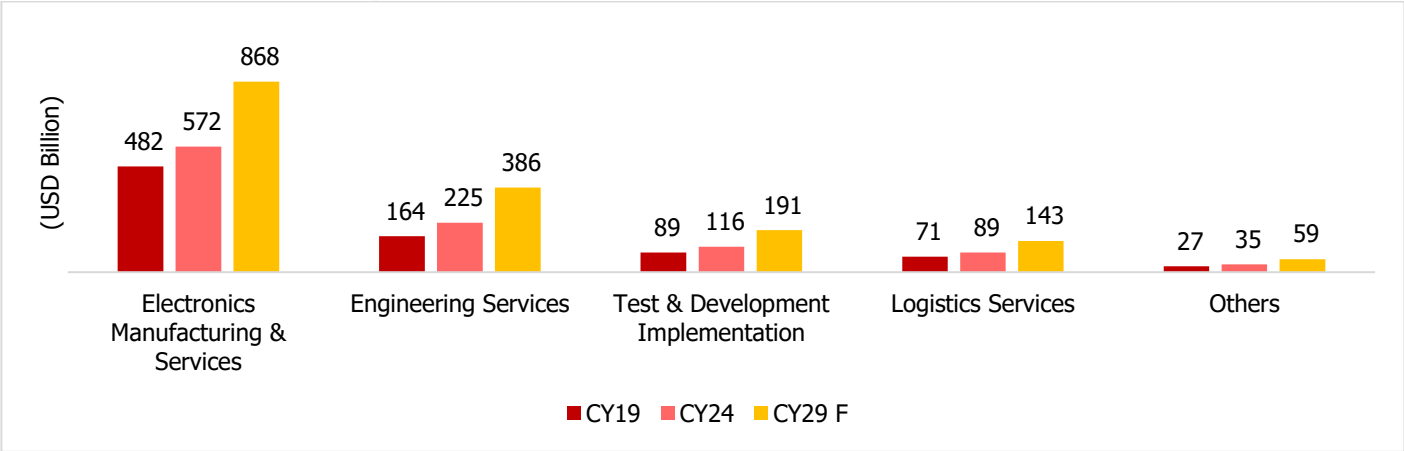
Looking forward, the EMS market is projected to grow at a 9.7% CAGR from CY24 to CY29, reaching USD 1,647 billion by CY29. The increasing complexity of devices, along with advancements in smart manufacturing technologies like robotics and IoT, will further drive demand. Automation and enhanced supply chain capabilities are expected to support the sector's continued growth.

2.3.1 Electronics Manufacturing Services (EMS) Market by Services

The global EMS market is expected to increase from USD 1,038 billion in CY24 to USD 1,647 billion by CY29, driven by growing demand for comprehensive manufacturing solutions across diverse industries. The electronics manufacturing & services segment is expected to grow from USD 572 billion to USD 868 billion, supported by strong activity in automotive, consumer, and industrial electronics. Engineering services are set to grow the fastest as OEMs increasingly rely on EMS providers for design, development, and prototyping to enhance innovation and reduce costs.

Other service segments are growing steadily due to increasing product complexity and stricter quality requirements driving demand for test and development services. Logistics services are expanding as companies seek more integrated and efficient supply chain management solutions. Meanwhile, the growth in the 'Others' category reflects the rising importance of aftermarket support, repair, and comprehensive lifecycle services in the EMS industry.

Chart 21: Global Electronics Manufacturing Services (EMS) Market: Breakup by Services



Source: IMARC Group, CareEdge Research
Note- Other includes Repair/recycling services, after-sales support, etc

(CAGR)	CY19-24	CY24-29F
Electronics Manufacturing	3.5%	8.7%
Engineering Services	6.5%	11.4%
Test & Development Implementation	5.5%	10.4%
Logistics Services	4.8%	9.9%
Others	5.9%	10.9%

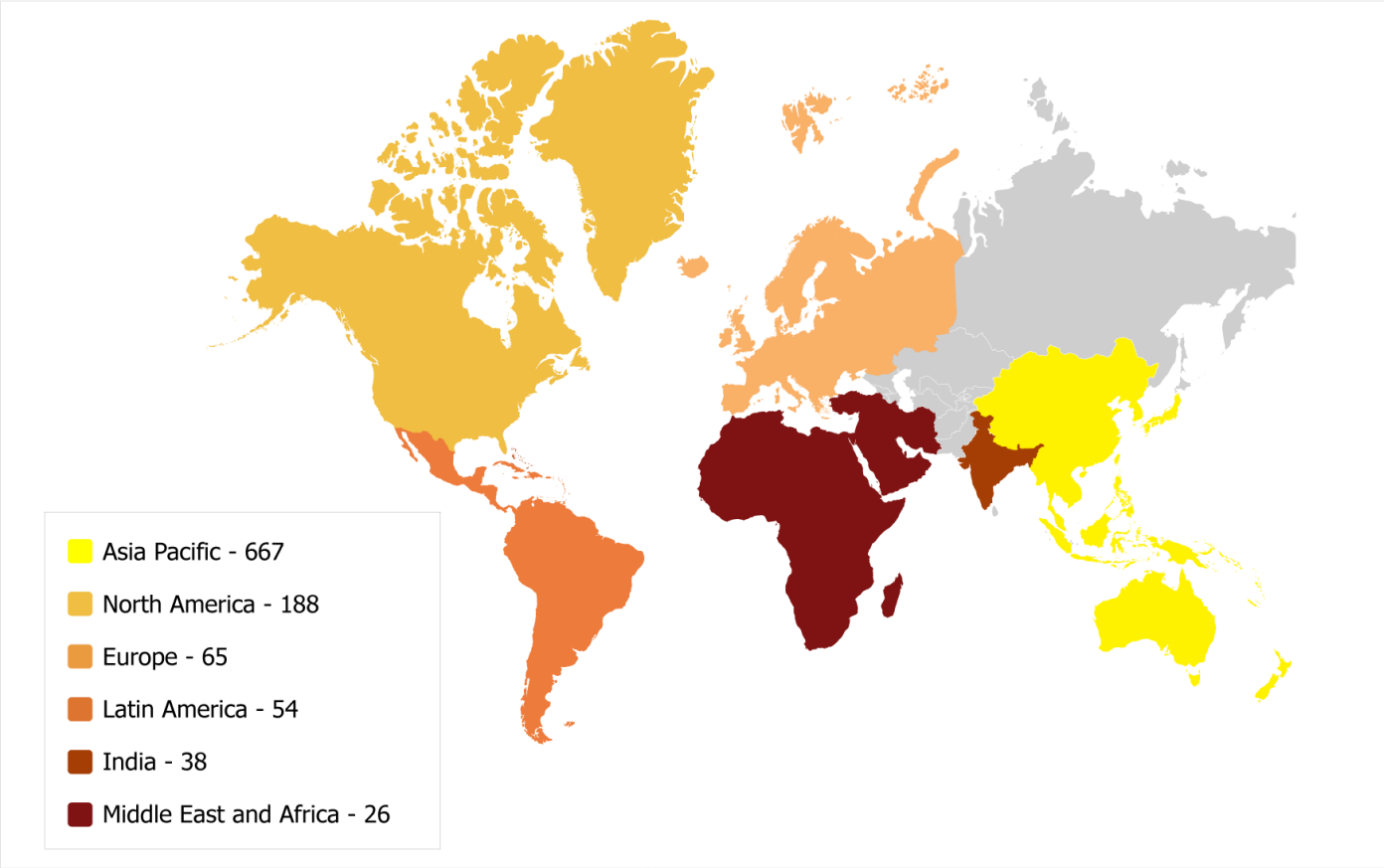
Note- Other includes Repair/recycling services, after-sales support, etc.

As the demand for EMS continues to grow, each service segment plays a critical role in optimizing global supply chains and ensuring the delivery of high-quality products. To stay competitive, EMS providers are increasingly adopting innovative technologies. For example, Engineering Services are now incorporating artificial intelligence and machine learning to improve product design and development, boosting both speed and accuracy. Similarly, Test and Development Implementation services are advancing with the use of state-of-the-art testing techniques to ensure that products meet rigorous safety standards, particularly in industries like aerospace and healthcare. The rising importance of Logistics Services emphasizes the need for more adaptable and transparent supply chains, with many EMS providers leveraging automation and real-time tracking to enhance efficiency. As these services evolve to meet new technological and market demands, the EMS industry is set for continued growth, catering to a broader spectrum of industries and applications.

2.3.2 Electronics Manufacturing Services (EMS) Market by Geographies

As of CY24, Asia-Pacific dominates the global electronics manufacturing services (EMS) market (67.9%) due to its established manufacturing infrastructure, cost-effective labour, and key production hubs in countries like China, South Korea, and Taiwan. As part of the Asia-Pacific region, India also plays a significant role in the growth of the Electronics Manufacturing Services (EMS) market. With its cost-effective labour, robust manufacturing infrastructure, and government initiatives like "Make in India," India is becoming a key hub for electronics production, contributing to the region's dominant market share in global EMS.

Chart 22: Global Electronics Manufacturing Services (EMS) Market (USD Billion): Breakup by Region (CY24)



Source: IMARC Group, CareEdge Research
Note: Asia Pacific excludes India

North America (18%) follows, driven by advanced technology and high demand for custom electronics. Europe (6%) has a smaller share, influenced by higher labour costs and a focus on specialised manufacturing. Latin America (5%), India (4%) and the Middle East & Africa (3%) represent smaller portions of the market, primarily due to limited manufacturing capacity and slower adoption of EMS services.

(CAGR)	CY19-24	CY24-29F
Asia-Pacific excluding India	3.4%	8.9%
North America	6.9%	11.7%
Europe	5.7%	10.7%
Latin America	2.3%	7.5%
Middle East and Africa	1.2%	6.2%
India	25.1%	16.1%

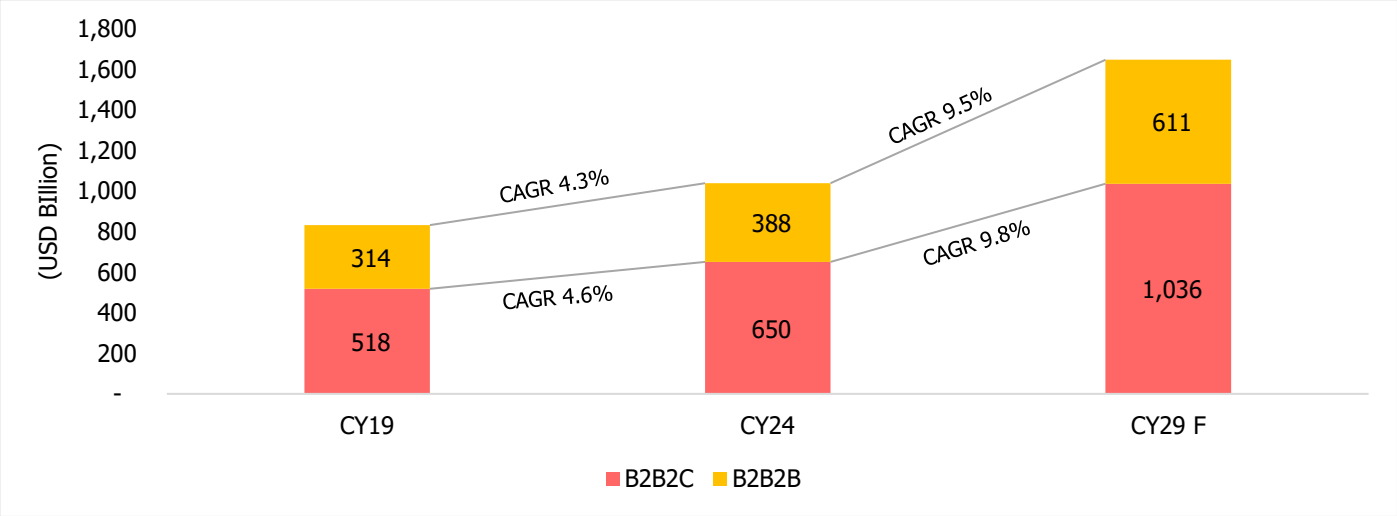
Between CY24 and CY29, North America is projected to experience growth rate in the EMS market, increasing from USD 188 billion to USD 326 billion, driven by reshoring initiatives, advanced manufacturing investments, and strong demand from aerospace, automotive, and technology sectors. Closely following, the Asia-Pacific region is expected to grow robustly from USD 705 billion to USD 1,100 billion, supported by its well-established manufacturing infrastructure, rising consumer electronics demand, and rapid industrialization in countries like India and Southeast Asia. India is projected to experience the highest growth CAGR of 17% during the CY24-29F period.

(Year-Wise % Share)	CY19	CY24	CY29 F
Asia-Pacific excluding India	67.6%	64.2%	61.9%
North America	16.2%	18.1%	19.8%
Europe	5.9%	6.3%	6.6%
Latin America	5.8%	5.2%	4.7%
Middle East and Africa	2.9%	2.5%	2.1%
India	1.5%	3.7%	4.9%

2.3.3 Electronics Manufacturing Services (EMS) Market by Segmentation- B2B2B vs B2B2C

The B2B2C channel (62.6% share during CY24) leads the global electronics manufacturing services (EMS) market due to the high demand for consumer electronics like smartphones, laptops, and wearables, which require large-scale production and efficient supply chains. Consumer electronics also experience faster product cycles and constant innovation, driving consistent growth in the EMS sector.

Chart 23: Global Electronics Manufacturing Services (EMS) Market: Breakup by Segments



Source: IMARC Group, CareEdge Research

The B2B2B segment (37.4% share during CY24) follows, as businesses in sectors like automotive, Aerospace & defence, railways, IT, data centres, power, clean energy healthcare, and telecommunications rely on EMS for specialised, high-quality, and custom electronic components. However, B2B2C remains dominant due to the larger volume of consumer products being produced.

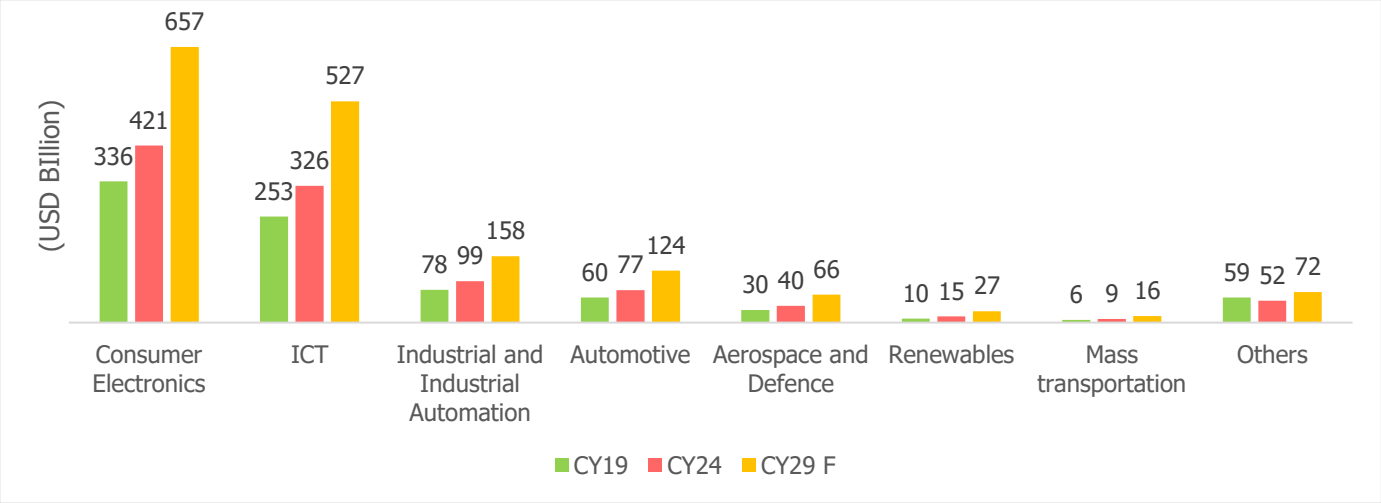
From CY24 to CY29, the B2B2C segment is projected to grow at a CAGR of approximately 9.8%, reflecting strong consumer demand for electronic devices. The B2B2B segment is expected to grow at a CAGR of around 9.5%, driven by increased investments in industrial, aerospace, IT, and clean energy sectors.

2.3.4 Electronics Manufacturing Services (EMS) Market by End- user Industries

As of CY24, the consumer electronics industry leads the global Electronics Manufacturing Services (EMS) market, driven by strong demand for devices like smartphones, laptops, and wearables that require large-scale production and continuous innovation. The ICT sector also play a significant role, fuelled by the need for telecommunications equipment and networking devices. The automotive sector increasingly relies on EMS for advanced electronics such as sensors and infotainment systems. Additionally, growing sustainability initiatives have boosted demand from the power and clean energy sectors for specialized electronic components. Smaller industries—including aerospace, defence, and healthcare

contribute by requiring specialized, high-precision electronics tailored to their unique needs. Though their overall share is limited, they are among the fastest-growing segments, driven by increasing demand for advanced, reliable, and customized electronic solutions.

Chart 24: Global Electronics Manufacturing Services (EMS) Market: Breakup by End- User Industries



Source: IMARC Group, CareEdge Research

Note:

1. ICT or Information and Communications Technology includes IT and Telecom
2. Automotive includes EVs as well
3. Aerospace and Defence includes Commercial, Defence and Space
4. Renewables include Solar, Wind and Hydro
5. Mass transportation includes Railways & Metros, Road-based Public Transportation
6. Others include the remaining industries other than mentioned above

(CAGR)	CY19-24	CY24-29F
Consumer Electronics	4.6%	9.3%
ICT	5.2%	10.1%
Industrial and Industrial Automation	4.9%	9.8%
Automotive	5.1%	9.9%
Aerospace and Defence	5.9%	10.7%
Renewables	8.3%	13.3%
Mass transportation	7.5%	12.7%
Others	-2.7%	6.9%

The growth of the global Electronics Manufacturing Services (EMS) market, projected to reach USD 1,647 billion by CY29, is driven by factors such as increasing product complexity, the rise of outsourcing for cost efficiency, and advancements in automation. Additionally, the demand for customized electronics in sectors like healthcare and automotive, along with the push for sustainability and energy-efficient solutions, is further fuelling the market's expansion.

(Year-Wise % Share)	CY19	CY24	CY29 F
Consumer Electronics	40.4%	40.6%	39.9%
ICT	30.4%	31.4%	32.0%
Industrial and Industrial Automation	9.4%	9.5%	9.6%
Automotive	7.2%	7.4%	7.5%
Aerospace and Defence	3.6%	3.8%	4.0%
Renewables	1.2%	1.4%	1.6%
Mass transportation	0.7%	0.8%	1.0%
Others	7.1%	5.0%	4.4%

2.3.5 Market Drivers & Restraints

Key Market Drivers:

Cost Optimization	Leveraging EMS providers allows OEMs to benefit from specialized expertise, economies of scale, and operational efficiency, resulting in lower production costs and improved quality without investing heavily in in-house capabilities.
Advances in Technology	Adoption of Industry 4.0 technologies—such as automation, AI, and robotics—enhances production efficiency, traceability, and product quality.
Growing Electronics Demand	The surge in consumer electronics, including smartphones, wearables, and IoT devices, increases reliance on EMS providers for scalable production.
Emerging Market Potential	Expansion in regions with low labour costs and rising consumer demand offers attractive growth opportunities for EMS providers.
Sector-Specific Opportunities	EMS providers gain competitive advantage by catering to high-growth sectors such as aerospace and defence, power and sustainability, and electric vehicles (EVs), where specialized manufacturing and stringent quality standards are critical.

Key Market Restraints:

Intellectual Property Risks	Outsourcing raises concerns about IP protection, necessitating strong legal and security measures.
Quality and Supply Chain Challenges	OEMs often face difficulties in maintaining control over product quality when outsourcing, which can lead to inconsistencies and affect end-product reliability.
Regulatory Burden	Following safety, labour, and environmental rules from different countries makes manufacturing more complicated and expensive for EMS companies.
Supply Chain Vulnerabilities	Disruptions caused by material shortages, political instability, or natural events can delay production and increase costs.

3 Overview of Electronics & Electronics Manufacturing Services in India

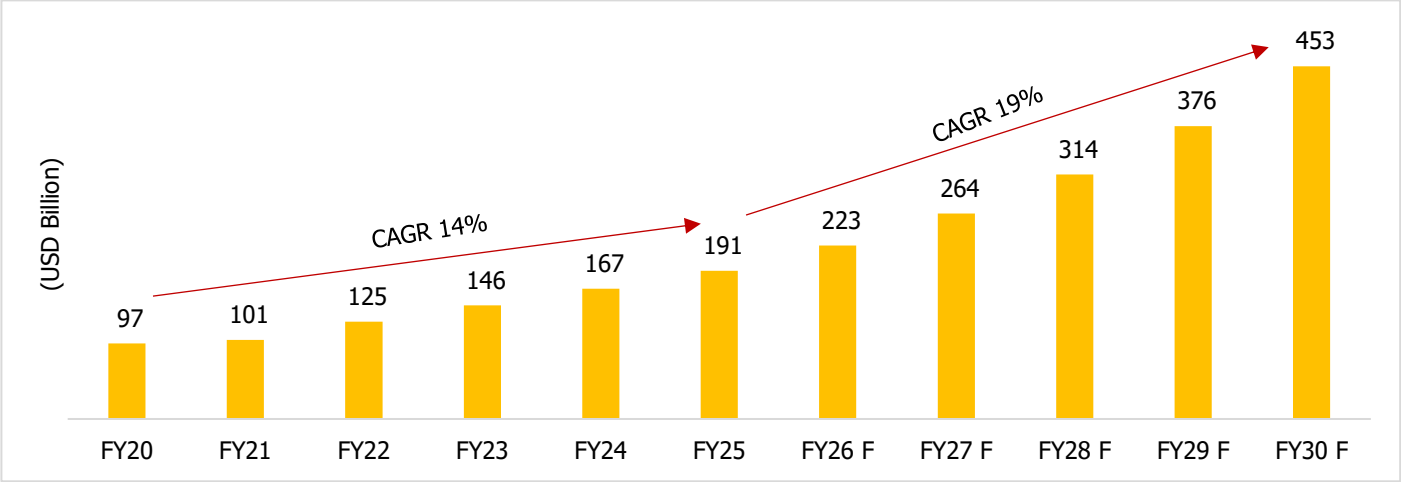
3.1 Electronics Market Size & Segmentation

India's electronics market has witnessed remarkable growth between FY20 and FY25, with market size increasing from USD 97 billion to USD 191 billion. This momentum has been driven by a combination of rising incomes, rapid urbanization, and an expanding digital ecosystem. The COVID-19 pandemic accelerated digital adoption across work, education, and entertainment. Government initiatives like "Digital India" and widespread 4G and 5G rollout have enhanced technology access, especially in underserved areas, boosting consumer engagement and demand.

Looking ahead, the market is projected to reach USD 453 billion by FY30, driven by key government programs such as the PLI scheme and "Make in India," which aim to strengthen domestic manufacturing and reduce import dependence. Growing demand for next-gen technologies—electric vehicles, IoT devices, semiconductors, and AI solutions—will further accelerate growth. With increasing foreign investment and manufacturing capacity, India is steadily emerging as a global electronics hub. The market is also backed by other government initiatives like SPECS and the Phased Manufacturing Program (PMP). These schemes focus on strengthening the local component ecosystem and boosting domestic value addition. Growing exports and increasing investment by global companies are further positioning India as a major hub for electronics manufacturing.

Further, India's electronics market is rapidly growing, driven by strong domestic demand and supportive government policies. Many global companies are setting up manufacturing units, making India a key hub for electronics production. Exports of electronics, especially mobile phones, are also rising steadily as India strengthens its position in global supply chains.

Chart 25: Indian Electronics Market



Source: IMARC Group, CareEdge Research
Note: Market size: production + import – export of finished goods

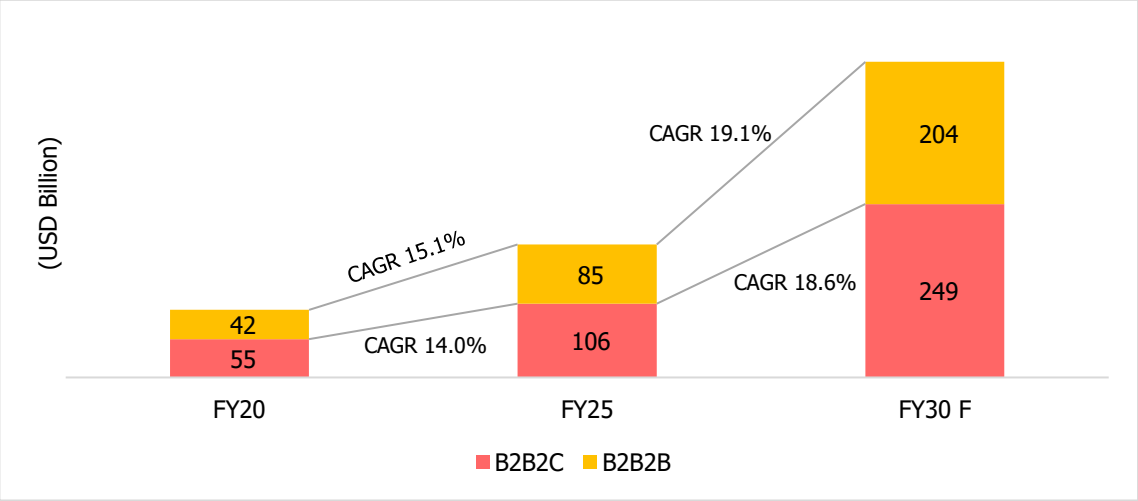
India's electronics market stands out globally due to its unique growth dynamics. Unlike developed economies such as the U.S. or Europe, where market expansion is largely driven by innovation and premium products, India's growth is fuelled by mass adoption and affordability. The demand is primarily from a large base of first-time buyers and consumers seeking value-driven technology solutions. The combination of a vast domestic market, supportive policy environment, and growing production capabilities uniquely positions India as a rising force in the global electronics industry.

3.1.1 Indian Electronics Market by Segments

In FY25, the **Business-to-Consumer (B2B2C)** segment dominated with a **55%** share, driven by several factors such as an expanding middle class and growing consumer affluence. Rising demand for affordable, feature-rich devices like smartphones, laptops, and home appliances is driven by growing online shopping and entertainment. Increased mobile internet access and affordable data plans are boosting digital services like e-commerce, social media, and streaming, further fuelling consumer electronics demand.

For the B2B2C segment, the market grew at a CAGR of 14% between FY20 and FY25, and is further expected to accelerate to a CAGR of around 19% during FY25 to FY30F.

Chart 26: India's Electronics Market: Breakup by Segments



Source: IMARC Group, CareEdge Research

(Year-Wise % Share)	FY25	FY30 F
B2B2C	55%	55%
B2B2B	45%	45%

On the other hand, the **Business-to-Business (B2B2B)** segment accounted for **45%** of the market, reflecting the significant technological investments being made by Indian businesses. The adoption of advanced technologies like AI, IoT, and cloud computing by companies is increasing their reliance on specialized electronics for operations, production, and logistics. Additionally, the government's initiatives to promote smart infrastructure, industrial automation, and digital transformation in sectors like healthcare, education, and manufacturing are further driving the demand for B2B2B electronics. The nearly equal split between B2B2C and B2B2B underscores the dual nature of India's electronics market, with both consumer-driven demand and business-focused technology investments playing vital roles in market growth.

For the B2B2B segment, the market grew at a CAGR of about 15% from FY20 to FY25, and is expected to rise at a higher CAGR of about 19% between FY25 and FY30F. Key products driving B2B2B growth include wiring harnesses, connectors, relays, cable assemblies, power cords, and customized electronic components.

India's electronics market is also benefiting from rising investments in critical sectors like data centers, power, and clean energy. The rapid expansion of data centers is driving demand for high-performance electronics and cooling solutions. Growth in electric vehicles (EVs) is boosting the market for power electronics and battery technologies, aligning with India's clean energy goals. Additionally, increased spending in aerospace and defence, as well as modernization of

railways, is creating new opportunities for advanced electronics manufacturing and innovation. These sectors are further strengthening India's position as a key player in the global electronics landscape.

3.1.2 Indian Electronics Market by End- User Industries

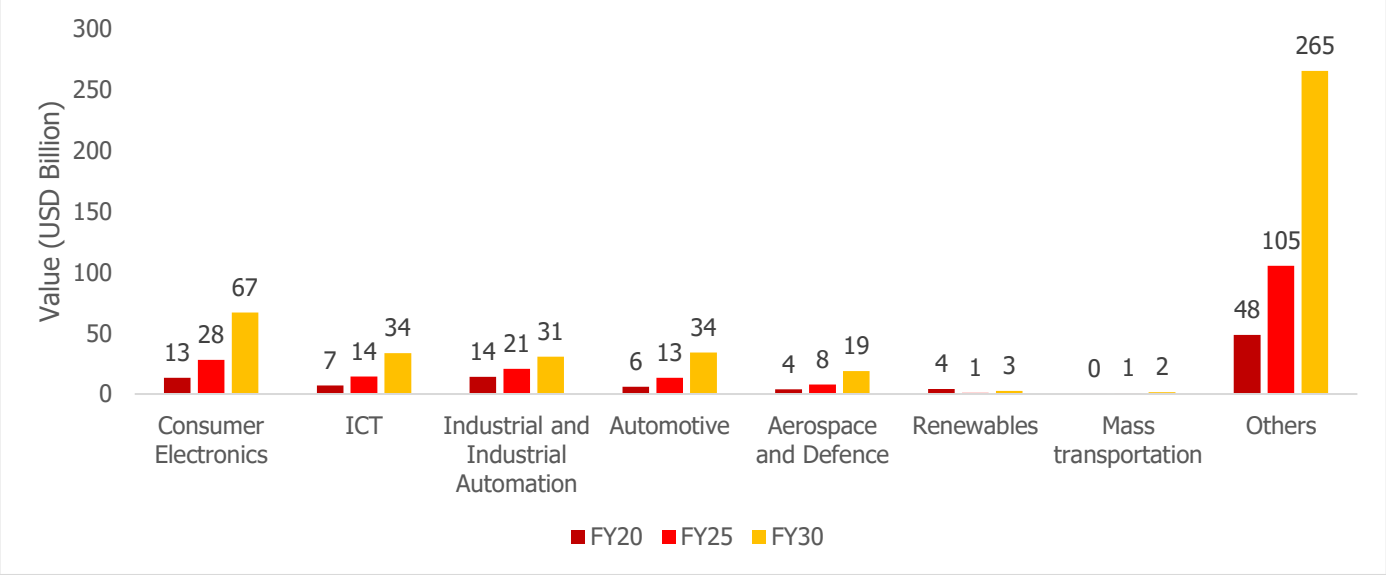
India's electronics market is experiencing strong and diversified growth across key end-user industries. The overall market grew at a CAGR of 14.5% between FY20 and FY25, and is expected to accelerate to 18.9% CAGR during FY25 to FY30, supported by increasing digitization, domestic manufacturing push, and broader industry demand.

Consumer electronics remains the dominant segment, expanding at 15.9% CAGR historically (between FY20 and FY25) and projected to grow at 19.1% CAGR (between FY25 and FY30) going forward, driven by rising demand for devices, growing e-commerce adoption, and faster delivery models. Consumer electronics (CE) leads India's electronics market, yet penetration of key products like air conditioners, refrigerators, and washing machines remains low, offering significant growth potential. Rising disposable incomes, urbanization, and aspirational spending are driving demand for smart, efficient appliances, especially in tier-II and rural markets.

Globally, companies are shifting from a China-dominated supply chain to a China+1 model, with India emerging as a strong alternative. While China still dominates CE exports, India is steadily expanding its share, supported by PLI schemes, policy support, and cost competitiveness.

India's EMS industry is also scaling up, serving both domestic and global brands across CE, automotive, and industrial sectors. This is strengthening India's role in the global electronics value chain and accelerating the shift towards local value addition and exports.

Chart 27: Market Breakup by End User Industries



Source: IMARC Group, CareEdge Research

Note:

1. ICT or Information and Communications Technology includes IT and Telecom
2. Automotive includes EVs as well
3. Aerospace and Defence includes Commercial, Defence and Space
4. Renewables include Solar, Wind and Hydro
5. Mass transportation includes Railways & Metros, Road-based Public Transportation
6. Others include the remaining industries other than mentioned above

Sectors such as Automotive, ICT, and Aerospace & Defence are also showing robust growth, reflecting trends like EV adoption, digital transformation, and greater focus on local defence production, rising infrastructure investments, 5G expansion, and energy-efficient technology adoption. These segments are forecast to grow at 20-22% CAGR between FY25 and FY30.

(CAGR)	FY20-25	FY25-30F
Consumer Electronics	15.9%	19.1%
ICT	15.4%	18.6%
Industrial and Industrial Automation	8.0%	8.1%
Automotive	17.5%	20.7%
Aerospace and Defence	15.5%	19.2%
Renewables	-23.8%	20.0%
Mass transportation	17.4%	18.0%
Others	16.8%	20.3%

India: A favourable destination for Electronic Manufacturing

Factor	Details
Large Domestic Consumer Base	India's vast market creates strong demand for locally manufactured electronics, offering significant growth potential.
Low Consumer Electronics Penetration	The adoption of appliances such as air conditioners, washing machines, and refrigerators remains low in many Indian households, especially in rural areas. This gap offers significant room for growth as affordability and accessibility improve.
Government Initiatives	Policies such as "Make in India" and Production-Linked Incentive (PLI) schemes support domestic production and reduce dependency on imports.
Cost-Effective Labour	India's competitive labour costs make it a cost-efficient option for manufacturers compared to other countries.
Growing Disposable Income	As income levels rise and more families move into the middle-income bracket, there's a noticeable shift toward purchasing aspirational and lifestyle-enhancing electronics. This trend is boosting demand across categories.
Robust Infrastructure	Competitive labour costs combined with a strong infrastructure—spanning transport, logistics, ports, and emerging digital solutions like blockchain and fintech—significantly enhance operational efficiency and manufacturing competitiveness.
Expanding Urbanization	The steady growth of urban centers is driving increased demand for modern, space-efficient, and tech-enabled appliances. Urban lifestyles are shaping consumer preferences and accelerating the need for smart electronics.
Innovation and R&D Eco-System	The country boasts a growing, tech-savvy workforce in electronics and technology, with ongoing training initiatives to ensure a steady supply of skilled workers in advanced technologies.
Ongoing Digital Transformation	Rising internet penetration, smartphone usage, and digital adoption across services are fueling demand for connected devices. Digitization is also enabling e-commerce, remote work, and smart home technologies, further expanding the electronics market.

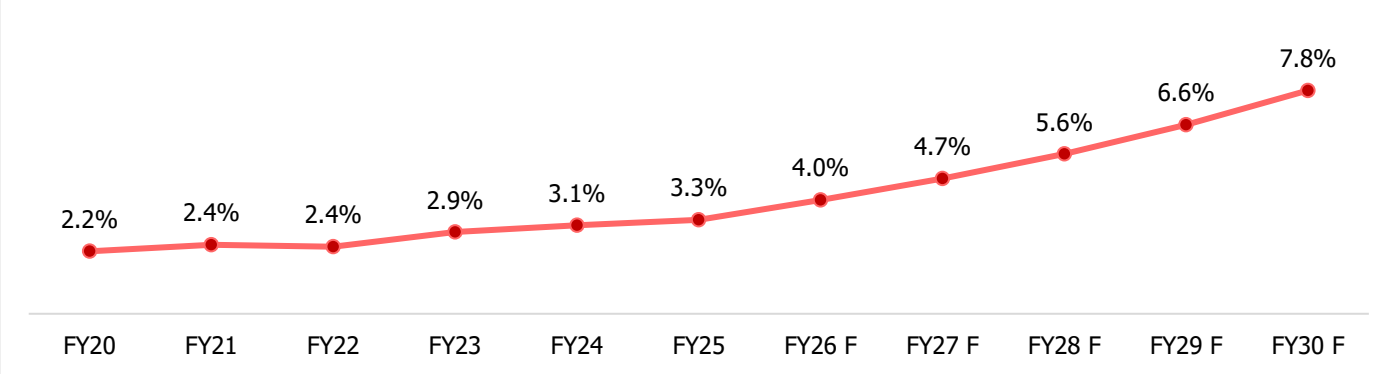
Factor	Details
Favourable Business Climate	Continuous improvement in Ease of Doing Business rankings, along with simplified regulations, tax benefits and ongoing reforms, creates a welcoming business climate.
China + 1 & Supply Chain Diversification	India is emerging as a key player in the China+1 strategy, offering companies an alternative manufacturing hub to reduce overreliance on China. This diversification helps global businesses mitigate supply chain risks and enhance resilience.

3.1.3 Indian Electronics Production as a % of GDP

The growing contribution of India's electronics production to its GDP underscores the sector's increasing importance in the nation's economic development. In FY20, the electronics industry contributed 2.2% to India's GDP, and this share has steadily risen, reaching 3.3% by FY25. India's electronics industry contribution towards GDP is expected to reach 7.8% by FY30. This growth highlights the expanding role of the electronics sector within India's overall economic framework.

India's electronics production is experiencing significant growth, driven by its growing **trade potential**, **sustainability efforts**, and **export potential**. The country's increasing participation in global trade agreements, such as Free Trade Agreements (FTAs), has opened up new markets for Indian electronics, enhancing the nation's trade potential. These agreements reduce tariffs and trade barriers, making Indian electronics more competitive globally. Additionally, India's commitment to sustainability in electronics manufacturing is gaining attention. Manufacturers are adopting energy-efficient technologies, reducing e-waste, and using environmentally friendly materials, aligning with global environmental standards. This shift toward green manufacturing not only helps India meet international sustainability goals but also attracts eco-conscious companies seeking responsible production sources.

Chart 28: India's Electronics Production as a % of GDP



Source: IMARC Group, CareEdge Research

Furthermore, India's growing export potential is a key driver of this growth. As its manufacturing capabilities improve and costs remain competitive, India has become an attractive destination for global companies looking to diversify supply chains. The country is witnessing an increase in the export of electronics, from smartphones to consumer appliances, contributing to a larger share of the sector in India's GDP and boosting its global presence.

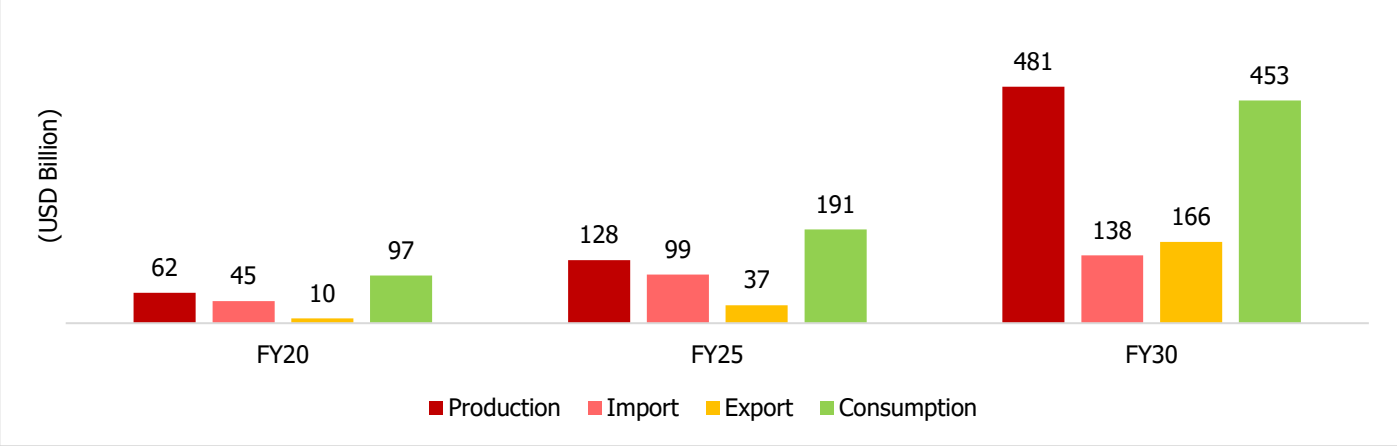
3.1.4 Comparison of Indian Domestic Electronics- Production, Exports and Imports

India's electronics sector is experiencing robust growth due to several critical factors. Government policies, such as the Production-Linked Incentive (PLI) schemes, have created favourable tax incentives that attract both domestic and foreign manufacturers, making India an increasingly attractive hub for electronics production. Additionally, India's participation in global trade agreements and the establishment of Special Economic Zones (SEZs) have improved export

opportunities, bolstered by export incentives like duty drawbacks and GST exemptions, which encourage companies to target international markets. The country has also seen significant investment in modern manufacturing facilities, improving its production capacity and making it a competitive destination for global manufacturers seeking diversification of supply chains.

India's electronics production is witnessing significant growth, increasing from USD 128 billion in FY25 to a projected USD 481 billion by FY30, reflecting a robust CAGR of approximately 30% over the five-year period. Exports are also expected to grow rapidly—from USD 37 billion in FY25 to USD 166 billion in FY30, implying a CAGR of around 35%, highlighting India's growing role in global electronics supply chains. While imports are also projected to rise, their pace is comparatively slower—from USD 99 billion in FY25 to USD 138 billion in FY30, with a CAGR of just 7%. This shift indicates a gradual narrowing of the trade gap and increasing self-reliance in electronics manufacturing.

Chart 29: Comparison of Indian Domestic Electronics Production Vs. Consumption Vs Exports Vs. Imports (USD Billion)



Source: IMARC Group, CareEdge Research

(~CAGR)	FY20-25	FY25-30F
Production + Import	16%	22%
Export + Consumption	16%	22%

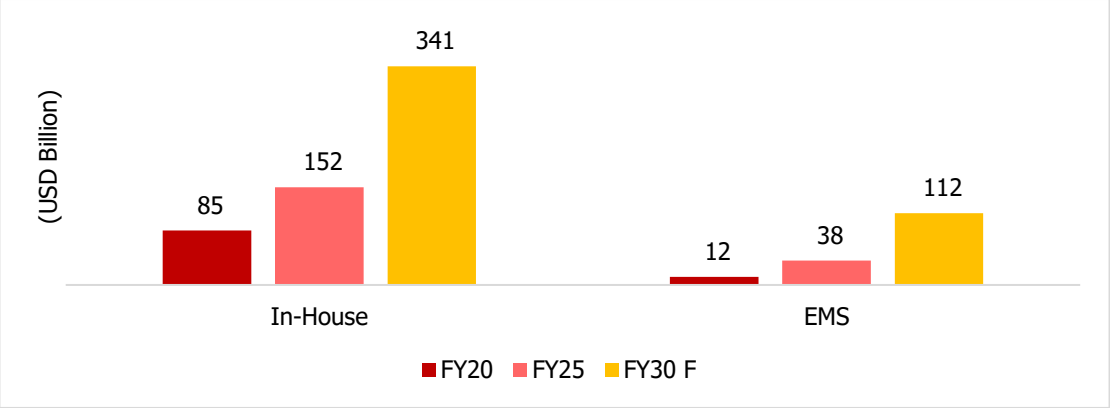
Furthermore, the sector is generating millions of jobs, with programs like Skill India helping to meet the demand for a skilled workforce in electronics manufacturing. Investment in research and development (R&D) is also driving innovation, making India competitive in high-tech areas such as semiconductors and 5G technology. This combined growth in production, consumption, exports, and technological advancements signals India's strengthening position in the global electronics market.

3.1.5 Indian Domestic Electronics Production (In-house Manufacturing and EMS)

India's domestic electronics production, comprising In-House Manufacturing and Electronics Manufacturing Services (EMS), has witnessed significant growth in recent years. Between FY20 and FY25, In-House Manufacturing increased from USD 85 billion to USD 152 billion, reflecting a CAGR of 12.4%, while EMS surged from USD 12 billion to USD 38 billion, registering a strong CAGR of 25.3%.

Looking ahead to the forecast period from FY25 to FY30, In-House Manufacturing is expected to accelerate further with a projected CAGR of 17.5%, reaching USD 341 billion. Similarly, EMS is anticipated to continue its high-growth trajectory, growing at a CAGR of 24.0% to touch USD 112 billion.

Chart 30: Market Breakup by Manufacturing



Source: IMARC Group, CareEdge Research

Electronics Manufacturing Services (EMS) provide a cost-efficient solution for companies seeking to scale production without establishing in-house manufacturing facilities. It offers flexibility, particularly for rapid scaling and specialized manufacturing requirements.

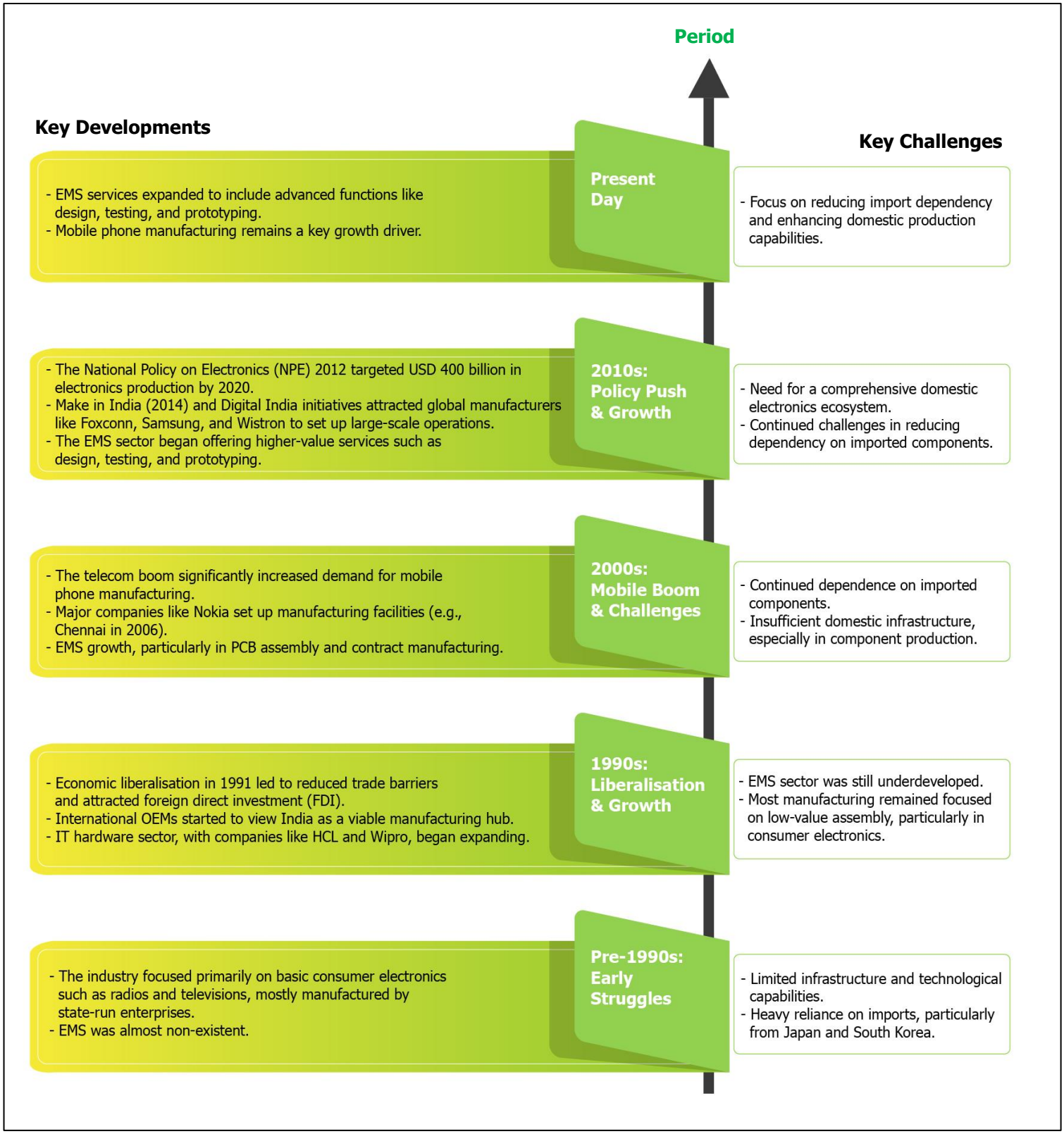
(CAGR)	FY20-25	FY25-30F
In-House	12.4%	17.5%
EMS	25.3%	24.0%

The share of Electronics Manufacturing Services (EMS) is expected to grow significantly in India's electronics market for several reasons. Firstly, EMS companies are evolving beyond traditional contract manufacturing to offer complete design and development services. This shift allows EMS providers to capture higher margins, while Original Equipment Manufacturers (OEMs) benefit by outsourcing both manufacturing and design, enabling them to focus on marketing, sales, and business expansion.

Secondly, the highly competitive and complex nature of the electronics industry is prompting OEMs to concentrate primarily on marketing and aftermarket services, leaving manufacturing responsibilities to specialized EMS companies. This strategic division helps OEMs streamline operations and enhance efficiency.

Lastly, EMS providers benefit from economies of scale, positioning them better to manage frequent technological changes and rapidly evolving product cycles. Their scale also enables stronger negotiation power with raw material suppliers, resulting in cost advantages that OEMs typically cannot achieve on their own. These factors collectively support a rising EMS market share in India's electronics manufacturing landscape.

3.2 Evolution of EMS Industry in India



3.3 Value Chain of EMS Industry in India

The **EMS (Electronics Manufacturing Services) industry** in India is a key driver of the country's electronics sector, spanning stages from design to after-sales support. Fuelled by technological innovation, strong government backing, and skilled talent, India is emerging as a major player in global electronics manufacturing.

- **Research & Development and IP Ownership:** EMS companies increasingly engage in R&D, collaborating with OEMs on product innovation while managing intellectual property rights to protect designs and technology.
- **Fabrication and Component Sourcing:** This involves procurement and fabrication of essential components such as semiconductors, capacitors, and resistors, alongside establishing strong partnerships with suppliers to ensure quality and timely availability.
- **Manufacturing and Assembly:** Core manufacturing activities include PCB fabrication, Surface Mount Technology (SMT) placement, and final product assembly, where components are integrated into finished products ready for the market.
- **Testing and Quality Control:** Rigorous functional and compliance testing ensures products meet performance standards and certifications such as CE and RoHS, supported by continuous quality monitoring.
- **Packaging and Distribution:** Customized packaging protects products and strengthens branding, while efficient logistics management ensures timely delivery across domestic and international markets.
- **After-Sales Support and Services:** Comprehensive services include warranty management, repairs, reverse logistics for returns or recycling, and customer support to maintain satisfaction and brand loyalty.

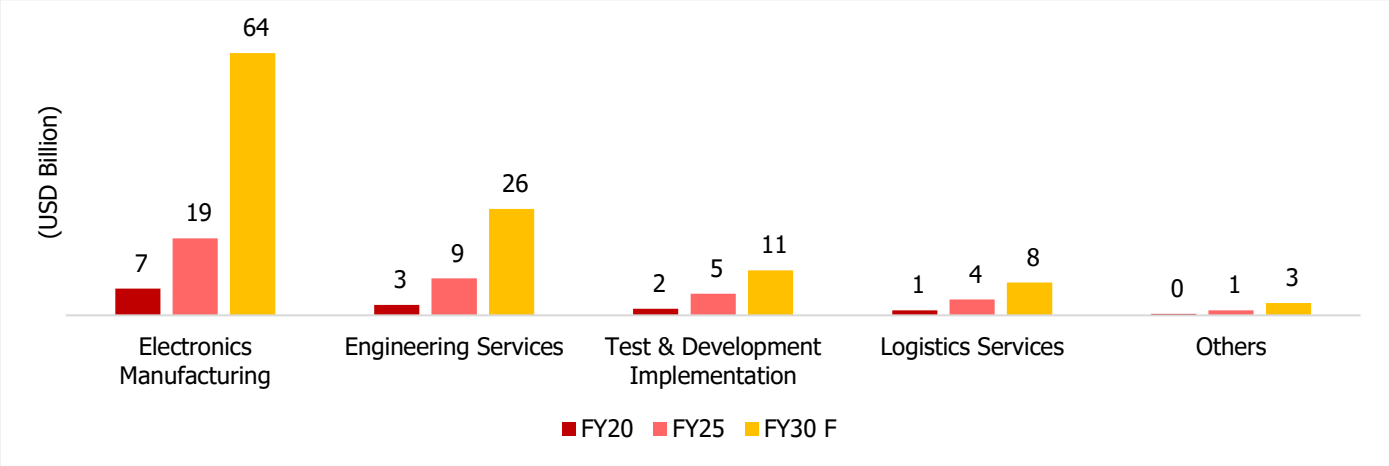
3.4 Indian Electronic Manufacturing Services Industry

3.4.1 Indian Electronic Manufacturing Services Industry by Services

In FY25, electronics manufacturing constituted the largest segment within the Electronics Manufacturing Services (EMS) market in India due to strong demand for consumer electronics, mobile phones, and automotive electronics. This growth was supported by increased domestic consumption, government incentives under the PLI scheme, and rising outsourcing by global OEMs, leading it to account for approximately 49.3% of the total EMS market share.

Following electronics manufacturing, engineering services accounted for ~24% of the EMS market in FY25, driven by the growing need for design customization, product development, and R&D support across sectors like consumer electronics, automotive, and telecom. Test & development implementation (~14%) gained prominence due to increased emphasis on quality control and compliance with global standards. Logistics services (~10%) grew alongside higher production volumes, necessitating efficient supply chain and distribution support. The remaining ~3% was attributed to other auxiliary services, including after-sales support and procurement services, which played a smaller yet supportive role in the EMS ecosystem.

Chart 31: Market breakup by type of Service



Source: Imarc Group, CareEdge Research
Other includes Repair/recycling services, after-sales support, etc.

The Indian Electronic Manufacturing Services (EMS) industry has experienced steady and broad-based growth from FY20 to FY25, supported by rising electronics demand, policy incentives such as the PLI scheme, and a shift toward outsourcing by global OEMs.

(CAGR)	FY20-25	FY25-30
Electronics Manufacturing	23.4%	27.8%
Engineering Services	28.4%	23.6%
Test & Development Implementation	26.4%	15.9%
Logistics Services	25.8%	15.7%
Others	27.4%	19.7%

Among the service segments (between FY20 and FY25), Engineering Services recorded the highest growth with a CAGR of 28.4%, highlighting India's growing strength in product design and development. Electronics Manufacturing, the core of the EMS industry, grew at a CAGR of 23.4%, reflecting capacity expansions and increased local production. Both Test & Development Implementation and Logistics Services posted strong ~26% CAGRs, underscoring the industry's growing focus on quality assurance and efficient supply chains. The Others category, which includes repair, recycling, and after-sales support, saw a CAGR of 27%, driven by growing demand for end-to-end lifecycle services and sustainability efforts.

Looking ahead, the industry is expected to accelerate further between FY25 and FY30 as India strengthens its role in the global electronics value chain. Engineering Services is projected to grow with a CAGR of 23.6%, reflecting increasing demand for design-led manufacturing and R&D capabilities. Electronics Manufacturing is expected to grow at 27.8% CAGR, supported by export growth and greater localization. Test & Development Implementation and Logistics Services are each forecast to grow at 15.9% CAGR, indicating deeper investments in quality, testing, and last-mile efficiency. Meanwhile, the Others segment is set to expand at 19.7% CAGR, fuelled by the rising importance of repair ecosystems, circular economy models, and robust after-sales infrastructure.

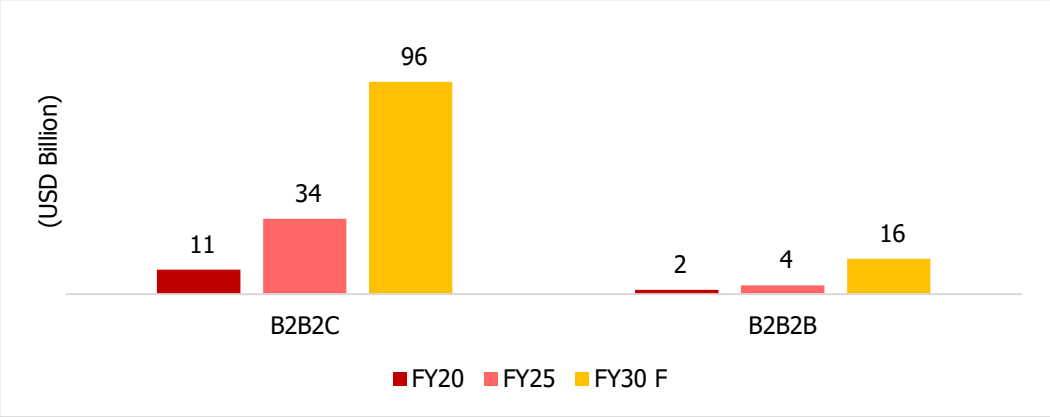
This growth marks a significant evolution in India’s EMS landscape—from traditional contract manufacturing to a more holistic and service-oriented model that supports the full product lifecycle.

3.4.2 Indian Electronic Manufacturing Services Industry by Segment

In FY25, the B2B2C channel dominated the Indian EMS market, accounting for approximately 89% of the total market, primarily due to the surge in demand for consumer electronics such as smartphones, televisions, wearables, laptops and home appliances.

From FY20 to FY25**,** the B2B2C segment of the Indian EMS industry grew from USD 11 billion to USD 34 billion, recording a historical CAGR of 25.3%. The rapid shift towards digital lifestyles, coupled with rising disposable incomes—further supported by recent income tax rate reductions—and growing smartphone penetration across both urban and rural regions, have played a key role in driving B2B2C sales. This momentum was further strengthened by large-scale manufacturing undertaken for prominent consumer brands and the increasing reliance on contract manufacturing. Government initiatives such as the Production-Linked Incentive (PLI) scheme and the Make in India campaign provided additional impetus by encouraging substantial investments in B2B2C electronics manufacturing. Together, these factors firmly established the B2B2C segment as the dominant channel within the EMS market. B2B2C segment is projected to further expand to USD 96 billion by FY30, with a forecasted CAGR of 23.1%.

Chart 32: Market breakup by type of Segment



Source: Imarc Group, CareEdge Research

Meanwhile, the B2B2B segment grew from USD 2 billion in FY20 to USD 4 billion in FY25, delivering a historical CAGR of 14.9%. This growth momentum is expected to continue, with the segment reaching USD 16 billion by FY30—maintaining a forecasted CAGR of 32.0%. This segment within India's EMS industry is witnessing strong growth, driven by increasing demand from sectors such as automotive, industrial automation, energy, and home appliances. These industries rely on specialized components like wiring harnesses, PCB assemblies, power cords, and control units, which require precision and customization.

(CAGR)	FY20-25	FY25-30F
B2B2C	25.3%	23.1%
B2B2B	14.9%	32.0%

Unlike the high-volume B2B2C segment, B2B2B EMS focuses on low-volume, high-complexity products, offering better margins and stronger long-term partnerships for EMS providers.

3.4.3 Indian Electronic Manufacturing Services Industry by End-user industry

Consumer electronics lead the Indian electronics manufacturing market as they cater to a wide range of utility and lifestyle needs, from entertainment to home automation. It accounted for nearly 78% (in FY25) of India's electronics manufacturing market due to strong domestic demand for smartphones, TVs, and other home appliances. The increasing

integration of AI and IoT in consumer devices has made them more appealing and multifunctional. Seasonal demand surges—especially during festive periods—significantly boost sales and manufacturing volumes.

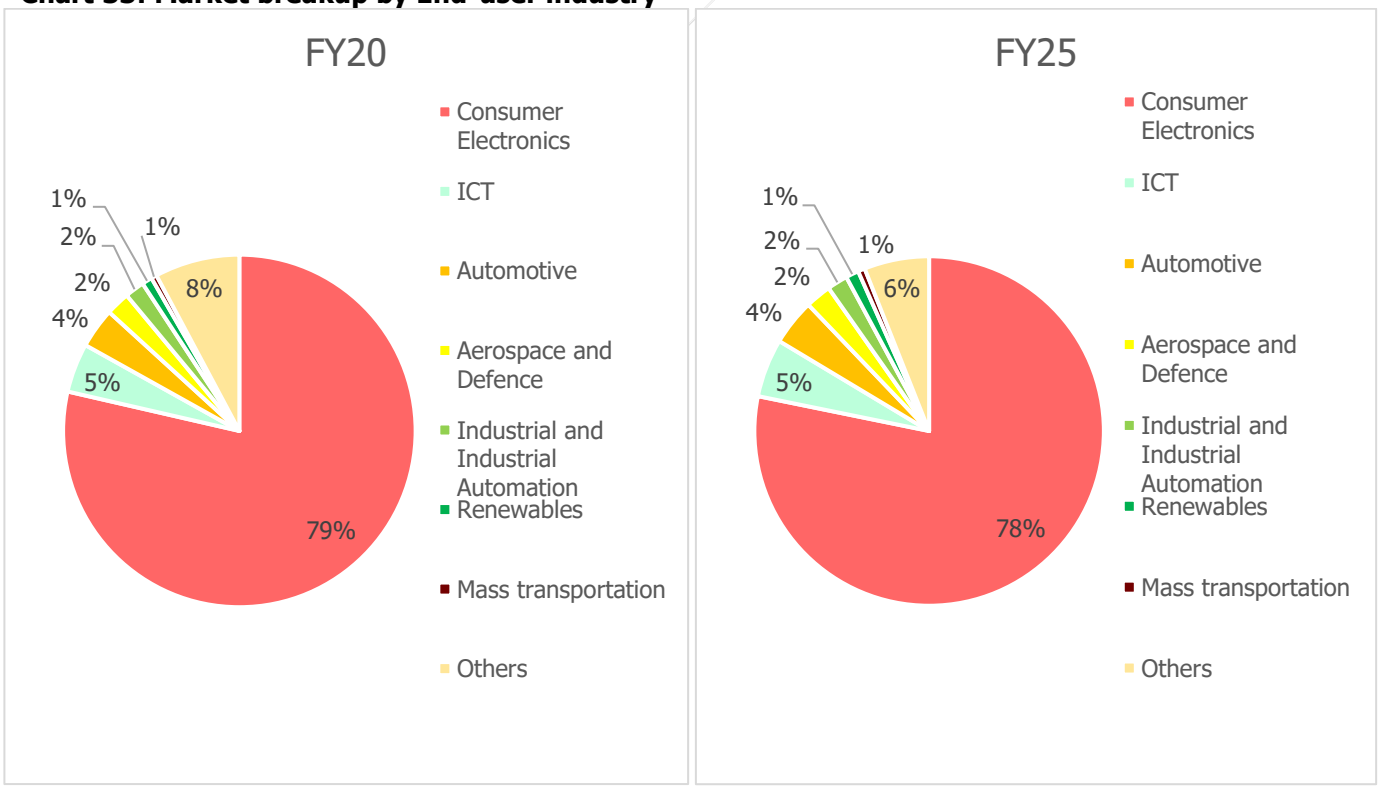
Table: Market Breakup by End Use Industries: Sales Value (in USD Billion)

End Use Industries	FY20	FY25	FY30F
Consumer Electronics	9.7	29.8	87.2
ICT	0.6	2.1	6.9
Automotive	0.5	1.6	5.2
Aerospace and Defence	0.3	0.9	2.9
Industrial and Industrial Automation	0.2	0.7	2.2
Renewables	0.1	0.5	1.6
Mass transportation	0.1	0.2	0.8
Others (Industries other than mentioned above)	1.0	2.3	5.0

Additionally, localization of software and interfaces in regional languages enhances product adoption. The growth of financing options like EMIs and buy-now-pay-later schemes has improved affordability across segments. Product innovation tailored to Indian conditions (e.g., dust-resistant appliances) also supports sustained demand. Together, these factors make consumer electronics the most dominant market for the Electronic manufacturing industry.

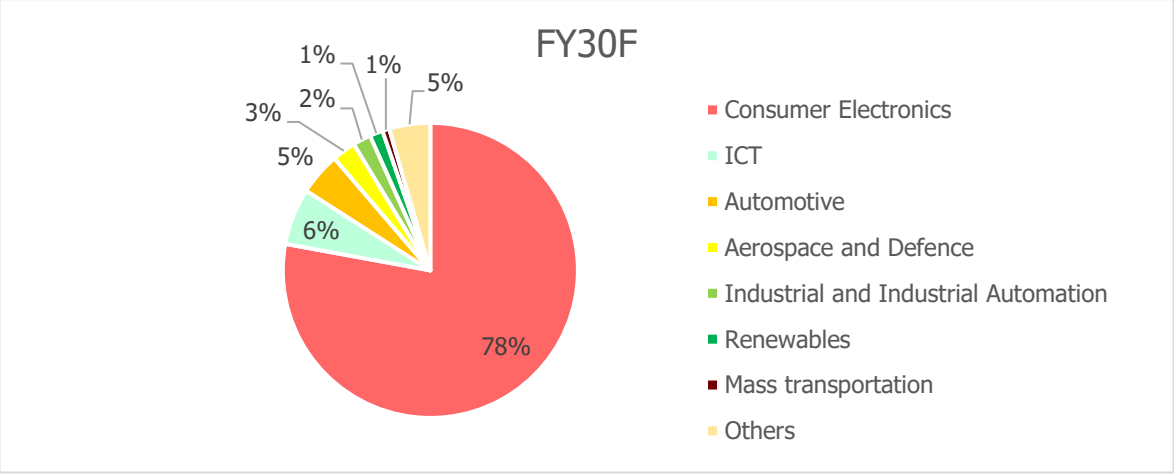
In India's EMS industry, rising demand for product upgrades and faster replacement cycles is boosting production. Consumers are opting for smarter, more efficient devices, leading brands to scale up offerings. This is particularly strong in consumer electronics and ICT segments.

Chart 33: Market breakup by End-user industry



Source: Imarc Group, CareEdge Research
Note:

1. ICT or Information and Communications Technology includes IT and Telecom
2. Automotive includes EVs as well
3. Aerospace and Defence includes Commercial, Defence and Space
4. Renewables include Solar, Wind and Hydro
5. Mass transportation includes Railways & Metros, Road-based Public Transportation
6. Others include the remaining industries other than mentioned above



Source: Imarc Group, CareEdge Research

Note:

1. ICT or Information and Communications Technology includes IT and Telecom
2. Automotive includes EVs as well
3. Aerospace and Defence includes Commercial, Defence and Space
4. Renewables include Solar, Wind and Hydro
5. Mass transportation includes Railways & Metros, Road-based Public Transportation
6. Others include the remaining industries other than mentioned above

Consumer Electronics: Growing from USD 10 billion in FY20 to USD 30 billion in FY25, this segment shows a CAGR of about 25.1%. Rising incomes, smartphone adoption, and demand for smart devices are driving growth. As consumer electronics scale rapidly, Indian EMS providers will see increased demand to deliver large volumes with high quality, fuelling sector expansion.

ICT: Growth in data consumption, expansion of data centers, and 5G network deployment are key drivers. The increasing complexity of IT hardware and telecom equipment demands sophisticated EMS capabilities, pushing Indian manufacturers to scale and innovate, boosting the EMS industry's growth. Rapid expansion of digital infrastructure—fibre networks, 5G towers, and smart cities—requires reliable, high-volume manufacturing of telecom hardware. This pushes EMS providers to ramp up capacity and quality standards, reinforcing India's position as a critical EMS hub.

Automotive (including EV & Clean Energy): Growing from nearly zero to USD 2 billion in FY25, this segment has grown at a CAGR of 28.9% (between FY20 and FY25) and is expected to reach USD 5 billion by FY30. The transition to electric vehicles and clean energy solutions, backed by government policies, is driving demand for specialized electronic components. This encourages OEMs to partner with Indian EMS firms, expanding the sector's footprint.

The Government of India's schemes such as FAME-II, PLI for Auto & ACC batteries, and PM E-DRIVE are driving growth in electric vehicle adoption and domestic manufacturing. By encouraging local production of advanced automotive components and batteries, these initiatives will significantly boost India's Electronic Manufacturing Services (EMS) sector, fostering higher value addition, job creation, and strengthening the country's position in the global electronics and EV supply chain.

Aerospace & Defence: The Union Budget 2025-26 allocates Rs 6,81,210.27 crore to the Ministry of Defence, a 9.53% increase from last year and the highest share of the total budget. This funding supports PM Modi's vision of a technologically advanced and self-reliant Armed Forces by promoting innovation and engaging private players and start-ups in defence technology. With Rs 449.62 crore dedicated to the iDEX and ADITI schemes—showing a threefold rise in two years—this boost will accelerate growth in India's emerging defence manufacturing and technology sector, strengthening domestic capabilities and driving self-reliance.

Industrial and Industrial Automation: The rise of automation, IoT, and Industry 4.0 in heavy industries creates demand for complex electronic control systems and sensors. Indian EMS providers will benefit as manufacturers seek local partners to deliver customized, scalable electronics solutions, strengthening the EMS ecosystem.

3.5 Market Drivers

1. **Government Support and Incentives**
   - Schemes like **PLI (Production-Linked Incentive)** and **Make in India** have encouraged both domestic and global players to invest in local EMS operations.
   - Moreover, the government's endeavours such as Modified Special Incentive Scheme (M-SIPS), Electronics Manufacturing Clusters, Electronics Development Fund and National Policy on Electronics 2019 (NPE 2019) has further supported this growth
   - Income Tax benefits, infrastructure support, and regulatory easing have made India an attractive manufacturing hub.

2. **Rising Demand for Consumer Electronics**
   - India's consumer electronics market is expected to grow from USD 120 billion in FY25 to USD 287 billion by FY30, registering a strong CAGR of 19%. This surge is fuelled by rising income levels, demand for smart devices, and expanding rural and urban adoption.
   - Increasing digitalization and internet penetration in both urban and rural areas are fuelling consumption.

3. **Growth of IoT and Smart Devices**
   - Expanding use of IoT in industrial, consumer, and automotive sectors is driving demand for custom EMS solutions and component-level innovation.
   - From FY26 to FY30, smart device categories in India are projected to grow at strong rates, with mobile phones expected to grow at a CAGR of 7%, LED TVs at 8%, and laptops at 9%, driven by rising digital adoption and consumer demand for connected technologies.
   - The automobile industry is experiencing a major shift driven by the adoption of Internet of Things (IoT) technologies, which are enhancing vehicles with connectivity features and advanced smart functionalities such as remote diagnostics and personalized user interfaces. Consumer priorities have evolved from traditional engine performance to a growing emphasis on convenience and intelligent features. Innovations like ADAS (Advanced Driver Assistance Systems), sunroofs, and integrated connectivity are becoming increasingly significant, reflecting the changing expectations of modern buyers and redefining the competitive landscape of the sector.

4. **Export Opportunities**
   - India is emerging as a global alternative to China for electronics manufacturing, especially for North American, European, and ASEAN markets.

5. **Shift Toward Outsourcing by OEMs**
   - Original Equipment Manufacturers (OEMs) increasingly rely on EMS providers for cost efficiency, scalability, and supply chain flexibility.

- OEMs are increasingly outsourcing manufacturing to EMS providers to reduce costs, improve scalability, and focus on core functions like R&D and marketing. This trend benefits Indian EMS companies by boosting contract volumes, enhancing capacity utilization, and attracting global clients, supporting growth and profitability.

6. **Expansion of the Automotive Electronics Segment**

- Rise in electric vehicles (EVs) and connected cars is boosting demand for EMS in components like battery management systems, infotainment, and control units.
- Many automobile OEMs are expanding their reach through innovative retail strategies, such as 'pop-up' stores in malls, airports, and smaller-format outlets. These digital and retail innovations enhance brand presence, improve customer convenience, and elevate the overall buying experience, thereby strengthening demand sentiment, ultimately benefitting the EMS industry as well.

3.6 Challenges

1. **Inefficient Supply Chain**

- India still heavily relies on imports, especially from China for semiconductors, PCBs, and other critical components, leading to supply chain vulnerabilities.

2. **Shortage of Skilled Manpower**

- Skill level refers to the technical expertise and practical training required to perform specialized tasks in electronics manufacturing. The EMS sector requires a specialized workforce for precision manufacturing, but there is a gap in adequately trained technicians and engineers.
- The Skill India initiative is addressing the EMS sector's need through collaborations with organizations like the Electronics Sector Skills Council of India (ESSCI), it offers industry-aligned courses in areas such as electronics assembly, automation, and IoT. These efforts are helping to bridge the skill gap by equipping technicians and engineers with the practical skills required for precision manufacturing, thereby enhancing the talent pool available to EMS companies in India.

3. **Manufacturing Ecosystem**

- A major challenge for the Indian EMS sector is the lack of a well-established manufacturing ecosystem, which limits seamless integration of components and supply chain efficiency. This gap often leads to higher costs and longer lead times compared to global competitors.

3.7 Entry Barriers to the Indian Electronics Manufacturing Industry:

1. **High Capital Investment:** Setting up manufacturing units and acquiring advanced machinery involves significant upfront costs.
2. **Technology and R&D Requirements:** Competing requires access to cutting-edge technology and continuous innovation.
3. **Skilled Workforce Shortage:** Availability of trained professionals for precision electronics is limited.
4. **Supply Chain Dependence:** Heavy reliance on imported components (especially semiconductors) poses risks and vulnerability.
5. **Regulatory Compliance:** Adhering to quality, safety, and environmental standards adds complexity and cost.
6. **Established Competition:** Dominance of global and large domestic players creates entry-level pressure.

To unlock the full potential of India's EMS sector, certain strategic steps that can be executed-

- **Reduce Capital Barriers** by offering financial support, shared infrastructure, and easy access to credit.
- **Improve Technology Access** through global collaborations, licensing support, and public R&D funding.
- **Bridge Skill Gaps** with focused training programs, industry tie-ups, and practical learning modules.
- **Strengthen Domestic Supply Chains** by developing component manufacturing and reducing dependency on imports.
- **Simplify Business Environment** by easing regulatory processes and encouraging faster clearances.
- **Support Emerging Players** with policy incentives, market linkage support, and dedicated EMS clusters.

3.8 Government Initiatives

1. Production Linked Incentive Scheme (PLI)

The PLI Scheme for large-scale electronics manufacturing incentivizes companies by offering direct financial support based on incremental sales of goods manufactured in India. It primarily targets smartphone and electronic component manufacturers. It will help offset the high capital investment required to enter the market by providing a 5-6% incentive on incremental sales. Encourages global and domestic companies to set up large production bases in India, boosting economies of scale and reducing reliance on imports.

Impact: Attracted major investments from companies like Foxconn, Wistron, and Dixon, strengthening India's position as a global electronics' manufacturing hub.

2. Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS)

SPECS offers financial incentives of up to 25% on capital expenditure for manufacturing electronic components, including semiconductors, passive components, sensors, and display fabrication units. It addresses the supply chain dependence barrier by promoting the local manufacturing of critical electronic components. Reduces India's reliance on imports (especially from China and Taiwan) and helps develop a self-reliant ecosystem.

Impact: Boosts backward integration and supports companies entering component-level manufacturing.

3. Modified Electronics Manufacturing Clusters Scheme (EMC 2.0)

EMC 2.0 supports the development of world-class infrastructure by establishing electronics manufacturing clusters with ready plug-and-play facilities, testing labs, logistics support, and training centers. It will help easing the infrastructure and logistics challenges by offering shared facilities and lowering costs for new entrants. Encourages cluster-based growth, which improves supply chain coordination and enhances productivity.

Impact: Supports the setting up of electronics parks in states like Karnataka, Tamil Nadu, and Uttar Pradesh, attracting both foreign and domestic investments.

4 Overview of Consumer Electronics & EMS Industry in India

The consumer electronics and EMS industry focuses on manufacturing and assembling devices such as smartphones, TVs, and laptops. In India, it has emerged as a major contributor to industrial growth and a key player in the global electronics ecosystem.

4.1 Market Size & Segmentation

India's consumer electronics reached USD 120 billion in FY25, growing at a CAGR of 14.5% from FY20 to FY25, driven by rising demand for smartphones, TVs, laptops, and appliances. With a large, tech-savvy population and a booming middle class, India has become one of the world's fastest-growing consumer markets.

Looking forward, the market is projected to grow at a CAGR of 19.0% from FY25 to FY30, reaching USD 287 billion by FY30. This growth is fuelled by global manufacturers shifting to India under the China+1 strategy and the rise of domestic EMS players meeting rising demand for high-quality, low-cost electronics.

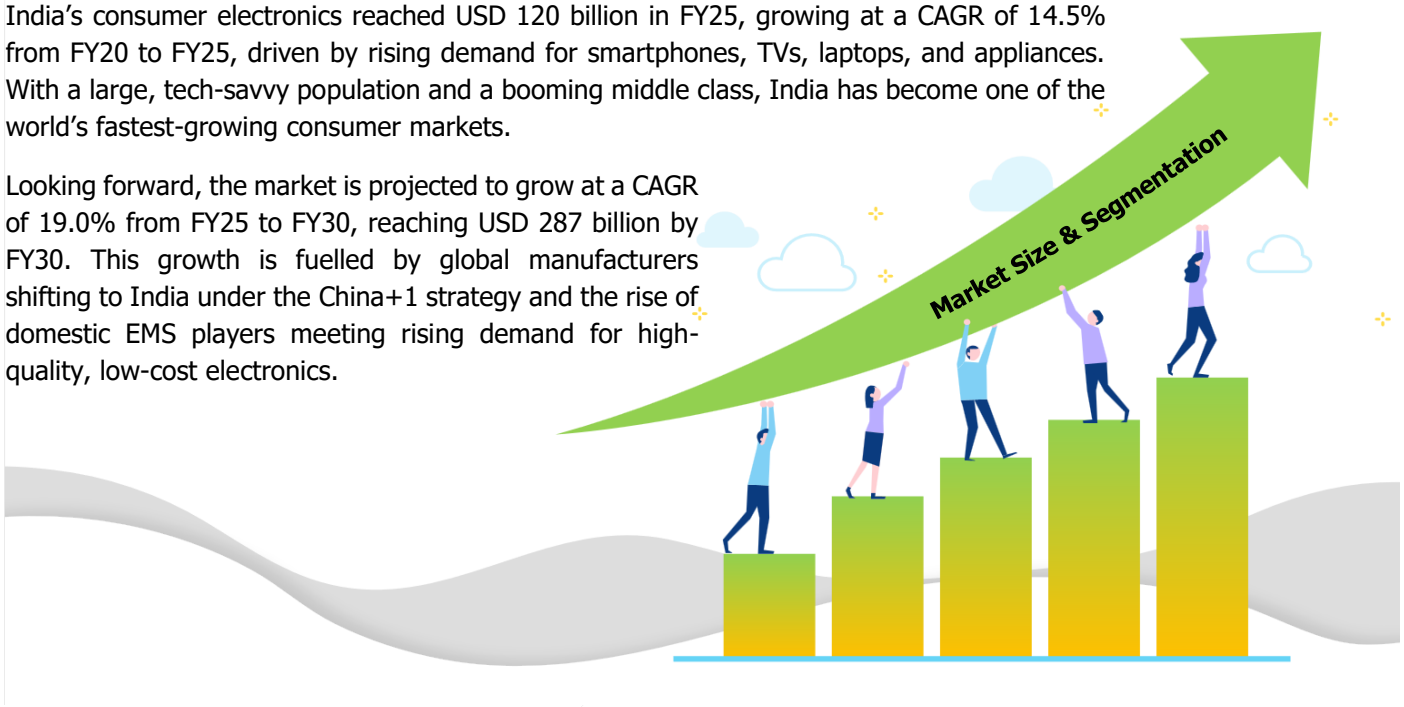
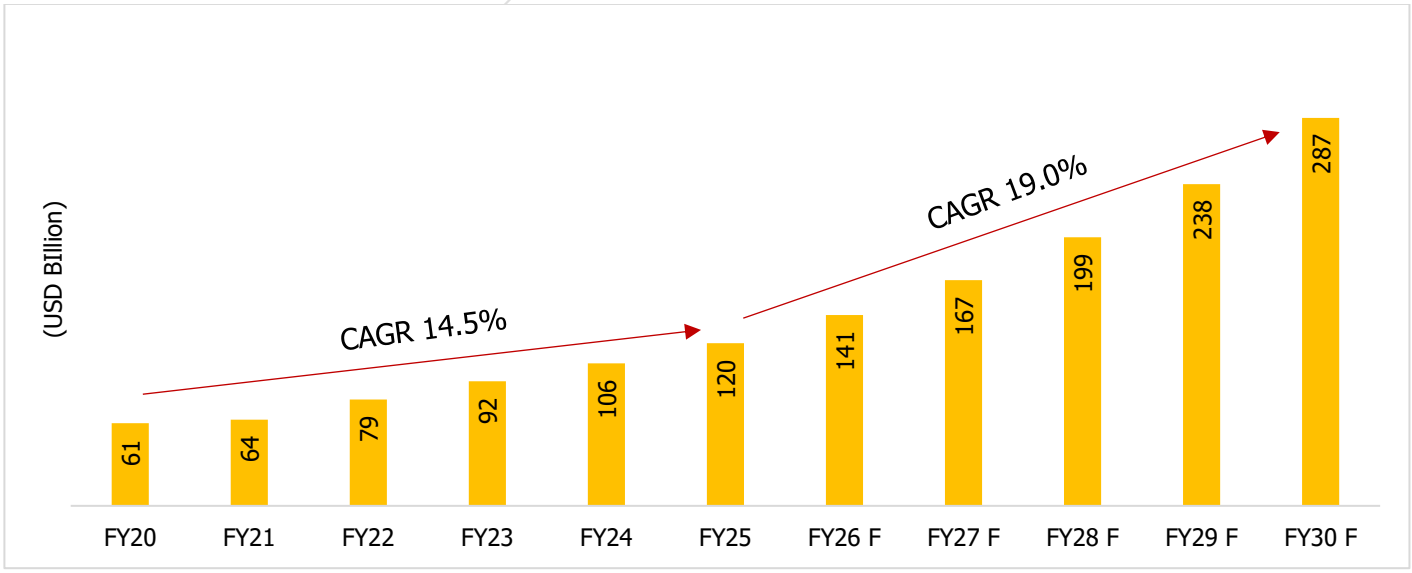


Chart 34: India's Consumer Electronics Market (Sales Value)

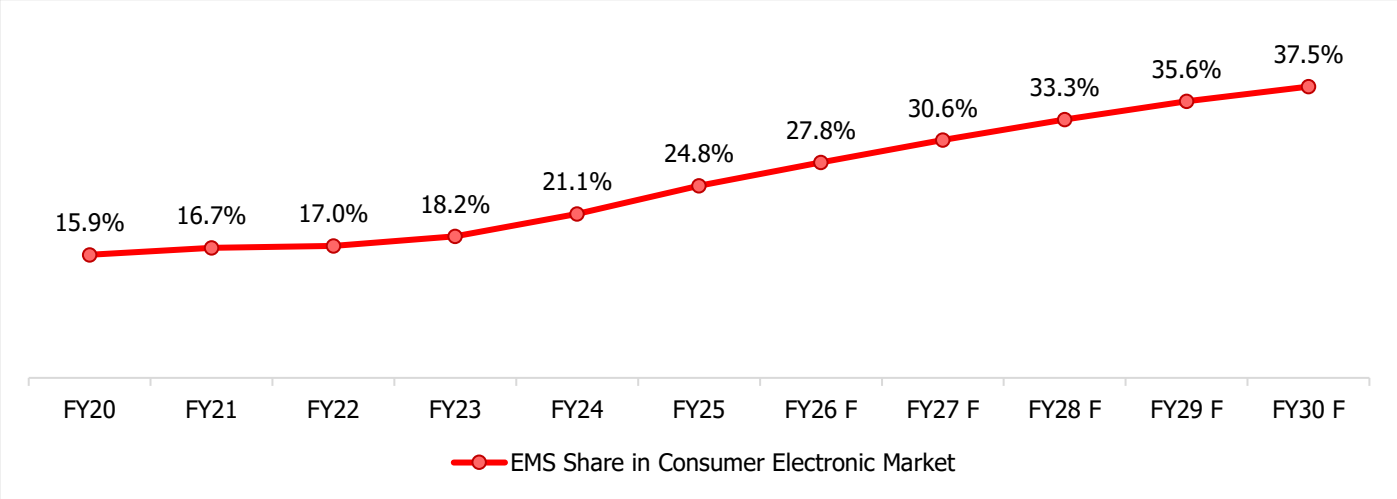


Source: IMARC Group, CareEdge Research
Note: Market size is: production + import – export of finished goods.

Consumer Electronics EMS

In India, EMS (Electronics Manufacturing Services) plays a vital role in the consumer electronics market by supporting large-scale, cost-efficient production and assembly. With growing domestic demand for smartphones, TVs, and other devices, EMS providers are crucial to scaling up manufacturing capabilities. Government initiatives like PLI schemes and a shift towards local sourcing are further boosting EMS growth in the country.

Chart 35: EMS share in Consumer Electronics Market



Source: IMARC Group, CareEdge Research

4.2 India's Consumer Electronics - by Products

India's consumer electronics market is experiencing robust growth, driven by rising disposable incomes, technological advancements, and a growing middle class. The market is diverse, with demand spanning across a wide range of products, from mobile phones and LED TVs to refrigerators and smart home appliances.

Each product category shows distinct growth patterns, reflecting both technological trends and changing consumer preferences-

Table 3: India's Consumer Electronics: Breakup by Products (USD Billion)

Product	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Mobile Phones	40	41	51	59	67	76	89	105	124	148	177
LED TVs	7	7	8	10	11	13	15	18	22	26	31
Laptops	3	3	4	5	5	6	7	8	10	12	15
Refrigerators	2	2	3	3	4	5	5	6	8	9	11
Air Conditioners	2	2	2	3	3	4	5	6	7	8	10
Washing Machines	1	2	2	2	3	3	4	4	5	7	8
Kitchen Appliances	1	1	2	2	2	3	3	4	5	6	7
Home Appliances	1	1	2	2	2	3	3	4	4	5	7
Set-Top Boxes	1	1	1	1	1	2	2	2	3	3	4
Others	3	3	4	5	6	7	8	9	11	14	17
Total	**61**	**64**	**79**	**92**	**106**	**120**	**141**	**167**	**199**	**238**	**287**

Source: IMARC Group, CareEdge Research

Others includes Digital cameras, computer peripherals, DVD players, electronic accessories, etc;
(Figures from FY26 to FY30 are forecasted).

The consumer electronics market in India is expected to see steady growth from FY26 to FY30, driven by several factors. Rising disposable incomes and technological advancements in products like mobile phones, LED TVs, and laptops will fuel demand. The increasing adoption of smart home devices, such as refrigerators, air conditioners, and washing machines, will further drive market expansion. Growing internet penetration and urbanization will boost the demand for connected devices, while the rise of e-commerce platforms makes electronics more accessible.

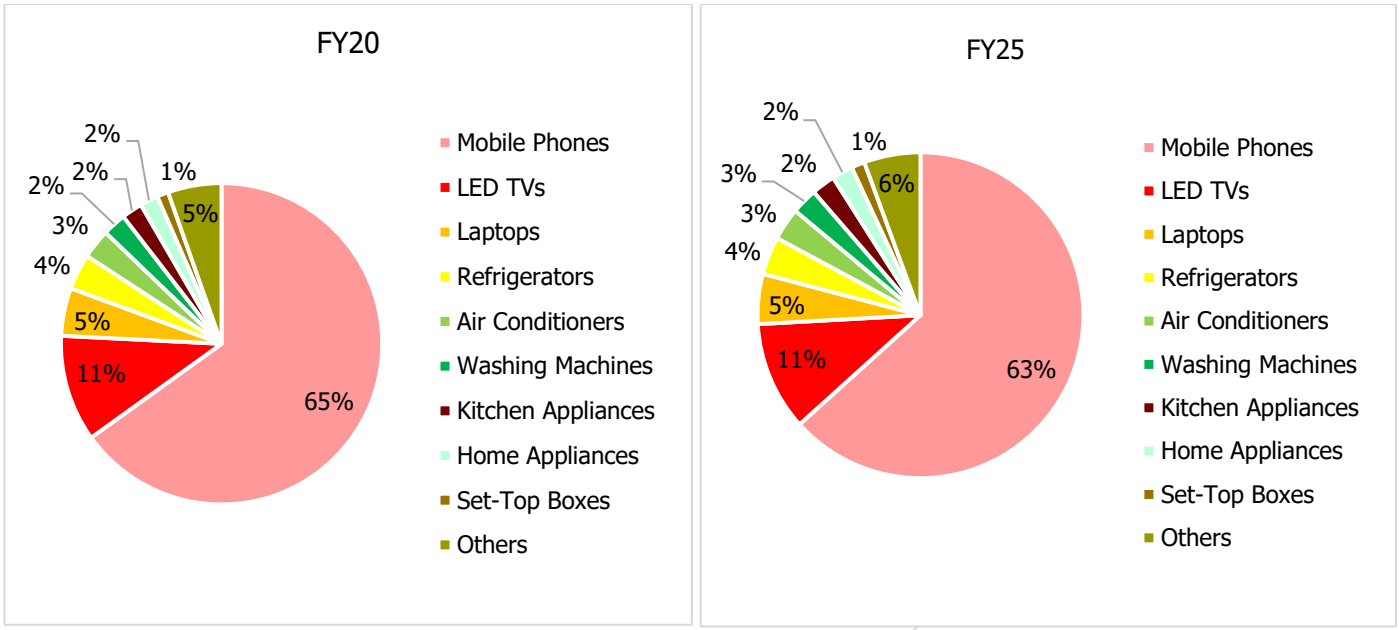
(CAGR)	FY20-25	FY25-30F
Mobile Phones	13.9%	18.3%
LED TVs	14.7%	19.2%
Laptops	15.2%	19.6%
Refrigerators	15.6%	20.1%
Air Conditioners	16.3%	20.7%
Washing Machines	16.6%	21.0%
Kitchen Appliances	17.1%	21.4%
Home Appliances	17.6%	21.8%
Set-Top Boxes	17.8%	22.0%
Others – Products other than mentioned above	15.3%	19.8%

The consumer electronics market in India is undergoing a notable transformation, driven by the swift rise of quick commerce (q-commerce). Platforms like Zepto, Blinkit, and Swiggy Instamart are enabling ultra-fast delivery of a wide range of electronics—from earbuds and smartwatches to larger home appliances—meeting the growing consumer demand for speed and convenience. This shift is supported by increased trust in online shopping, flexible payment methods, and a strong preference for instant deliveries. To overcome challenges such as the lack of physical product interaction and dependable after-sales service, the industry is blending online ease with offline support. As a result, q-commerce is redefining customer expectations and reshaping how electronics are purchased and delivered across the country.

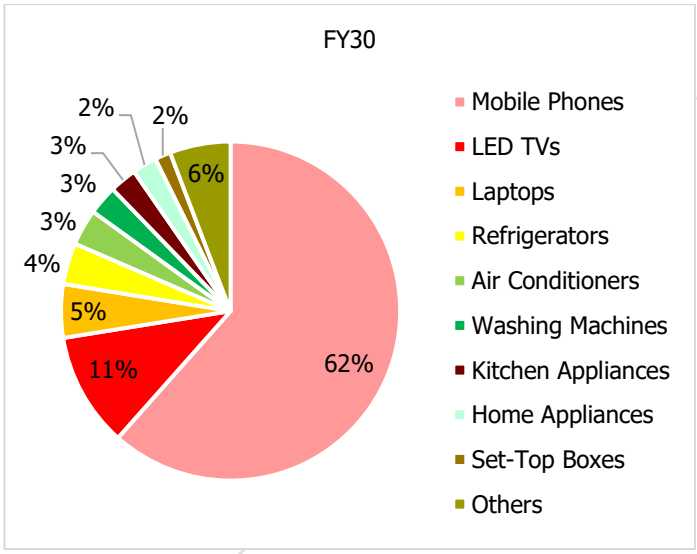
Between FY20 and FY25, India's consumer electronics market expanded, driven by increased digital adoption, growing urbanization, and rising household incomes. Products like home appliances and set-top boxes led the growth with 18% CAGR, while washing machines and kitchen appliances followed closely at 17%, reflecting higher demand for convenience and lifestyle upgrades in middle-class households. Core segments like mobile phones, LED TVs, and laptops also maintained healthy growth as digital connectivity became essential.

Looking ahead to FY25–FY30, the "India's Consumer Electronics" is expected to grow at a faster pace of around 19% CAGR, supported by rising demand for smart, connected, and energy-efficient products. Categories such as air conditioners, washing machines, and kitchen appliances are projected to grow at around 20% CAGR, while home appliances and set-top boxes are expected to lead with 22% CAGR. This surge is being driven by increasing rural penetration, growing aspirations in tier-II and III cities, the rise of smart homes, and aggressive product distribution via quick commerce and e-commerce platforms.

Chart 36: India's Consumer Electronics Market: Breakup by Products (FY20 vs FY25 vs FY30)



Source: IMARC Group, CareEdge Research
Others includes Digital cameras, computer peripherals, DVD players, electronic accessories, etc.



Source: IMARC Group, CareEdge Research
Others includes Digital cameras, computer peripherals, DVD players, electronic accessories, etc.

The combined impact of Artificial Intelligence (AI), 5G technology, and the Internet of Things (IoT) is revolutionizing India's consumer electronics market. AI is improving user experiences through personalized features, smart automation, and predictive maintenance. Meanwhile, 5G offers faster, low-latency connectivity that supports real-time device interactions. At the same time, the growing IoT ecosystem connects billions of devices, enabling smarter homes, wearables, and appliances. Together, these technologies are driving innovation, boosting efficiency, and opening new opportunities for both consumers and manufacturers across India.

4.3 India's Consumer Electronics Market- by Product- wise Sub- Segments

Mobile Phone-

By FY25, PCBA and Displays continued to dominate the component structure, with shares of 28% and 20%, respectively. From FY25 to FY30, most component shares remain relatively stable, but items like adapters, wire harnesses, and wires and cables show a CAGR of ~2–3%, reflecting increased localization and demand for robust connectivity components.

LED TV-

In FY25, displays (23%) and PCBA (22%) held the bulk of the component value. Over FY25–FY30, component shares remained largely unchanged, indicating a mature and saturated market. Growth is seen primarily in wires, power cords, and plugs, which expand (CAGR ~1–2%) as backend accessories are increasingly sourced domestically.

Mobile Phone

Product	FY20	FY25	FY30
PCBA	29.3%	28.2%	27.4%
Displays	21.0%	20.5%	20.1%
PCB Controllers & Control Box	9.7%	9.8%	9.8%
Electrical Accessories	4.7%	4.8%	4.9%
Wire Harness	4.5%	4.7%	4.8%
Wires and Cables	4.1%	4.4%	4.6%
Indian Plugs, Sockets, Receptacles	3.1%	3.4%	3.5%
Mobile Chargers	2.9%	3.1%	3.3%
Power and Extension Cords	2.7%	3.0%	3.2%
Adapters	2.4%	2.7%	2.9%
Others	15.7%	15.5%	15.4%

LED TV

Product	FY20	FY25	FY30
Displays	23.7%	22.7%	22.1%
PCBA	22.5%	21.9%	21.7%
PCB Controllers & Control Box	13.0%	12.9%	12.8%
Electrical Accessories	5.1%	5.3%	5.3%
Wire Harness	4.9%	5.1%	5.2%
Indian Plugs, Sockets, Receptacles	4.5%	4.8%	4.9%
Wires and Cables	4.4%	4.7%	4.8%
Power and Extension Cords	4.2%	4.5%	4.7%
Adapters	3.7%	4.1%	4.3%
Remotes	2.5%	2.8%	2.9%
Others	11.5%	11.3%	11.3%

Others in Mobile phone include battery, speaker modules, RF antenna, microphone, camera and other sensors, etc.
Others in LED TV include speakers, TV frame sensors, tuner module, internal antenna, cooling units, mechanical parts, etc.

Laptops-

As of FY25, PCBA (31%) and Displays (18%) continued to be the largest components. Between FY25 and FY30, most key components show marginal decline or stagnation, on the other hand elements like wire harnesses and extension cords see a CAGR of ~1.5–2%, aligned with increased modularity and peripheral demand.

Refrigerators-

By FY25, Compressors (31%) remained the leading cost driver. From FY25 to FY30, the component mix remains stable, with a slight decline in compressor share and incremental growth in cords, wires, and power accessories. This shift reflects gradual electronic expansion in refrigeration units.

Laptop

Product	FY20	FY25	FY30
PCBA	32.1%	30.9%	30.1%
Displays	18.6%	18.3%	18.1%
PCB Controllers & Control Box	8.9%	9.0%	9.1%
Adapters	7.1%	7.2%	7.3%
Electrical Accessories	4.5%	4.7%	4.8%
Wires and Cables	4.3%	4.6%	4.7%
Wire Harness	4.2%	4.5%	4.7%
Power and Extension Cords	4.1%	4.4%	4.6%
Indian Plugs, Sockets, Receptacles	3.4%	3.7%	3.9%
Others	12.7%	12.7%	12.6%

Refrigerators

Product	FY20	FY25	FY30
Compressor	32.5%	31.2%	30.4%
PCBA	13.0%	12.7%	12.5%
PCB Controllers & Control Box	9.0%	9.1%	9.1%
Wire Harness	8.1%	8.3%	8.4%
Electrical Accessories	7.9%	8.1%	8.3%
Wires and Cables	7.1%	7.5%	7.7%
Power and Extension Cords	6.3%	6.6%	6.8%
Indian Plugs, Sockets,	4.8%	5.1%	5.3%

Others in laptop include battery pack, cooling fan, Wi-Fi/BT module, SSD, speakers, touchpad, mechanical parts, etc.
Others in refrigerator include condenser fan, thermostat, insulation heater, mechanical parts, etc.

ACs-

In FY25, Compressors (24%) and PCBA (16%) continued to lead. Over the next five years, compressor share reduces slightly, while growth is evident in power cords, wire harnesses, and "Others" (CAGR ~1.5–2%), driven by increased sophistication and demand for smart, energy-efficient ACs.

Washing Machine-

FY25 data shows motors (24%), PCBA (14%), and controllers (13%) as top components. From FY25 to FY30, motors and PCB shares are expected to stabilize, but components like wire harnesses, cables, and extension cords may grow steadily (CAGR ~2–3%), owing to rising automation and added features in washing machines.

Air Conditioner

Product	FY20	FY25	FY30
Compressor	25.1%	24.1%	23.4%
PCBA	16.3%	16.0%	15.7%
PCB Controllers & Control Box	11.3%	11.2%	11.2%
Wire Harness	8.1%	8.2%	8.2%
Electrical Accessories	7.8%	8.0%	8.1%
Wires and Cables, Power and Extension Cords, Indian Plugs, Sockets, Receptacles	7.2%	7.5%	7.6%
Remotes	6.2%	6.5%	6.7%
Others	4.7%	5.0%	5.2%

Washing Machine

Product	FY20	FY25	FY30
Motors	24.6%	23.6%	22.8%
PCBA	14.8%	14.4%	14.2%
PCB Controllers & Control Box	12.7%	12.7%	12.6%
Wire Harness	8.3%	8.5%	8.6%
Electrical Accessories	8.0%	8.2%	8.4%
Wires and Cables, Power and Extension Cords, Indian Plugs, Sockets, Receptacles	7.1%	7.5%	7.7%
Others	6.3%	6.6%	6.8%

Others in ACs include condenser coils, filters, refrigerant lines, swing mechanisms, sensors, mechanical parts, etc.
Others in washing machine include valves, mechanical drum, heater, tubs, mechanical parts, etc.

Kitchen Appliances-

In FY25, motors (17%) and others (23%) dominated due to the diversity of devices. From FY25 to FY30, steady growth is seen in power cords, wires, and adapters (CAGR ~1.5–2%), reflecting broader electrification and the rise of multifunction smart appliances in Indian kitchens.

Kitchen Appliances

Product	FY20	FY25	FY30
Motors	17.9%	17.3%	16.9%
PCBA	10.5%	10.2%	10.1%
PCB Controllers & Control Box	9.5%	9.4%	9.3%
Electrical Accessories	7.9%	8.1%	8.2%
Wire Harness	7.6%	7.9%	8.0%
Power and Extension Cords	7.1%	7.4%	7.6%
Wires and Cables	6.9%	7.3%	7.5%
Indian Plugs,	4.5%	4.9%	5.1%

Home Appliances

Product	FY20	FY25	FY30
Motors	17.8%	16.8%	16.1%
PCBA	10.7%	10.4%	10.3%
Electrical Accessories	10.3%	10.3%	10.2%
PCB Controllers & Control Box	9.2%	9.3%	9.3%
Wire Harness	8.2%	8.4%	8.5%
Power and Extension Cords	7.4%	7.7%	7.9%
Wires and Cables	7.0%	7.4%	7.6%
Indian Plugs, Sockets, Receptacles	6.1%	6.4%	6.7%
Adapters	4.2%	4.5%	4.7%
Remotes	1.7%	1.8%	1.9%
Others	17.5%	17.1%	16.8%

Product	FY20	FY25	FY30
Sockets, Receptacles			
Adapters	4.1%	4.5%	4.7%
Others	24.0%	23.2%	22.6%

Others in kitchen appliances include heating elements, sensors, batteries, blades, jars, knobs, trays, buttons, gaskets, seals.
Others in home appliances include blower, heating unit, sensors, filters, batteries, other mechanical parts, etc.

Set-Top Boxes-

By FY25, PCBA (32%) and controllers (13%) retained their central role. While overall component shares remain flat through FY30, steady growth (~1–1.5% CAGR) in wiring, plugs, and extension cords indicates continuing hardware upgrades and gradual indigenization of box peripherals.

Set- Top Boxes

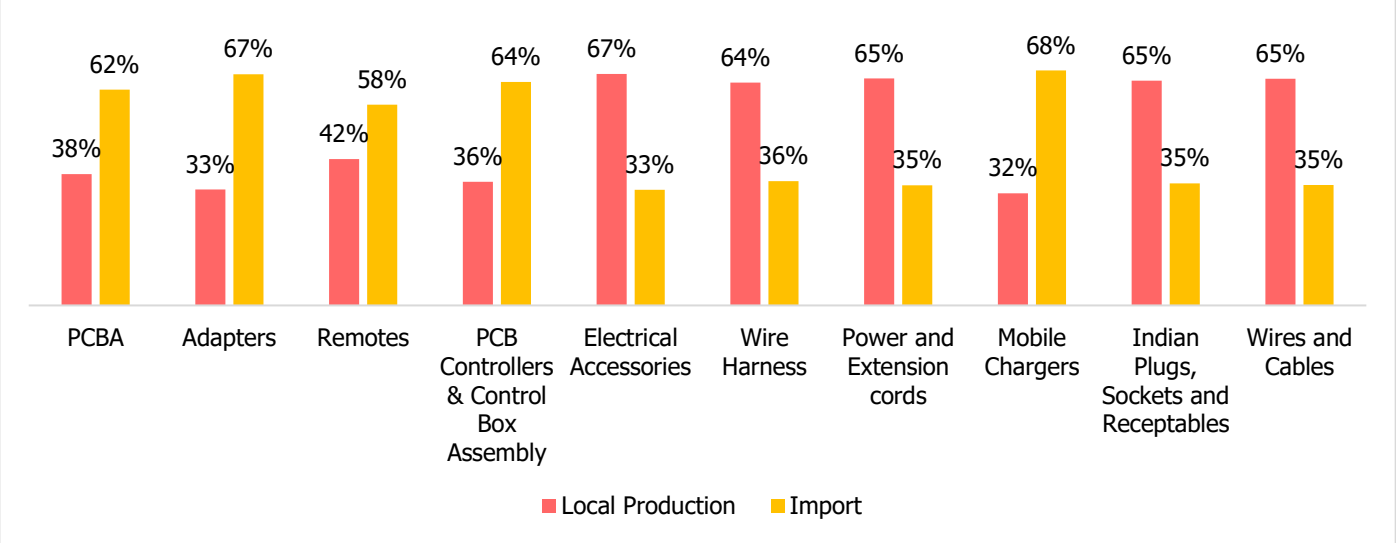
Product	FY20	FY25	FY30
PCBA	33.2%	32.3%	31.8%
Adapters	6.1%	6.2%	6.3%
Remotes	9.7%	9.8%	9.9%
PCB Controllers & Control Box	13.0%	12.8%	12.7%
Electrical Accessories	5.0%	5.1%	5.2%
Wire Harness	4.5%	4.7%	4.9%
Power and Extension Cords	4.1%	4.5%	4.7%
Indian Plugs, Sockets, Receptacles	4.7%	4.9%	5.0%
Wires and Cables	4.4%	4.7%	4.9%
Others	15.5%	15.0%	14.7%

Note: Others include IR receivers, Wi-Fi/BLE module, memory chip, audio amplifier, heatsink, signal filters, mechanical parts, etc.

4.3.1 Domestic Production vs Import Market

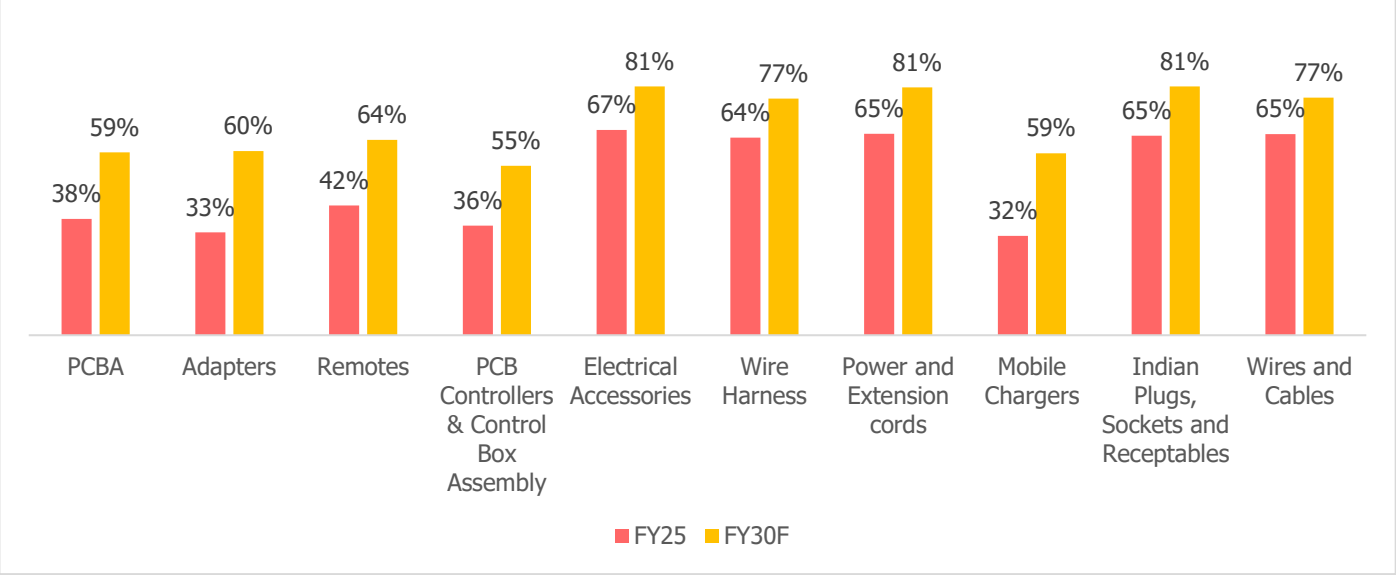
The Subsegment Market Breakup by Production vs Import (FY25) for consumer electronics reveals high import dependence for components like mobile chargers (68%), adapters (67%), and PCBA (62%). In contrast, domestic manufacturing is stronger in segments such as electrical accessories, wire harnesses, plugs, and cables, with over 60% produced locally. While India has made progress in building local capacity, critical components continue to rely on imports, indicating further scope for indigenization.

Chart 37: Subsegment Market Breakup by Production vs Import (FY25)



Source: IMARC Group, CareEdge Research

Chart 38: Subsegment Market Breakup by Production vs Import (FY30F)



Source: IMARC Group, CareEdge Research
Note: F: Forecast

Over the coming years, India's domestic manufacturing capacity is projected to expand significantly across various electronics subsegments. Key areas such as PCBA, adapters, remote controls, mobile chargers, power and extension

cords, and wires and cables are expected to witness increased local production. This growth will be driven by rising demand from consumer electronics, industrial automation, and automotive sectors, along with strong policy support under initiatives like PLI and Make in India. As a result, India is gradually reducing its import dependence while strengthening its position as self-reliant electronics manufacturing hub.

4.4 Market Drivers & Restraints

Market Drivers
Rising Disposable Incomes: With steady economic growth and an increase in per capita income, Indian consumers now have greater purchasing power. This shift is enabling households to invest in lifestyle-enhancing electronics such as smartphones, smart TVs, and kitchen appliances, which were previously considered luxury items.
Expanding Middle Class: India's middle class is growing rapidly and becoming more brand-conscious and aspirational. This demographic seeks value-added features, quality products, and frequent upgrades, leading to consistent demand across both metros and tier-II/III cities. The rising appetite for convenience and modern living is driving sales of smart and connected devices.
Growing Internet Penetration: The widespread availability of affordable smartphones and low-cost data plans has significantly increased internet access, even in remote areas. As a result, consumers are now more informed, price-sensitive, and digitally active, using online platforms to research, compare, and purchase electronics.
Technological Advancements: Advancements in 5G connectivity, Artificial Intelligence (AI), and Internet of Things (IoT) are transforming the electronics landscape. Products such as AI-powered TVs, voice assistants, wearables, and smart home appliances are gaining popularity, prompting faster product replacement cycles and growing demand for feature-rich devices**.**
Supportive Government Policies: Government initiatives like Make in India, the Production-Linked Incentive (PLI) scheme, and customs reforms are strengthening the domestic electronics manufacturing ecosystem. These policies encourage local production, reduce dependence on imports, and make India a more attractive destination for global electronics brands.
Expansion of E-Commerce: The rise of e-commerce platforms such as Amazon, Flipkart, and Tata Neu have made consumer electronics more accessible across India. Competitive pricing, deep discounts, EMI offers, easy returns, and fast delivery are encouraging both first-time and repeat buyers—especially in smaller towns and rural markets.

Market Restraints
Underdeveloped Local Supply Chain: A significant share of essential components like semiconductors, display units, and sensors is still sourced from abroad
Skilled Talent Shortage: There is a lack of adequately trained workers, especially for high-precision tasks in assembly, quality control, and advanced testing—limiting efficiency and innovation.
Limited R&D and Design Capability: India’s electronics sector invests minimally in research and development, resulting in a weak ecosystem for innovation, product design, and proprietary technology development.
Regulatory and Operational Bottlenecks: Navigating multiple compliance requirements, tax complexities, and certification standards increases the cost and time of doing business—especially for smaller players resulting in high barriers to entry.

Tough Competitive Landscape: The market is highly competitive, dominated by global brands and established local players, making it challenging for new entrants and MSMEs to scale or gain visibility.

4.5 Value Chain Dynamics

The Consumer Electronics & EMS Industry in India operates through a comprehensive value chain, ranging from raw material sourcing to after-sales service. Every stage in this chain is essential for ensuring efficient production, timely distribution, and high customer satisfaction of electronic products.

Stage	Description
Raw Materials, Components Sourcing & Manufacturing	This stage involves sourcing essential materials like semiconductors, circuit boards, plastics, and metals from both domestic and international suppliers. While India produces key components such as PCBAs, adapters, cables, and remotes locally, it continues to rely heavily on imports for advanced components, particularly semiconductors. Alongside this, product design, prototyping, research and development (R&D), and patenting are integral to driving innovation and ensuring products meet market demands with a competitive edge.
Assembly and Production	Assembly of components into final consumer products like smartphones, televisions, home appliances, and wearables. EMS companies often handle large-scale assembly for global brands.
Testing & Quality Control	Rigorous testing to ensure product durability, performance, and safety standards are met, ensuring high reliability and consumer satisfaction.
Packaging, Distribution & Retail Sales	This stage involves packaging finished products and preparing them for retail or bulk shipment to wholesalers, exporters, and distribution networks. Efficient logistics and supply chain management ensure timely delivery to market, where products are then sold through e-commerce platforms, offline stores, and distributors—supported by targeted marketing strategies to drive consumer demand and build brand loyalty.
After-Sales Service & Support	Providing after-sales support, including warranties, customer service, repair services, and spare parts, ensuring continued customer satisfaction and product longevity.

4.6 Government Policies & Initiatives

Policy/Initiative	Objective	Support/Assistance	Impact/ Goal
Production Linked Incentive (PLI) Scheme	To boost domestic manufacturing and attract significant investments in electronics and mobile phone production.	Provides incentives based on sales growth.	Aims to generate employment and enhance India's role in global electronics manufacturing.
Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS)	To strengthen the domestic production of electronic components and semiconductors.	Offers capital expenditure assistance for setting up or expanding production facilities.	Aims to reduce import reliance and strengthen local manufacturing of critical components.

Policy/Initiative	Objective	Support/Assistance	Impact/ Goal
Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme	To develop robust infrastructure for electronics manufacturing hubs across India.	Provides financial aid for creating infrastructure and shared facilities.	Aims to lower logistics costs, streamline supply chains, and attract investment in manufacturing zones.
Atmanirbhar Bharat Abhiyan	To promote self-sufficiency by encouraging local manufacturing and reducing dependency on imports.	Supports local production, innovation, and start-ups in multiple sectors, including electronics.	Focuses on promoting self-reliance, innovation, and boosting manufacturing capabilities across industries.
Atal Innovation Mission (AIM)	To encourage a culture of innovation and entrepreneurship throughout India.	Establishes innovation labs, incubation centres, and provides funding to start-ups.	Aims to support the growth of new technologies and foster innovation in the electronics and technology sectors.
Skill India Initiative	To train individuals in various skills, particularly those related to electronics manufacturing.	Offers skill development programs to enhance employability in the electronics industry.	Focuses on closing the skill gap and providing a qualified workforce for the electronics sector.

4.7 Entry Barriers

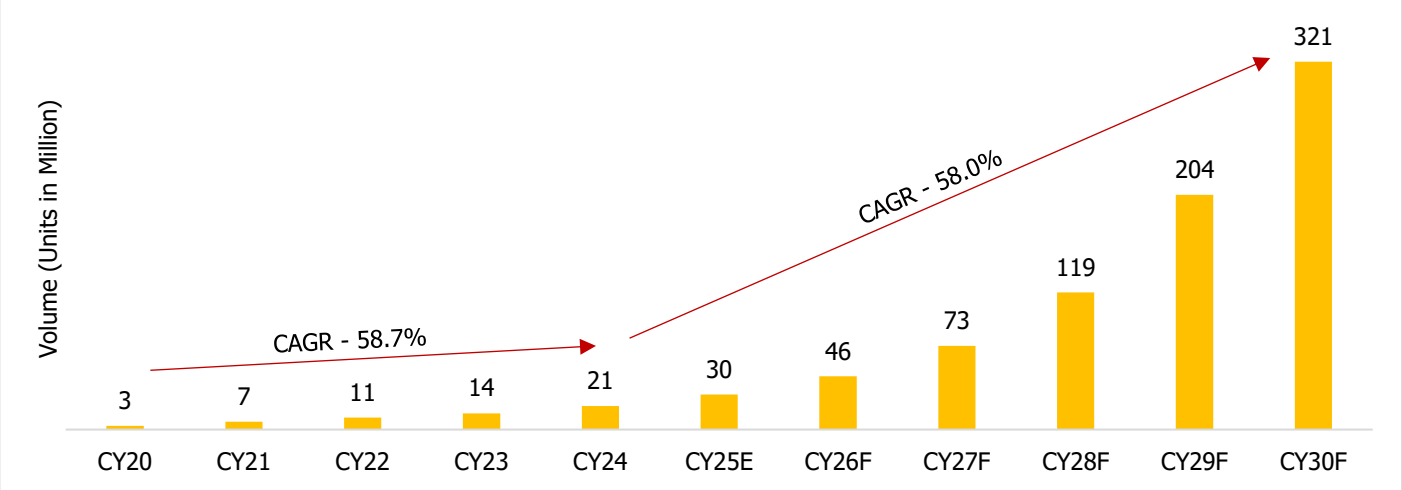
Entry Barrier	Description
High Capital Investment	Significant upfront investment in manufacturing facilities and technology is required, making it challenging for new entrants.
Regulatory Complexity	Navigating India's complex regulatory environment, including certifications and import/export rules, can be costly and time-consuming.
Established Competition	Existing companies benefit from strong brand recognition, supply chain networks, and economies of scale, making it difficult for new players to compete.
Supply Chain and Logistics Challenges	Developing a reliable logistics and supply chain infrastructure in India is complex and may be a challenge for new entrants.
Dependence on Imported Components	Reliance on imports for key components like semiconductors increases costs and exposes new entrants to global supply chain risks.
Skilled Workforce Availability	The challenge of sourcing and retaining skilled labor for specialized manufacturing processes can limit the ability of new entrants to scale.

5 Electric Vehicle Industry

Electric Vehicles: A Sustainable Transportation Alternative

An Electric Vehicle (EV) is a type of automobile that uses an electric motor for propulsion instead of a traditional internal combustion engine (ICE). Unlike conventional vehicles that rely on petrol or diesel, EVs are powered by electricity stored in rechargeable batteries. These batteries are charged using an external electricity source, such as a home charger, public charging station, or dedicated EV infrastructure. Once charged, the stored electrical energy is used to operate the motor, enabling the vehicle to move. EVs offer a cleaner and more sustainable alternative to fuel-based vehicles, as they produce zero tailpipe emissions, reduce dependence on fossil fuels, and help mitigate urban air pollution.

Chart 39: Global EV Market Trend



Source: Imarc Group, CareEdge Research

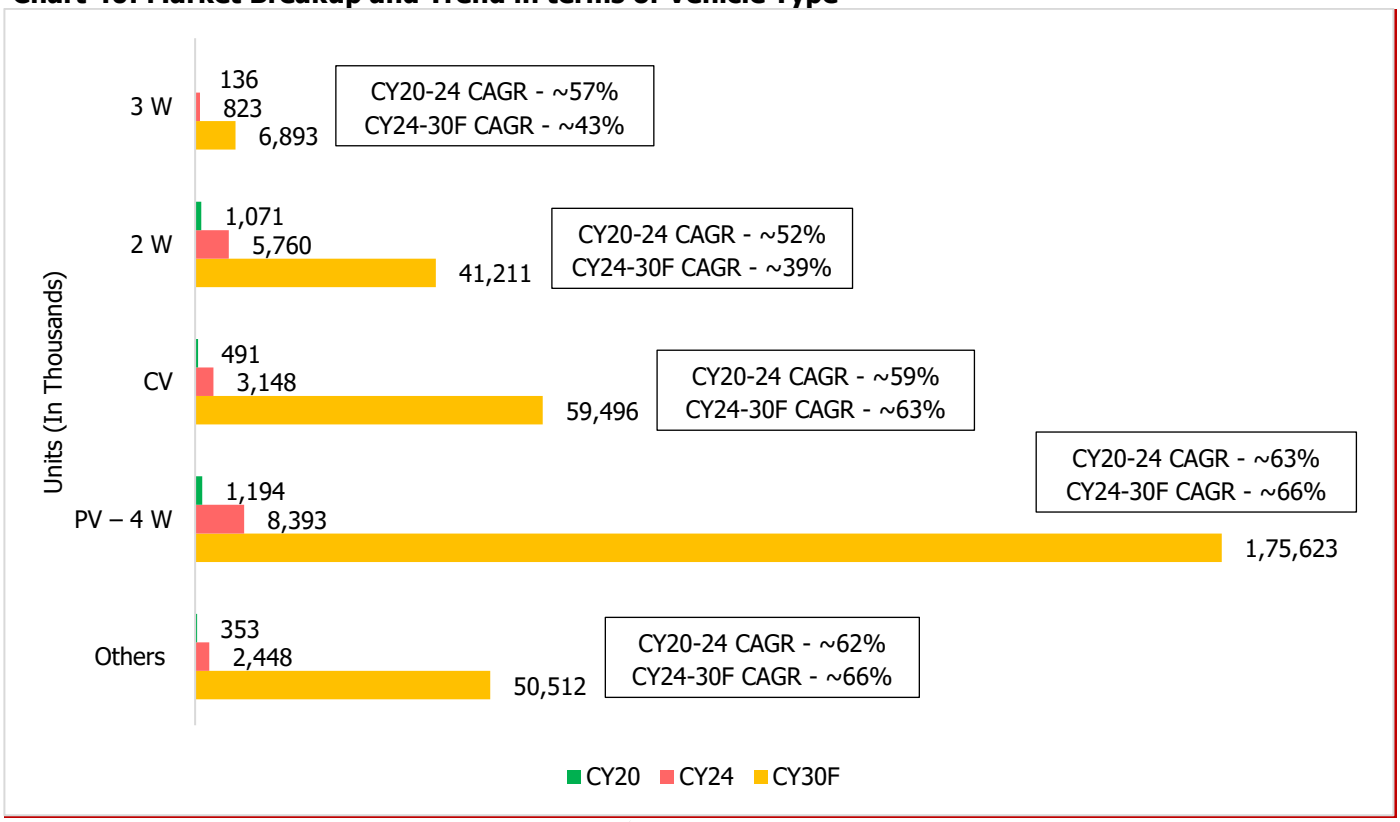
Market Segmentation:

The EV market is segmented into **two-wheelers (2W), three-wheelers (3W), four-wheelers (4W), and Others**:

	**2W**: Includes e-scooters and motorcycles, popular for personal use and delivery services due to low cost and ease of charging.
	**3W**: Used mainly for public transport (e-rickshaws) and small cargo movement. Widely adopted in India for affordable last-mile connectivity.
	**4W**: Comprises passenger vehicles and light commercial vehicles, gaining popularity with wider model availability, longer battery range, and expanding charging infrastructure.
	**Others**: Encompasses electric buses, trucks, and specialty vehicles used in public transport and industrial applications. This segment is growing with fleet electrification and urban mobility initiatives.

Each segment plays a unique role in meeting diverse transport needs and supports the broader transition to clean mobility.

Chart 40: Market Breakup and Trend in terms of Vehicle Type



Source: Imarc Group, CareEdge Research

Note:

1. CV includes Trucks and buses
2. Others include Small Goods Vehicles

The global 4W EV segment is expected to witness the fastest growth, with a projected CAGR of around 64% during FY20-30 due to a combination of supportive government policies, rising environmental awareness, and advancements in battery technology.

Growth Drivers of the Global EV Industry

- Environmental Concerns: Rising awareness about air pollution and climate change is prompting a shift from ICE vehicles to EVs as a cleaner alternative.
- Government Policies and Incentives: Various national and state governments are offering subsidies, tax exemptions, and policy support (like PM E-Drive in India, EV mandates in China, and the IRA in the U.S.) to boost EV adoption.
- India's COP commitment milestones, such as achieving net zero by 2070 and sourcing 50% of energy from renewables by 2030, serve as broad climate goals influencing national policies. These targets drive transformation across sectors like energy, transport, and industry. They reflect India's integrated approach to sustainable and low-carbon economic growth. These climate goals will accelerate EV industry growth by promoting cleaner transport solutions and prompting electric mobility adoption.
- Advancements in Battery Technology: Continuous improvements in battery efficiency, energy density, and cost are enhancing vehicle range and reducing overall EV prices.

- Expansion of Charging Infrastructure: Increasing investments in public and private EV charging networks are reducing range anxiety and encouraging adoption.
- Automaker Investments: Major automotive manufacturers are heavily investing in EV development and launching new models across all segments to meet growing demand.
- Fuel Cost Savings: EVs offer lower running and maintenance costs compared to ICE vehicles, which appeals to cost-conscious consumers.
- Urbanization and Smart Cities: The rise of smart city initiatives and stricter emission zones in urban centres are promoting the use of electric mobility solutions.

5.1 EV Charger and Related Components Industry

Understanding EV Chargers

A residential EV charger is a compact device that enables electric vehicle owners to conveniently charge their vehicles at home using the household electrical supply.

5.1.1 Global EV Charger and Components Market

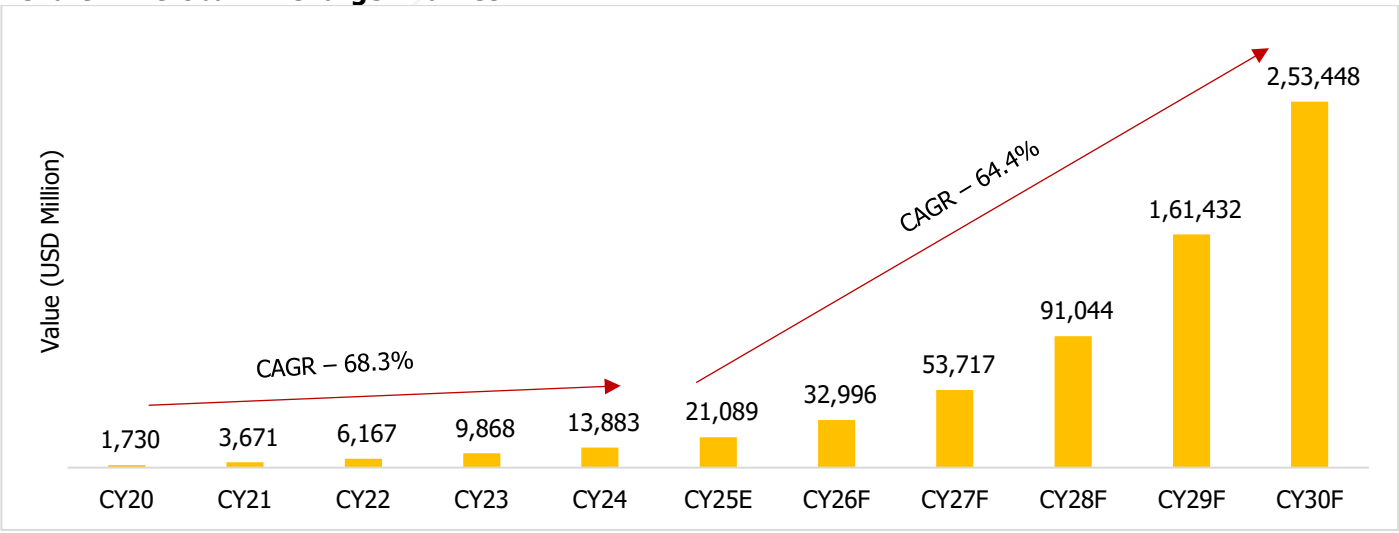
Demand Trends in EV Chargers

The global residential EV chargers are witnessing strong growth, fuelled by increasing electric vehicle adoption, supportive government incentives, and consumer preference for convenient at-home charging, particularly overnight. This trend is particularly evident in suburban and rural regions, where access to public charging infrastructure may be limited.

Technological advancements, such as integration with smart home systems and solar energy setups, are further driving adoption by offering energy-efficient and cost-effective solutions. The market is also benefiting from regulations mandating EV-ready infrastructure in new residential buildings, particularly across Europe and North America.

Looking ahead, the residential EV charger market is expected to grow steadily, supported by an expanding global EV fleet and a wider range of affordable, user-friendly charger options. The market is increasingly shifting towards smart chargers that offer advanced features such as real-time energy monitoring, app-based remote control, and dynamic load management—enhancing both energy efficiency and user convenience.

Chart 41: Global EV Charger Market



Source: Imarc Group, CareEdge Research

5.1.1.1 Global EV Charger Market Segmentation

These EV chargers are generally classified into two types:

Level 2 chargers are more commonly used in homes with dedicated EV charging setups, offering a practical and efficient solution for daily charging needs.

Segmentation based on Charger Type:

The EV charger market can be segmented based on **charger type** as follows:

1. **AC Chargers (Alternating Current)**
   - **Level 1 Chargers**:
     - Use a standard 120V outlet
     - Slow charging – typically adds 3–5 miles of range per hour
     - Ideal for home use with minimal driving needs
   - **Level 2 Chargers**:
     - Use a 240V outlet
     - Faster charging – adds 10–60 miles of range per hour
     - Common in homes, commercial buildings, and public stations

2. **DC Fast Chargers (Direct Current)**
   - Also known as **Level 3 Chargers**
   - Provide rapid charging by supplying power directly to the battery
   - Capable of charging an EV up to 80% in 20–40 minutes
   - Used primarily in commercial charging stations and highway corridors

Table 4: Global Market Segmentation, Based on Charger Type (Volume and Value)

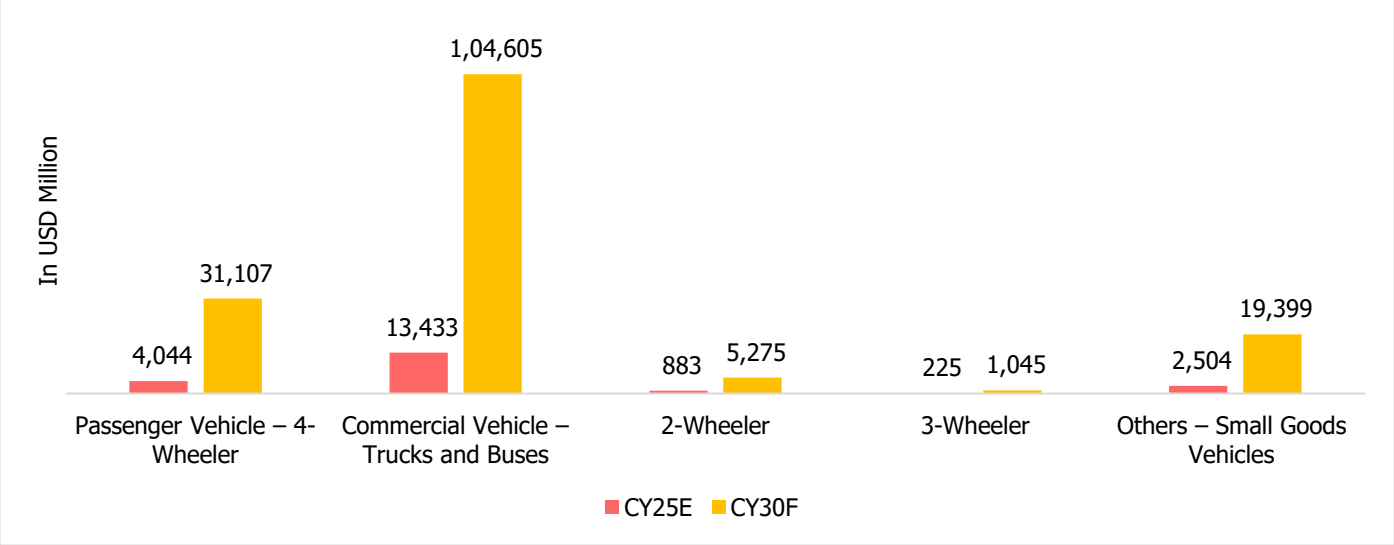
In USD Million	CY25E	CY30F	Estimated CAGR
AC	10,442	1,10,922	60.4%
DC	3,441	50,510	71.1%
Total	**13,883**	**1,61,432**	63.3%

In Thousand Units	CY25E	CY30F	Estimated CAGR
AC	7,119	67,698	56.9%
DC	3,684	43,757	64.0%
Total	**10,803**	**1,11,455**	59.5%

Source: Imarc Group, CareEdge Research
Note: E: Estimate, F: Forecast

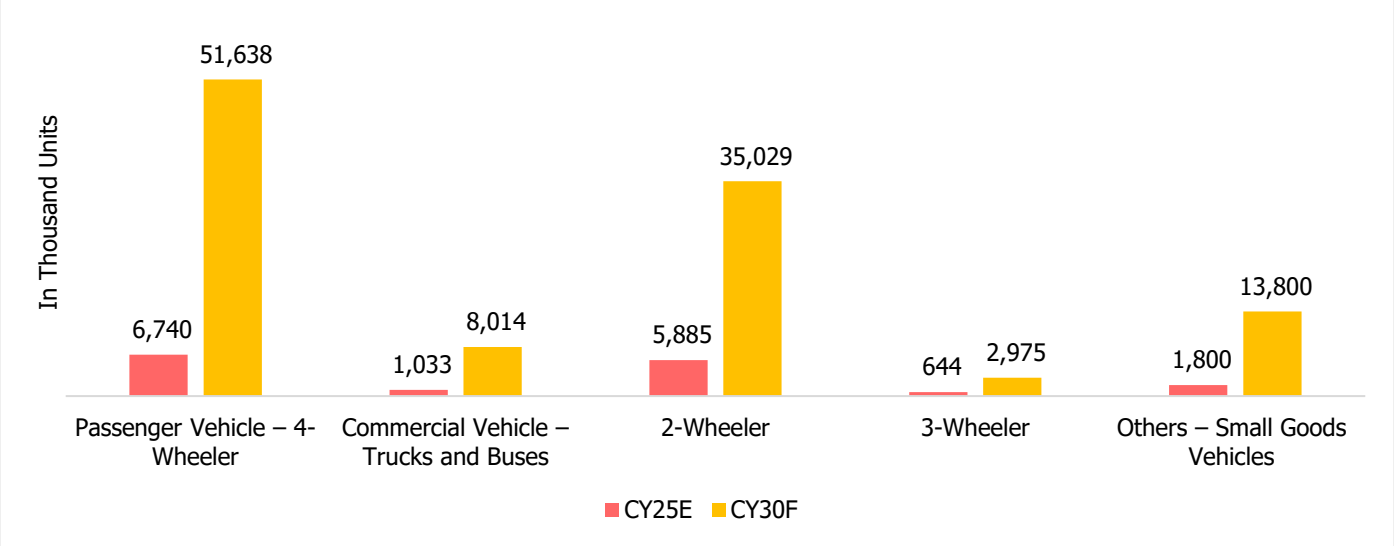
Segmentation based on Vehicle Type:

Chart 42: Global Market Segmentation, Based on Vehicle Type (Value)



Source: Imarc Group, CareEdge Research
Note: E: Estimate, F: Forecast

Chart 43: Global Market Segmentation, Based on Vehicle Type (Volume)



Source: Imarc Group, CareEdge Research
Note: E: Estimate, F: Forecast

Table 5: Global Market Segmentation – Estimated CAGR Trend

CAGR (FY25-30)	Value	Volume
PV – 4-Wheeler	50.4%	50.3%
CV – Trucks and Buses	50.8%	50.6%
2-Wheeler	43.0%	42.9%
3-Wheeler	35.9%	35.8%
Others – Small Goods Vehicles	50.6%	50.3%

The market is largely dominated by vehicle segments such as trucks, buses, and other commercial vehicles, as these require high-capacity, fast charging that cannot be accommodated by residential setups. Their fixed routes, fleet-driven operations, and strong government initiatives for cleaner public transportation make centralized public charging infrastructure more practical and essential compared to 2W and 4W EVs.

5.1.2 Indian EV Charger and Components Market

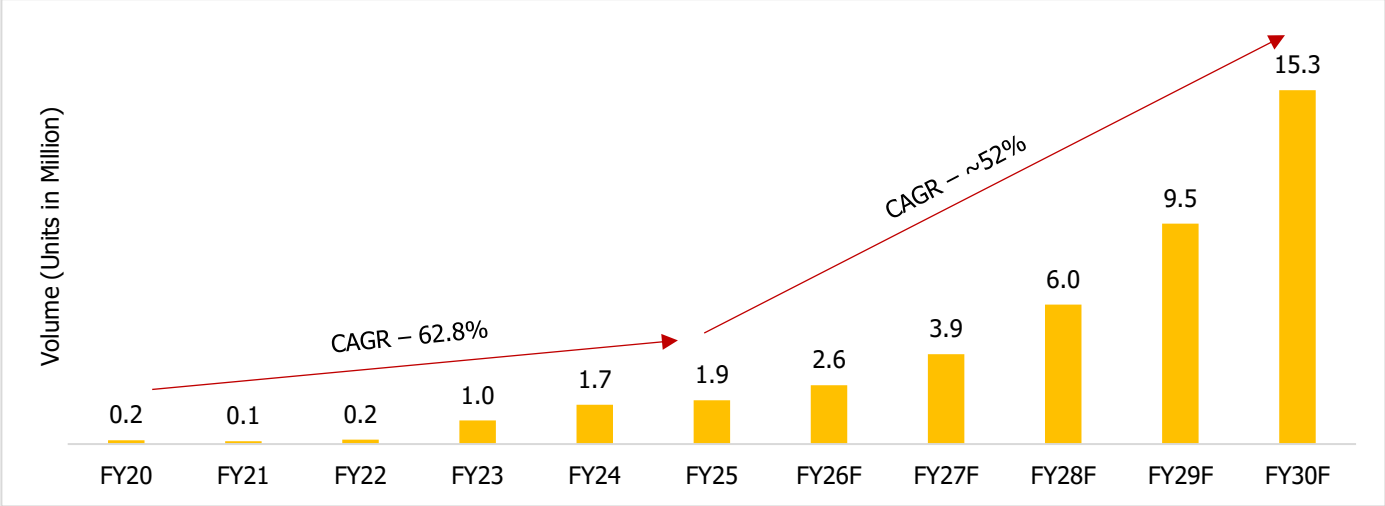
The EV segment in India has been on an upward trend. This is in parallel with the declining growth rate of domestic sales of ICE vehicles in the last few years. The other factors impacting ICE vehicle sales include increased fuel prices, semiconductor shortages, and increased vehicle prices.

India's electric vehicle (EV) adoption has historically been constrained by underdeveloped charging infrastructure. However, this landscape is steadily improving due to government-led initiatives such as FAME III, PLI schemes, and public-private partnerships, which are enhancing network coverage, especially in metro areas and along major highways. Efforts to standardize charging solutions and promote installations in residential and commercial spaces are gradually alleviating range anxiety.

Public EV charging stations have grown over fivefold from FY22 to early FY25, backed by strong central and state-level support. Concurrently, automakers are launching higher-range EVs (up to 489 km) and investing in both public and home charging networks, signalling a long-term commitment to electric mobility.

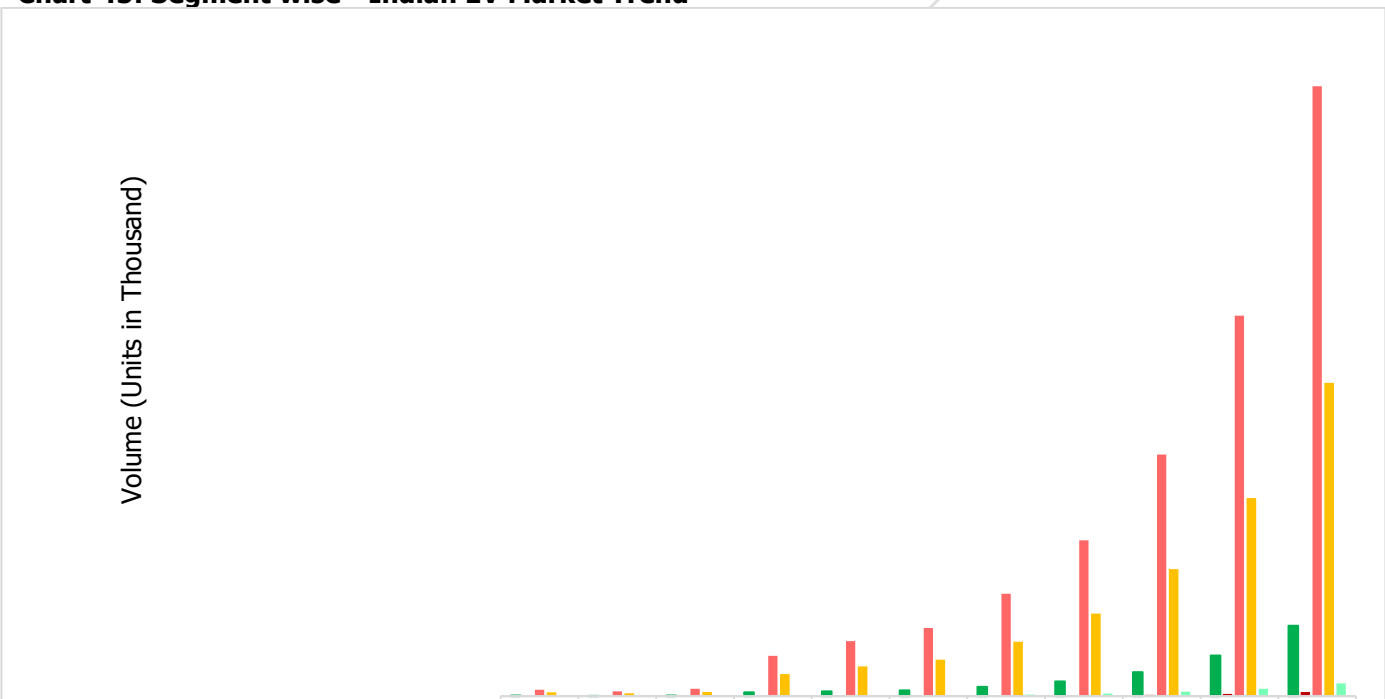
EV penetration is projected to reach ~9% by the end of FY26. The Global Bharat Mobility Expo 2025 saw a strong focus on the EV segment, with numerous automotive players unveiling new or updated EV models for the Indian market. This aligns with the Government of India's ambitious goal of achieving 30% EV penetration by 2030. The increasing EV sales in FY25 can be attributed to supportive government policies aimed at lowering upfront costs, expansion of charging infrastructure, rising fuel prices, and evolving consumer preferences toward sustainable mobility.

Chart 44: Indian EV Market Trend



Source: FADA, Imarc Group, CareEdge Research

Chart 45: Segment wise - Indian EV Market Trend



	FY20	FY21	FY22	FY23	FY24	FY25	FY26F	FY27F	FY28F	FY29F	FY30F
Passenger Vehicle – 4-Wheeler	8.5	6.6	10.1	57.4	75.1	89.6	139	222	365	616	1,069
Commercial Vehicle – Trucks and Buses	0.4	0.4	0.7	3.4	4.1	4.6	7	12	20	34	62
2-Wheeler	98.4	74.2	110.7	613.5	835.4	1,037.0	1,554	2,366	3,665	5,773	9,254
3-Wheeler	57.3	42.2	61.8	337.3	451.0	552.5	827	1,254	1,928	3,006	4,754
Others – Small Goods Vehicles	1.5	1.2	1.9	10.5	13.7	16.3	25	40	67	113	196

Source: Imarc Group, CareEdge Research

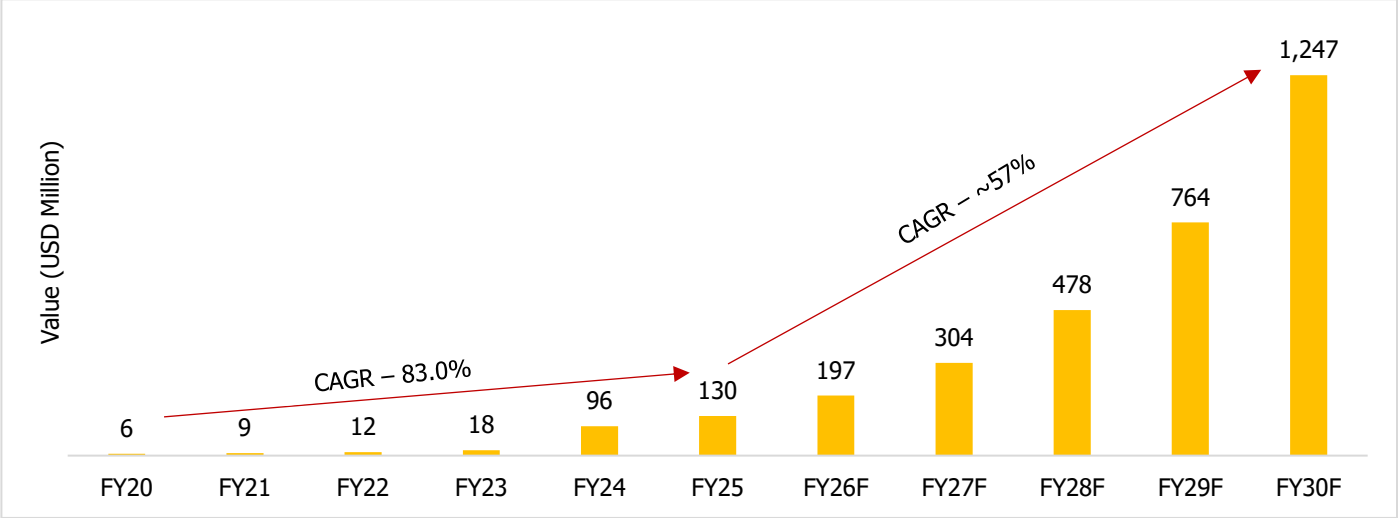
Note:

1. CV includes Trucks and buses
2. Others include Small Goods Vehicles

CAGR		
Type	FY20-25	FY25-30F
PV – 4 W	60.3%	64.2%
CV	60.3%	68.4%
2 W	60.2%	54.9%
3 W	57.3%	53.8%
Others	60.3%	64.3%

The Indian EV charger market is growing steadily, driven by the rising adoption of electric vehicles, especially two- and three-wheelers, supported by government schemes like FAME and PM e-Drive. Increasing investments in charging infrastructure and demand for fast chargers in urban areas are boosting expansion. With most 2Ws and 3Ws charged at home, residential charging solutions are becoming essential. The market is expected to grow rapidly, focusing on accessible, affordable, and smart charging options, in line with the broader EV sector's growth.

Chart 46: Indian EV Charger Market Trend



Source: Imarc Group, CareEdge Research

5.1.2.1 Indian EV Charger Market Segmentation:

- **Based on Charger Type**

Table 6: Indian Market Segmentation, Based on Charger Type (Volume and Value)

In USD Million	FY25	FY30F	CAGR
AC	124	1,160	56.3%
DC	6	87	71.6%
Total	130	1,247	57.1%

In Thousand Units	FY25	FY30F	CAGR
AC	1,261	11,529	55.7%
DC	277	2,882	59.8%
Total	1,537	14,412	56.5%

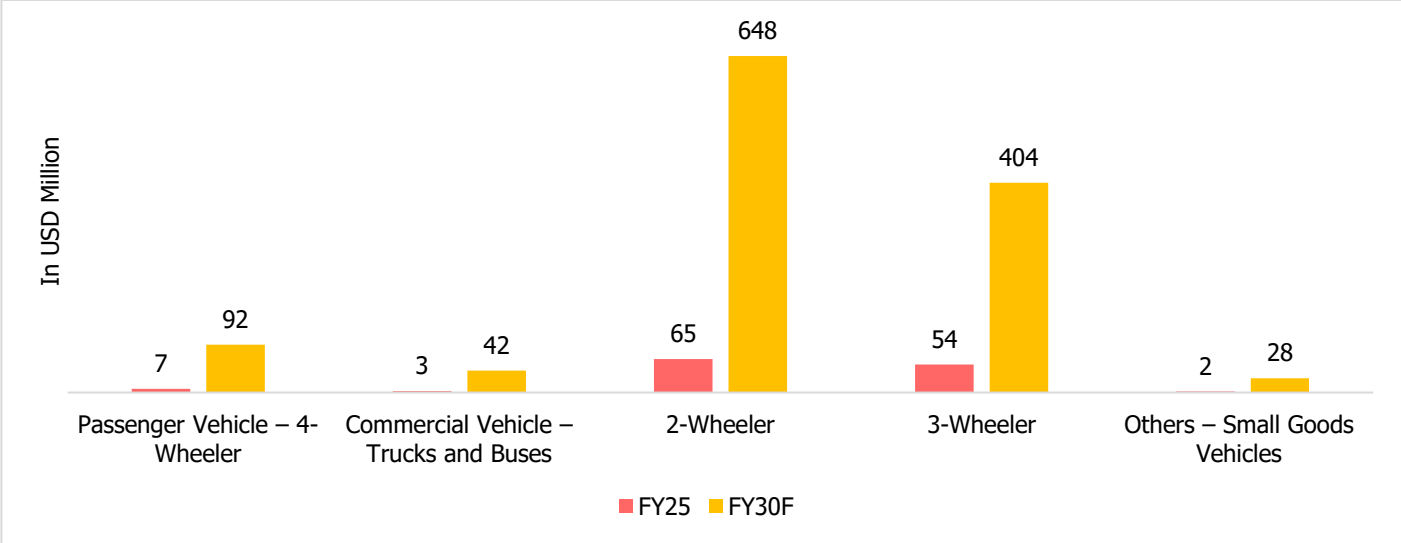
Source: Imarc Group, CareEdge Research

Note: F: Forecast

AC chargers dominate in the Indian charging infrastructure, as they are more cost-effective, require less infrastructure investment, and are compatible with India's existing power grid, making them more widely adopted. They also provide sufficient charging speed for overnight use, aligning with current EV adoption rates. DC chargers, though faster, are more expensive and require significant infrastructure upgrades.

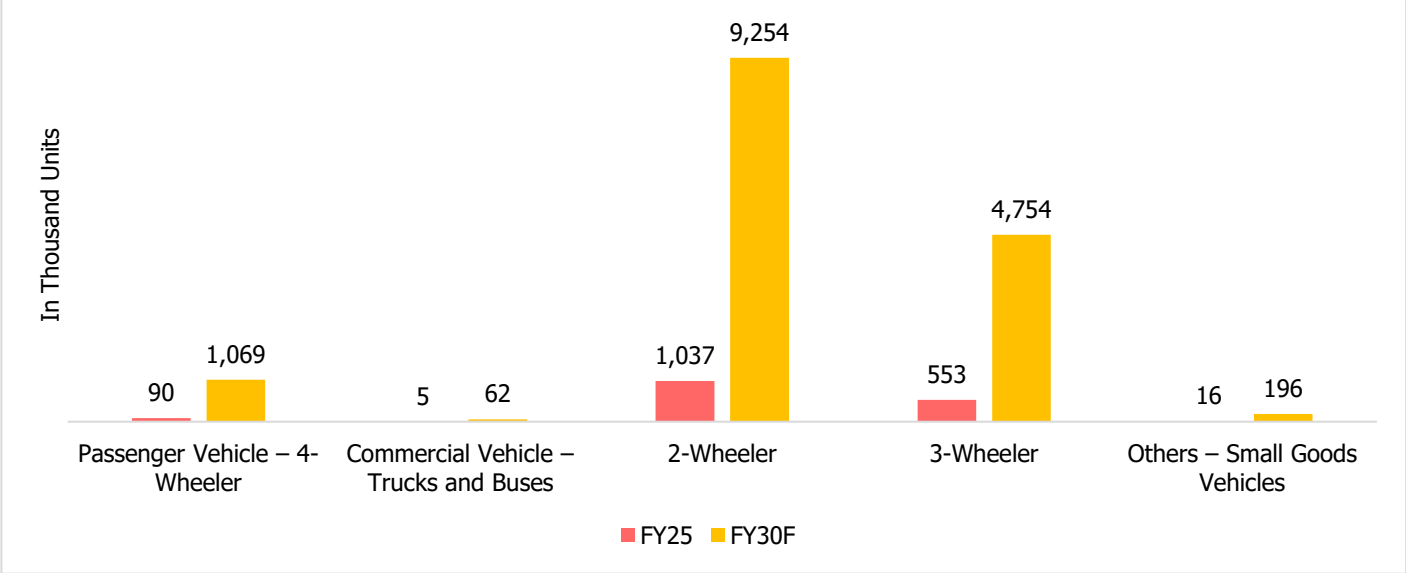
- **Based on Vehicle Type**

Chart 47: Indian Market Segmentation, Based on Vehicle Type (Value)



Source: Imarc Group, CareEdge Research

Chart 48: Indian Market Segmentation, Based on Vehicle Type (Volume)



Source: Imarc Group, CareEdge Research

Table 7: Indian Market Segmentation – Estimated CAGR Trend

CAGR (FY25-30)	Value	Volume
2W	65.5%	64.2%
3W	69.7%	68.4%
4W	58.6%	54.9%
Others	49.7%	53.8%
Total	66.1%	64.3%

India's EV industry is witnessing significant growth, primarily driven by electric two-wheelers, three-wheelers, and commercial vehicles such as buses. These segments are gaining momentum due to increasing consumer adoption and robust government support for electric mobility. As EV technology advances and more manufacturers offer ready-to-market products, electric two-wheelers have emerged as the most promising segment, supported by competitive pricing and favourable policy incentives. Additionally, these vehicles operate efficiently with low-power chargers, contributing to a steady growth trajectory. This surge is also propelling the EV charger market, with rising demand for affordable, low-capacity chargers and decentralized charging infrastructure.

5.2 Component-wise Cost Breakdown of an EV Charger

Urban areas require a well-balanced mix of Level 1 and Level 2 chargers to cater to diverse charging needs Level 1 chargers are suitable for overnight residential charging, while Level 2 chargers serve daily commuters at workplaces, shopping centres, and public parking spaces.

In contrast, highway regions primarily demand fast DC chargers, which enable quick top-ups during long-distance travel, reducing downtime and supporting seamless intercity mobility for electric vehicles.

5.2.1 Types of EV Chargers and Installation Costs

Table 8: EV Charger Types and Installation Expenses

Charger Type	Voltage (V)	Power (kW)	Compatible vehicles	Total cost*
Level 1 (AC)	240 V	<= 3.5 kW	2W, 3W, 4W	Rs. 15,000 - 30,000
Level 2 (AC)	380-400 V	<= 22 kW	2W, 3W, 4W	Rs. 50,000- 100,000
Level 3 (DC)	200-1000 V	50-150 kW	4W, CV	Rs. 500,000 - 15,00,000
Fast DC Chargers	>= 480 V	50-150 kW	4W, CV	Rs. 10,00,000 - 50,00,000

Source: CareEdge Research

Note: * - The actual cost may vary based on several factors such as the installation location, availability and capacity of electrical infrastructure, extent of civil work and site preparation required, applicable government incentives or subsidies, and compliance with local permits and regulatory requirements.

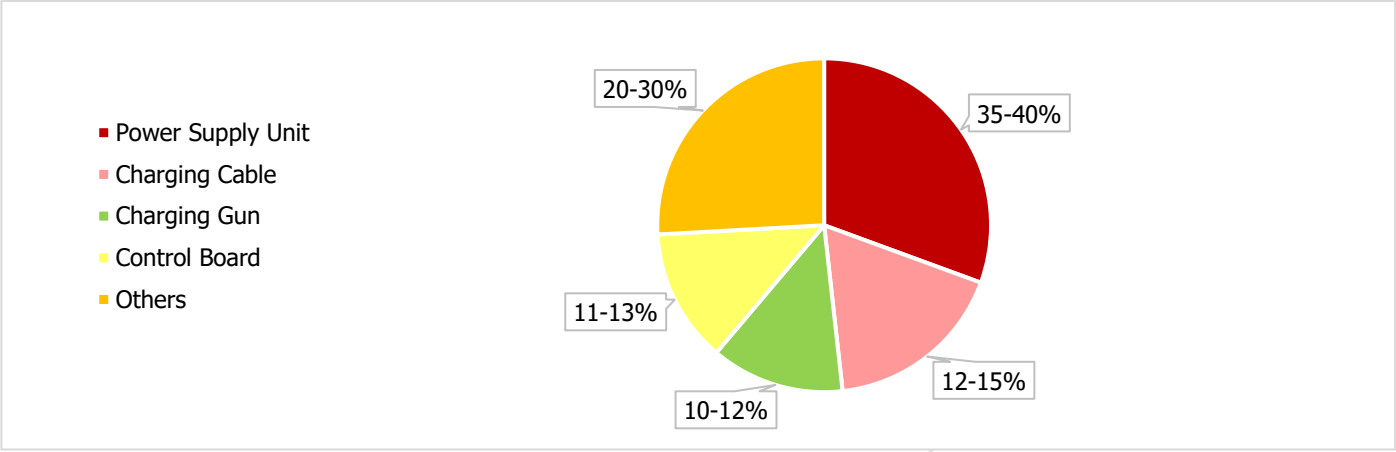
DC chargers are significantly more expensive than AC chargers due to their advanced technology, which includes built-in AC to DC conversion, sophisticated safety systems, and robust components. They also require efficient cooling systems to handle high power output, contributing further to the cost difference.

Table 9: Comparison of AC and DC charger

Parameter	AC Charger	DC Charger
Charger Type	Slower charging (Level 1/2)	Fast charging (Level 3 and above)
Charging Time	4-8 hours for a full charge	30–90 minutes for ~80% charge
Usage	Home use, commercial complexes	Highways, fleet hubs, public stations

Parameter	AC Charger	DC Charger
Hardware Complexity	Simple circuitry, relies on onboard charger of the EV	High-power electronics, converts AC to DC within the charger

Chart 49: EV AC charger - Cost Breakup



Source: Imarc Group, CareEdge Research
Note: Others include User Interface, Enclosure & Safety, etc.

The charging cable and gun together account for approximately 22–27% of the total EV charger cost, highlighting their critical role in ensuring safety, durability, and compatibility with various vehicle types. Their high-quality materials and engineering standards significantly influence the overall reliability and performance of the charging system. For a manufacturer of EV cables and guns, this presents a strong business opportunity, given their substantial cost share and rising demand, it allows for value-added product offerings, scalability, and potential long-term contracts with EV OEMs and charger manufacturers.

5.3 Government Policies

The government has increased focus on the industry related to increased focus on localization of components. Various initiatives taken by the government are: -

- **PM E-Drive scheme**

In September 2024, the government approved the PM E-Drive scheme with a budget of Rs.10,900 crore over two years, providing Rs.3,679 crore in subsidies to incentivize E2Ws, E3Ws, e-ambulances, e-trucks, and other emerging EVs. The scheme aims to support 24.79 lakh E2Ws, 3.16 lakh E3Ws, and 14,028 e-buses, while also allocating Rs.780 crore to enhance vehicle testing infrastructure. It also includes e-vouchers, and a streamlined EV buying process. The scheme proposes the installation of 22,100 fast chargers for e-4 Ws, 1800 fast chargers for e-buses and 48,400 fast chargers for e2W/3Ws. A notable feature is the scheme's promotion of electric ambulances, marking a key step in integrating EVs into the healthcare sector. Also, Battery-as-a-Service (BaaS) will also play a vital role in EV adoption.

Vehicle Segment	Maximum number of vehicles to be supported	Total fund support from MHI (In Rs. Crores)
E2W	24,79,120	1,772
E3W	3,15,988	907
E Ambulance	To be notified separately	500
E Trucks	To be notified separately	500

Vehicle Segment	Maximum number of vehicles to be supported	Total fund support from MHI (In Rs. Crores)
E Buses	14,028	4,391
EV PCS	72,300	2,000
Testing Agencies upgradation	-	780
Administration expenses	-	50

Source: Ministry of Heavy Industries

This will help in creating a surge in demand for charging infrastructure. With plans to install over 70,000 fast chargers across vehicle categories, there is a direct opportunity for charging solution providers to scale operations and win supply contracts. Additionally, the focus on e-ambulances and the healthcare sector opens niche markets, while the inclusion of Battery-as-a-Service (BaaS) supports the need for modular, interoperable charging systems, further expanding the scope for technological and product innovation in the EV charging segment.

- **National Automotive Testing and R&D Infrastructure Project (NATRiP)**

The National Automotive Testing and R&D Infrastructure Project (NATRiP) is a Government of India initiative aimed at enhancing the automotive sector's core competencies and integrating it with the global market. The project promotes advanced manufacturing, localized R&D, and export growth by leveraging India's strengths in IT and electronics. Implemented by the NATRIP Implementation Society (NATIS), it involves setting up cutting-edge testing and R&D centers at six locations, including Manesar, Chennai, Indore, and Silchar, along with upgrades to existing facilities in Pune and Ahmednagar, with a total investment of Rs. 3,727.30 crore.

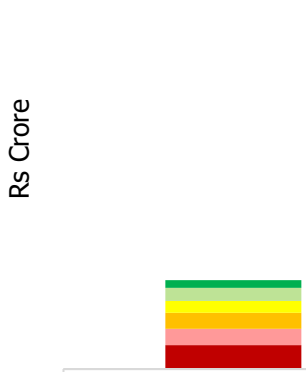
The NATRiP initiative can benefit a EV charging solution manufacturer in India by providing access to advanced testing and R&D infrastructure. These facilities can help the company validate product performance, ensure regulatory compliance, and accelerate innovation. Additionally, the focus on localized R&D and integration with global standards supports the development of competitive, export-ready charging technologies, enhancing both domestic credibility and international market access.

- **The Automotive Mission Plan 2047**

The government is also actively working on the Automotive Mission Plan (AMP) 2047, a long-term strategy aimed at positioning India as a global hub for the automotive and auto-component sectors, which includes plans to locally produce 28 components under the Maki in India Initiative. Building on the success of the previous Automotive Mission Plans (AMP 2016 and AMP 2026), AMP 2047 envisions substantial growth in vehicle production, increased exports, and significant contributions to the economy. AMP 2047 aims to solidify India’s position as a key player in the global automotive landscape while focusing on sustainability, innovation, and economic growth.

AMP 2026 envisages that the Indian Automotive Industry will grow 3.5-4 times its value from its output of around Rs. 4,640 Billion in 2015 to about Rs 16,160 – 18,885 Billion by 2026, based on a base of case with average GDP growth rate of 5.8% and an optimistic case with an average GDP of 7.5% during the 2016-26 period. The following chart provides current and projected composition of the industry over the next decade.

Chart 50: Automotive Mission Plan Projections



	FY15	FY26 Base Case	FY26 Optimistic case
Component After market	39,900	1,78,700	2,00,000
Component Exports	69,000	4,36,700	4,62,500
OEM Exports	62,500	2,23,300	2,95,000
OEM Value Addition	83,200	1,83,800	2,00,000
Componet imports	84,300	1,48,500	1,83,000
Systems/components (inhouse/domestic)	1,25,100	4,45,000	5,49,000

Source: NITI Aayog Press Release

As EV volumes rise under the plan, the demand for robust charging infrastructure will also grow, creating significant business opportunities for charging solution providers. Additionally, the "Make in India" focus on localizing 28 automotive components may help reduce input costs, encourage technology partnerships, and attract investments, thereby supporting domestic manufacturers in scaling operations and becoming globally competitive.

- **Previous policy framework/regulations pertaining to Electric Vehicles industry in the passenger vehicles segment**

The Government had launched FAME (Faster Adoption and Manufacturing of (Strong) Hybrid and Electric Vehicles in India) in 2015 with the objective of promoting and facilitating adoption of Electric Vehicles in India. The second phase of the scheme FAME II was launched from April, 2019 for three years with a total budgetary support of Rs 10,000 crore. By incentivizing electric vehicle adoption, especially in public transport and fleet segments, the demand for EV chargers rises significantly, directly expanding the customer base for charger manufacturers.

- **Scrappage Policy**

The government had announced the scrappage policy in 2021 which will mandate commercial vehicle fleet owners to abandon or scrap their vehicles after 15 years if they don't meet the fitness or emission criterion laid by the government. This is expected to boost demand for new, cleaner commercial vehicles, encouraging a shift toward electric alternatives. It also supports the EV segment by promoting fleet modernization and reducing pollution, aligning with India's green mobility goals. This shift increases the need for a robust charging infrastructure, boosting demand for both portable and fixed EV charging solutions.

- **Production Linked Incentive (PLI) scheme for Semi-Conductors**

The Indian government has launched a Rs 76,000 crore incentive to boost domestic semiconductor and display manufacturing, alongside a Rs 25,938 crore PLI scheme to promote green automotive production. This aims to reduce import dependency and strengthen supply chains. While primarily focused on chips, the initiative indirectly benefits

manufacturers of strategic electronic components by ensuring better access to critical inputs, lowering costs, and enhancing ecosystem resilience for sectors such as defence, railways, and EV infrastructure.

5.4 Entry Barriers

- **Technology & R&D Requirements**: Developing compact, reliable, and safe chargers with smart features (like IoT, mobile app integration) requires significant engineering expertise and investment in innovation.
- **Certification & Safety Compliance**: Meeting BIS, NABL, IEC, IP and other global safety and performance standards is mandatory and involves rigorous testing and approval processes. BIS certification is required for products used in the ICT sector to ensure they meet Indian safety and quality standards.
- **Regulatory Complexity**: Navigating through evolving government regulations, safety protocols, and licensing procedures can be time-consuming and operationally challenging.
- **Capital Investment:** Initial costs for tooling, prototyping, manufacturing facilities, and testing equipment are high, especially for scalable, high-quality production.
- **Power Supply Constraints**: Reliable electricity and robust grid connectivity are essential, especially in rural or semi-urban areas. Future-proofing chargers to align with smart grid and V2G (vehicle-to-grid) tech—like ISO15118—is also vital.
- **Technology & Compatibility**: Ensuring compatibility across various EV models, CPOs (Charge Point Operators), and grid systems requires continuous R&D and strong software-hardware integration. The market is becoming competitive, so offering a unique value proposition (portability, fast charging, cross-EV compatibility) is critical to stand out.
- **Low Consumer Awareness**: The market is still evolving, and efforts are needed to educate users and build consistent demand for both public and private charging solutions.
- **Supply Chain Vulnerabilities**: Access to quality semiconductors, batteries, and electronic components can be disrupted by material shortages, political instability, or natural events.

6 Strategic Electronics & EMS Industry

Strategic Electronics

The Strategic Electronics industry encompasses a specialized segment of the electronics sector that serves critical domains such as defence, aerospace, automotive, railways, metros, ICT, industrial and industrial automation, renewable energy, nuclear energy, and other essential infrastructure. These sectors demand high levels of reliability, security, and technological advancement, given their mission-critical nature.

Strategic electronics are vital to national security and are often developed through coordinated efforts involving defence research organizations, public sector undertakings (PSUs), Indian Railways, and private entities, including electronic manufacturing OEMs, EV manufacturers, and aerospace and industrial firms.

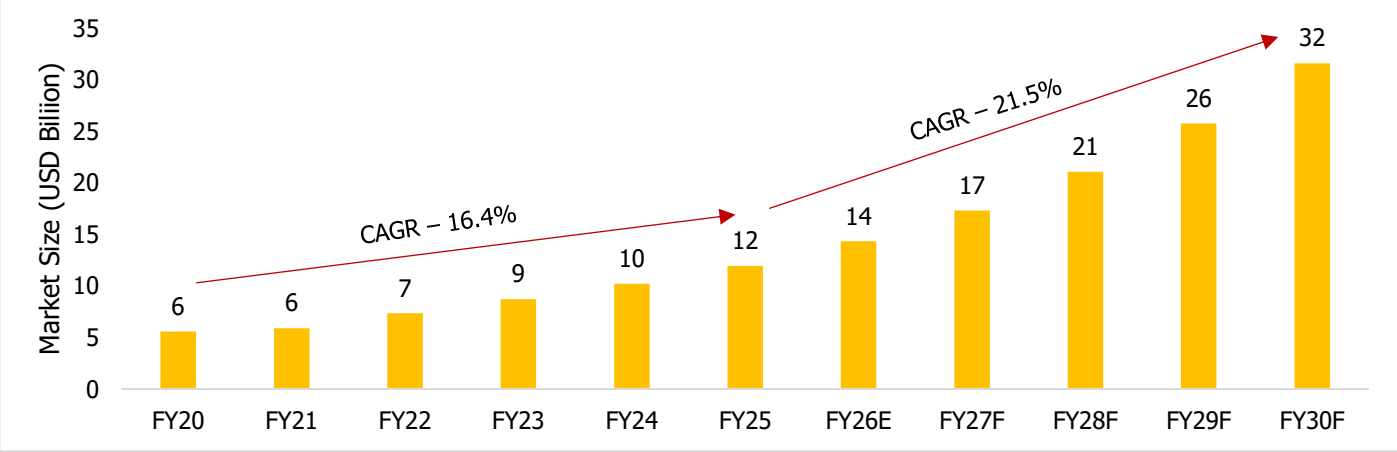
In India, this sector is gaining momentum as the nation aims to strengthen its electronics manufacturing ecosystem, modernize defence capabilities, and reduce import dependence. Growing urbanization and commercial expansion have also highlighted the need for improved mass transport systems, further driving demand in strategic sectors.

India's strategic electronics sector has witnessed rapid development, driven by evolving geopolitical dynamics, fast-paced digitalisation, and the growing emphasis on self-reliance in defence technology. The increasing demand for sophisticated electronic systems including radar, communication, avionics, missile guidance, electronic warfare, and surveillance, has prompted the government to prioritize domestic manufacturing. Flagship initiatives such as Atmanirbhar Bharat, make in India, and the Defence Production Policy are central to promoting the indigenization of these critical technologies.

Government initiatives such as the Production-Linked Incentive (PLI) scheme under the "Make in India" campaign, along with increased budgetary allocations across defence, infrastructure, manufacturing, and renewable energy, are promoting domestic innovation and manufacturing.

In particular, the defence sector is witnessing a strong push for indigenous technology development tailored to the unique needs of Indian armed forces and critical infrastructure. Overall, the Strategic Electronics industry is central to India's goal of achieving technological self-reliance and ensuring long-term national security.

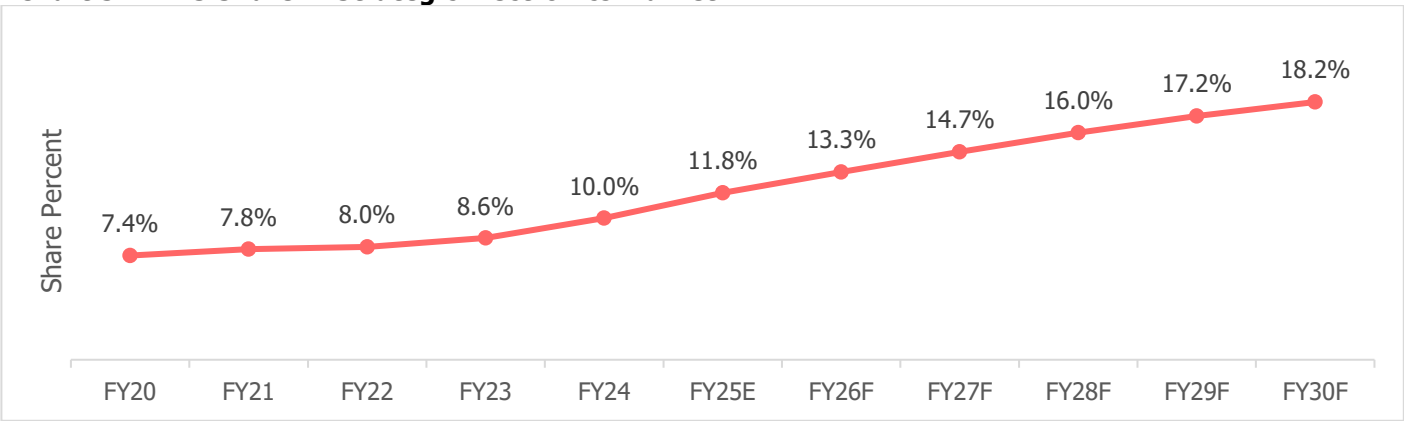
Chart 51: Domestic Strategic Electronics Market Trend



Source: Imarc Group, CareEdge Research

Note: 1. Market definition- production + import – export of finished goods 2. E- Estimate and F- Forecast

Chart 52: EMS Share in Strategic Electronics Market



Source: Imarc Group, CareEdge Research
Note: E- Estimate and F- Forecast

The EMS market is expected to grow faster than the overall strategic electronics market in India, thereby increasing its share annually. This growth is driven by rising outsourcing by OEMs, government initiatives like Make in India and PLI schemes, and expanding demand from sectors such as automotive, defence, telecom, and consumer electronics. As companies aim to reduce costs and focus on core competencies, they increasingly rely on EMS providers for design, assembly, and testing, boosting the EMS market's contribution to the total electronics ecosystem.

6.1 Application of Strategic Electronics

6.1.1 Critical Role of Strategic Electronics in Infrastructure and Safety

Strategic electronic products play a vital role in ensuring safety, communication, control, automation, and energy efficiency. They ensure real-time control, safety, efficiency, and reliability across these infrastructure-intensive and mission-critical industries.

Table 10: Sector-wise breakdown of commonly used strategic electronic systems:

Industry	Products
Mass Transportation (Railways and Metro Systems)	• Train Control and Signaling Systems (ETCS, CBTC) • Passenger Information Systems (PIS) • SCADA Systems for traction and energy monitoring • Automatic Train Protection (ATP) and Operation (ATO) modules • Railway Electrification Monitoring Systems • CCTV Surveillance, Access Control, and Fire Detection • On-board Electronics – cables, wiring harnesses, data transmission systems, braking control units • Trackside Electronics – axle counters, point machines, interlocking systems
Mass transportation (Road-based Public Transportation)	• Intelligent Transportation Systems (ITS) • Automatic Fare Collection (AFC) Systems • Vehicle Tracking and Fleet Management Systems • Passenger Information Systems (PIS) • Electronic Ticketing Machines (ETMs) • Surveillance and CCTV Systems

Industry	Products
	• Traffic Signal and Control Systems • Emergency Communication and Alert Systems • Driver Assistance and Monitoring Systems • Vehicle Diagnostic and Control Units (especially in buses)
Aviation (Civil & Defence)	• Avionics Systems – navigation, radar, communication, flight control • Flight Data Recorders & Black Boxes • Electronic Warfare Systems • Aircraft Wiring Harnesses and Power Distribution Units • In-flight Communication Systems • Air Traffic Control (ATC) Electronics • Ground Support Electronics – diagnostic systems, telemetry systems
Shipbuilding (Defence & Merchant)	• Integrated Bridge Systems (IBS) • Navigation and Communication Systems (e.g., radar, sonar, AIS) • Electronic Warfare and Surveillance Systems (for defence vessels) • Power Management and Distribution Systems • Underwater Acoustic Sensors and Control Electronics • Fire Control and Combat Management Systems (defence-specific)
Renewable Energy Sector	• Inverter and Converter Systems • SCADA and Remote Monitoring Systems for Solar and Wind Farms • Power Management and Grid Synchronization Electronics • Battery Management Systems (BMS) • Smart Meters and Energy Meters • Control Panels and Relay Protection Systems
Industrial & Industrial automation	• Programmable Logic Controllers (PLCs) • Supervisory Control and Data Acquisition (SCADA) Systems • Distributed Control Systems (DCS) • Human-Machine Interfaces (HMI) • Industrial IoT (IIoT) Devices and Gateways • Motor Drives and Control Systems • Sensors and Actuators • Industrial Robots and Embedded Controllers
Automobiles	• Electronic Control Units (ECUs) • Advanced Driver Assistance Systems (ADAS) • Engine Management Systems • Telematics Control Units (TCUs) • Battery Management Systems (BMS) – for EVs • Infotainment and Navigation Systems • Vehicle-to-Everything (V2X) Communication Modules • Sensor Systems (LiDAR, Radar, Cameras)
Information and Communication Technology	• Routers, Switches, and Network Firewalls • Baseband and Radio Frequency (RF) Systems • Data Center Servers and Storage Systems • Optical Transmission Systems • Network Interface Controllers (NICs)

Industry	Products
	• Wireless Communication Modules (Wi-Fi, LTE, 5G) • Embedded Systems in Telecom Infrastructure • Cybersecurity Hardware Solutions

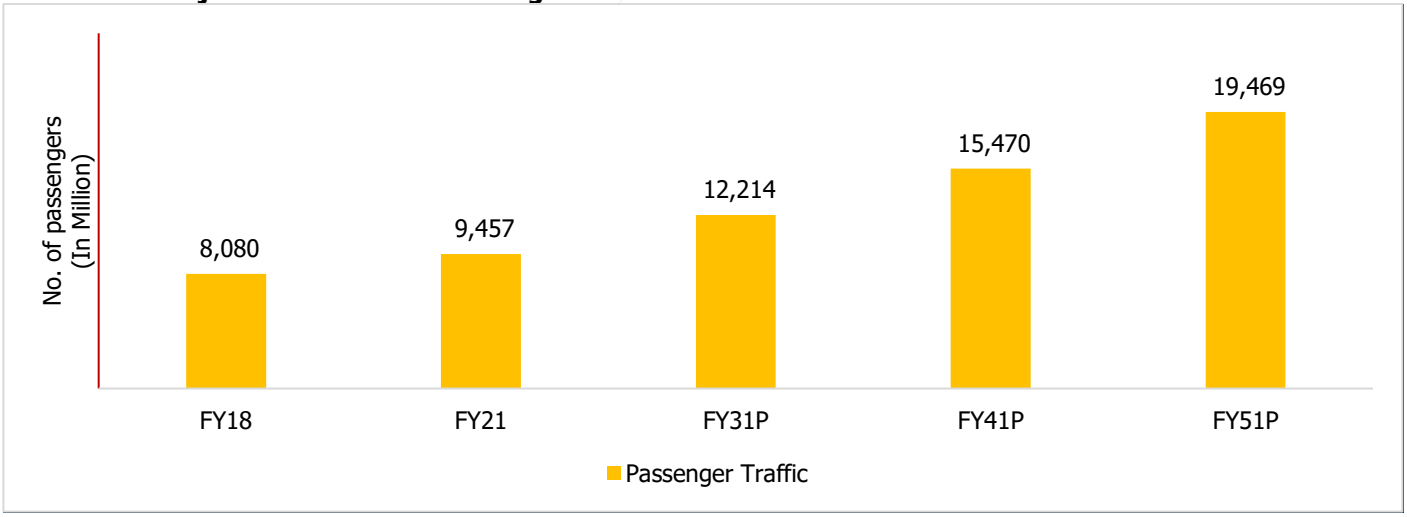
6.1.2 Sector-wise Infrastructure and Manufacturing Trends

1. Railways

Railways is one of the key consumer segments in the specialty cable industry. Wherein, specialty cables are used in signalling and control system, power supply and communication system. Among the rail transit cables, specialty cables with DC tractions, flame-retardant, fire-resistance, green environment friendly and self-temperature control cables are used in railway construction. The rail transit construction has an extensive impact on the specialty cable industry. Moreover, the railway sector has been the recipient of more than Rs. 1,000 billion investment allocation in the previous three budgets, with the government focusing on improving connectivity across the country.

India Railways ranks as the world's fourth-largest and continues to be one of the fastest-growing globally. India, being a vast subcontinent, requires efficient and cost-effective transportation for minerals, food grains, and industrial goods to support economic growth. Rail transport plays a key role in this regard, offering reliability, lower costs, faster transit times, and environmental benefits such as reduced carbon emissions. To enhance freight movement, Indian Railways launched the 'National Rail Plan (NRP) for India – 2030' in FY20, aimed at increasing the railways' freight modal share from 24% in FY22 to 45% by FY30, whereas the global average for the same stood at 60% in FY22 as per Ministry of Railways. This involves significant capacity expansion to ease bottlenecks and scale up the network to handle 3,600 MT of cargo by FY30, with 'Mission 3000MT' set as an intermediate goal. Similarly, the passenger traffic is expected to grow at a CAGR of 2.6% between FY21 and FY31, driven by population growth and a growing workforce.

Chart 53: Projected Growth in Passenger Traffic



Note: P-Projected; Source: Indian Railways, National Railway Plan

Additionally, under the Foreign Trade Policy 2023 announced in March, the government has targeted exports worth USD 2 trillion by 2030, up from USD 770 billion in FY23, with equal contribution from merchandise and services. While exports currently rely heavily on sea and air routes, the share of rail in export logistics is projected to rise, supported by strategic initiatives such as the India-Middle East-Europe Economic Corridor, the Euro-Asia Rail Route, and the Chabahar Port project in Iran. These projects aim to provide alternative trade routes to regions like Afghanistan and Central Asia, with

rail connectivity forming a critical backbone for seamless cargo movement between India's hinterland and international markets.

Such growing demand from freight traffic and passenger traffic is expected to source additional coaches and wagons. As the railway sector expands its fleet, the need for high-quality electrical components rises proportionally. This creates increased business opportunities for suppliers of critical onboard systems like wiring harnesses, control cables, communication lines, and power distribution solutions. The companies stand to gain from higher order volumes, potential long-term contracts, and greater integration into the expanding railway supply chain, supporting both revenue growth and market positioning.

Under NIP, the transport infrastructure promoting trade growth involves the Road, Railways, Port, and Airport segments. The capital expenditure plan between FY20 to FY25 for these sectors are depicted in the table below:

Table 11: Capital expenditure plan between FY20 to FY25

Particulars (Rs. crore)	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total
Road	3,32,559	3,83,283	3,56,966	2,52,780	2,63,912	2,72,481	2,72,241	21,34,222
Railways	1,33,387	2,62,465	3,08,800	2,73,831	2,21,209	1,67,870	2,62,000	16,29,562
Port	13,357	18,104	20,649	15,863	7,724	10,002	NA	1,21,194
Airport	18,667	21,655	24,820	21,334	25,386	5,141	NA	1,43,448

Source: National Infrastructure Pipeline

Railway investments have gained momentum rising from 9.8% of total infrastructure investment in FY20 to ~15% in FY25. The key focus areas in railway infrastructure are decongestion of over utilised rail network, construction of new lines, doubling, tripling, quadrupling of rail lines, and purchase of rolling stock such as wagons, locomotives, coaches, etc. Historically, capital investment in railways has been mainly from the government and a minor proportion was from private players. The involvement of private players is limited to allied activities such as track laying and maintenance, manufacturing & maintenance of coaches and wagons, construction of bridges, stations, signalling, and telecommunication works.

As per Economic Survey, 434 projects valued at Rs 11,170 billion have been identified under three railway corridors, mapped on the PM GatiShakti portal. Under PPP model, 17 projects have been completed (Rs 16,434 crore) and 8 ongoing (Rs 16,614 crore) under the PPP model. Sanctioned in December 2015, the 508 km Mumbai-Ahmedabad High-Speed Rail project, supported by Japan, has a revised estimated cost of Rs 1,080 billion. As of October 2024, the project has achieved 47.17% physical progress, with an expenditure of Rs 67,486 crore.

The Union Budget 2025-26 has provided a substantial boost to Indian Railways, with a record gross budgetary support of Rs 2,520 billion, the second year in a row with such high funding. This allocation aims to strengthen railway infrastructure, improve safety, and enhance the passenger experience nationwide.

Key announcements include:

Type of Train	Volume	Timeline
Vande Bharat	200	To roll out in next 2-3 years
Amrit Bharat	100	
Namo Bharat	50	

Also, to increase affordability and accessibility, 17,500 non-AC general coaches will be added. Notably, Rs 1,16,000 crore is earmarked specifically for safety upgrades such as modern signaling, track improvements, and accident prevention systems. By 2047, the government intends to construct a 7,000 km high-speed rail network, enabling trains to reach speeds of upto 250 km per hour.

As railway networks grow and modernize, demand for high-performance wiring and cabling, signaling systems, power transmission, and safety-critical electronic components will increase. Additionally, projects like the India-Middle East-Europe Economic Corridor and Chabahar Port will require extensive cabling and electrical systems, creating new business opportunities. This infrastructure push also opens up long-term supply contracts with railways and EPC players, boosting order books and providing strong revenue visibility.

Table 12: Proposed Expenditure under NRP (Rs. Trillion)

Head	FY21-26	FY26-31	FY31-41	FY41-51	Total
Dedicated Freight Corridors	-	1.5	0.5	0.3	2.3
High Speed Rail Corridors	-	5.1	2.9	7	15
Network improvements	1.3	0.7	2.2	1.8	6
Flyovers and Bypasses	0.8	-	-	-	0.8
Terminals	0.6	0.2	0.1	0.04	0.9
Rolling Stock	3.1	1.7	3.6	4.8	13.2
Total	**5.8**	**9.2**	**9.3**	**13.9**	**38.2**

Source: NRP Document, Ministry of Railways

Lately, Railways has received the highest budgetary allocation among infrastructure sectors, with a significant portion of the planned capex earmarked for rolling stock. Within this, wagons and passenger coaches account for the largest share, driven by rising momentum in both freight and passenger traffic. This surge is fuelling demand for wiring and harness systems, which are critical for power distribution, control, and safety functions within coaches and wagons, enabling efficient lighting, communication, HVAC, and monitoring systems. Their reliability and durability are essential for the smooth and safe operation of rail transport.

Major Initiatives to Enhance Railway Signalling Systems and Their Impact on the Strategic Electronics Industry

Indian Railways is modernising its signalling and safety systems to enhance operational efficiency and safety across its vast network. As per Economic Survey:

- **Elimination of mechanical signalling**: Indian Railways is replacing mechanical signalling with Electrical/Electronic Interlocking systems. In FY25, 25 out of 62 pending stations have been upgraded to electrical/electronic interlocking systems, with 9 zonal railways now free from mechanical signalling. This transition from mechanical to electronic interlocking significantly increases the use of electrical control panels, sensors, relays, and automation systems, all of which rely heavily on specialty cables and harnesses for reliable signal transmission and power distribution.
- **Kavach**: This indigenously developed Automated Train Protection system has seen Rs 1,547 crore invested (till November 2024). The specification version 4.0 was approved on July 16, 2024. This system involves onboard control units, trackside devices, communication modules, and power interfaces; all requiring robust and precise cabling solutions.
- **Electronic interlocking**: EI systems have been installed at 227 stations in FY25, increasing the coverage to a total of 3,576 stations. The first Direct Drive Interlocking system was commissioned in November 2024 at Tajpur station. It demands continuous communication and signal relay, which involves extensive use of high-integrity signal cables and harnesses to withstand long-distance deployment and environmental stress.

- **Automatic Block Signalling (ABS)**: ABS is being installed to enhance capacity on high-density routes. 720 route kilometres have been completed this fiscal year, increasing the coverage to a total of 4,906 kilometres.
- **Signal design automation tool for electronic interlocking**: This tool automates route control chart generation for station yards. Version 5.0 was released on September 19, 2024.

Railway Passenger Coach Industry

The passenger traffic is broadly divided into 3 broad categories: Long Distance AC passengers (LDAC), Long Distance non-AC passengers (LDNA), and Suburban passengers. The passenger traffic is expected to grow at a CAGR of 5% from FY21 to FY31. This will lead to increased investments in new trains, station upgrades, and electrification of routes. This will directly benefit companies manufacturing special wire harness and cables and electrical/electronic distribution systems, as these components are critical for train operations (lighting, HVAC, signaling, and safety systems), station infrastructure (power distribution, surveillance, and communication), and railway electrification projects. Higher passenger volumes also necessitate more reliable and energy-efficient systems, driving demand for advanced cabling and electrical solutions, thus expanding business opportunities in both public and private rail projects.

Railway Locomotives & Wagons Industry

- **Locomotives**: Powered engines that pull or push trains, used in both passenger and freight services. They can be electric or diesel and are essential for train movement and control.

- **Wagons**: Unpowered railcars used to transport freight such as coal, cement, oil, or containers. They vary in design based on the type of cargo and form the core of rail logistics.

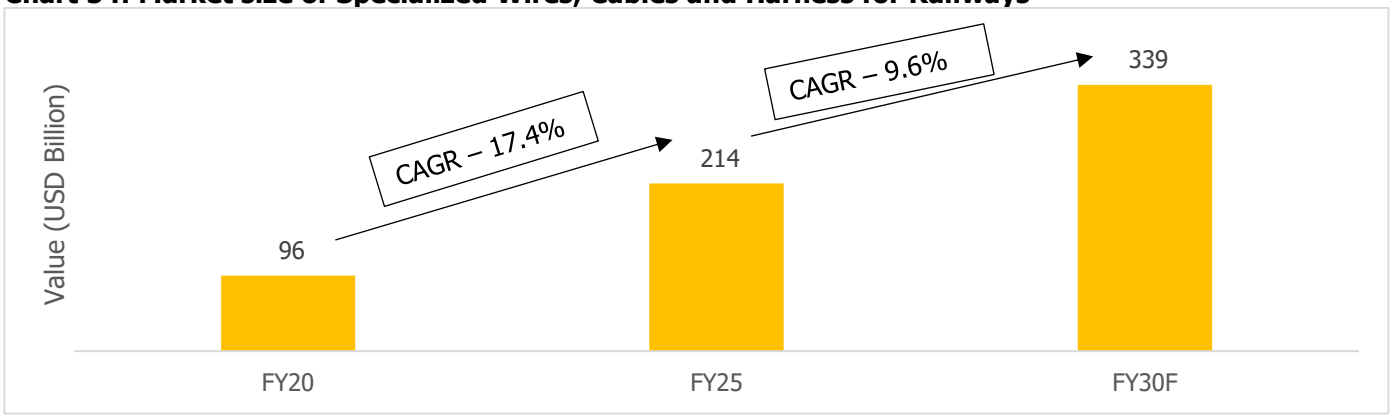
Under National Rail Plan, approximately 20,700 locomotives will be required by 2031 to cater to the increasing traffic compared to 12,734 locomotives in FY21.

Table 13: Projected Growth in Locomotive and Wagons Requirement

Particulars	FY26P	FY31P	FY41P	FY51P
No. of Locomotive Required (in thousands)	17.8	21.74	32.58	47.02
No. of Wagons Required (in thousands)	407	544	777	1,062

Source: Indian Railways, National Railway Plan

Chart 54: Market size of Specialized Wires, Cables and Harness for Railways



Source: Imarc Research

Demand from Wagons is estimated to be around 27-28% of the total demand from railways throughout the period considered. Remaining demand is from Passenger coaches and locomotives. The specialised wires, cables and harness market for railways is estimated to increase by around 9-10% CAGR during the FY25-30 period.

2. Metro Rail Segment

As per Ministry of Housing & Urban Affairs, India has around 1,000 km of operational metro lines across 11 states and 23 cities; with over 2,500 metro coaches in use roughly costing Rs 32,500 crores. The average daily ridership was about 28 lakhs in 2013-14. With the rapid expansion of metro rail network, the average daily ridership has now crossed 1 Crore. The operational metro lines are further expected to increase by more than 2x over the next 4-5 years. While most coaches were previously imported, the government, under the Make in India initiative, mandated in August 2017 that 75% of metro cars and 25% of critical metro construction equipment be sourced domestically. Currently, four metro coach manufacturing facilities operate in India, established by PSUs or global firms, with ICF also setting up a unit. This growing indigenization and network expansion is expected to boost demand for companies manufacturing special wires, harnesses, cables, and electrical/electronic distribution systems, which are vital for powering trains, automation, stations, and depots.

Table 14: Metro Rail Network Under Construction/Recently launched

Sr No	Name of Metro Rail Project	Under Construction Length (Km)
1.	Delhi Metro Extension from Dwarka Sector 21 to India International Convention & Expo Centre (IICC), Dwarka	2.03
2.	Delhi Metro Phase IV (03 Priority Corridors)	65.20
3.	Patna Metro Rail Project	32.51
4.	Bangalore Metro Rail Project Phase II	58.48
5.	Bangalore Metro Rail Project Phase 2A & 2B	58.19
6.	Ahmedabad Metro Rail Project Phase I	29.46
7.	Ahmedabad Metro Rail Project Phase II	28.25
8.	Surat Metro Rail Project	40.35
9.	Bhopal Metro Rail Project	27.87
10.	Indore Metro Rail Project	31.55
11.	Kanpur Metro Rail Project	23.38
12.	Agra Metro Rail Project	29.40
13.	Mumbai Metro Line 3	33.50
14.	Nagpur Metro Rail Project Phase I	12.12
15.	Pune Metro Rail Project Phase I	21.28
16.	Pune Metro Line III	23.33
17.	Mumbai Metro Line 2A	8.77
18.	Mumbai Metro Line 2B	23.60
19.	Mumbai Metro Line 4	32.30
20.	Mumbai Metro Line 4A	2.70
21.	Mumbai Metro Line 5	24.90
22.	Mumbai Metro Line 6	14.50
23.	Mumbai Metro Line 7	5.60
24.	Mumbai Metro Line 9(7A)	13.72
25.	Navi Mumbai Metro Line 1	11.10
26.	Kochi Metro Rail Project Phase 1A	2.00
27.	Kochi Metro Rail Project Phase 2	11.20
28.	Chennai Metro Rail Project Phase II	118.90
29.	Kolkata Metro East-West Corridor	85.16
30.	Other Metro Rail Projects in Kolkata	
	TOTAL	**871.34**

Source: PIB 2023

Table 15: Metro Rail Network Under Appraisal/Approval

Sr No	Name of Project	Stretch (Kms)
1.	Remaining three corridors of Delhi Metro Phase-IV Projects	43.68
2.	Nashik MetroNeo	33.00
3.	Nagpur Metro Phase II	43.80
4.	Pune Metro Phase 1A	4.41
5.	Thane Integral Ring Metro	29.00
6.	Pune Metro Rail Project extension Line from Swargate to Katraj	5.46
7.	Gorakhpur MetroLite Project	15.14
8.	Extension of Noida-Greater Noida Metro Rail	14.96
9.	Kochi Metro Phase 1A	2.00
10.	Kochi Metro Phase II	11.20
11.	Jammu MetroLite	23.00
12.	Srinagar MetroLite	25.00
13.	MetroNeo project in Dehradun	22.42
14.	Metro Rail from HUDA City Centre to Cyber City and Spur to Dwarka Expressway	28.50
15.	Chennai Metro Phase II	118.90
16.	Bengaluru Metro	44.00
	TOTAL	**464.92**

Source: PIB, CareEdge Research

With the approval of these new projects, India now has 1,018 km of Metro lines under construction in various cities across the nation, namely, Delhi, Bangalore, Kolkata, Chennai, Kochi, Mumbai, Nagpur, Ahmedabad, Gandhinagar, Pune, Kanpur, Agra, Bhopal, Indore, Patna, Surat and Meerut. The Ministry also highlighted the significant strides made in indigenization, with the majority of civil structures being constructed domestically. India has developed four state-of-the-art manufacturing facilities of metro coaches that have produced over 1,000 Metro coaches in the last five years, supporting various Metro rail systems across the country. Along with it the government is also proposing Metro Lite and Metro Neo lines which are suitable for smaller cities with lower peak traffic.

Also, the first Rapid Rail Transit System (RRTS) corridor of 82 km between Delhi and Meerut has been sanctioned at a cost of Rs. 30,274 crore. Of this, 34 km of this corridor is operational, with the 'NaMo Bharat' train running on this network.

India's Expanding Global Metro Footprint: India's metro development expertise is gaining international recognition, with growing interest in replicating its successful models. The Delhi Metro Rail Corporation (DMRC) is currently managing metro projects in Bangladesh and has offered consultancy services in Jakarta. Additionally, countries like Israel, Saudi Arabia, Kenya, and El Salvador are in discussions with DMRC to explore potential collaborations, aiming to emulate India's metro success.

Railway and Metro Expansion: Driving Demand for Specialized Wire Harness and Cables

Indian Railways traditionally relied on colour light signals and train detection through track circuits and axle counters. While effective for basic operations, this system didn't fully optimize section capacity. Over the past decade, there has been a shift toward modern signalling technologies, including Electronic Interlocking Systems, Automatic Block Signalling, and integrated level crossing signalling; enhancing both efficiency and safety.

Rail transport is among the most efficient modes of mobility, requiring robust electrical systems. Electrical connectors and wiring harnesses are essential for linking various train components such as lighting, power, and communication systems.

India's increasing focus on rail infrastructure, highlighted by the record Rs 2,520 billion allocation in the Union Budget 2024-25, reflects a strong commitment to modernization. This ongoing investment in rolling stock and infrastructure is expected to drive demand for interconnect products, positioning the electrical connector and wiring harness market for robust growth in the coming years.

The ongoing modernization and expansion of Indian Railways—supported by substantial capital allocation, reform-driven policy momentum, and integration with global trade corridors—presents a long-term growth opportunity for the strategic electronics industry. Manufacturers of specialty cables, wiring harnesses, distribution panels, and signal systems are set to benefit from:

- Rising production volumes
- Recurring and large-scale orders
- Long-term contracts with EPC firms and railway agencies
- Stable revenues and improved market presence in critical infrastructure projects

As a result, this sector not only becomes increasingly relevant but also strategically vital to India's infrastructure transformation.

3. Aerospace

India ranks as the world's third-largest aviation market and continues to be one of the fastest-growing globally. Despite this status, air travel penetration in India remains relatively low compared to other mature aviation markets, indicating significant potential for future expansion.

In 2025, the Protection of Interest in Aircraft Objects Bill, 2025 was passed, aligning India's aviation leasing laws with global standards to reduce leasing costs. By addressing gaps in legal enforcement, the Bill is strategically designed to reduce aircraft leasing costs for Indian carriers, which were previously 8-10% higher than in other nations. This is expected to boost investor confidence in India's burgeoning aviation market significantly. The intended impact of the Bill includes reduced risk premiums, lower interest rates, and lease costs for passengers and shippers. This bill will benefit airlines operator by lowering their aircraft leasing costs. With reduced lease expenses and interest rates, these carriers can improve profitability, offer more competitive fares, and expand their fleet more cost-effectively.
Entering its 9th year, the UDAN scheme has successfully operationalized 619 routes and 88 airports, including two water aerodromes and 13 heliports, with plans to expand to 120 additional destinations in next 10 years. Consequently, as per CMIE, in FY25 India witnessed a record-high passenger traffic exceeding 410 million, with projections suggesting this could surpass 600 million by 2031. To cater to the rising demand, Indian airlines such as Air India, IndiGo, and Akasa Air have placed massive aircraft orders. Details are as follows:

Airline Company	Manufacturer	Number of Aircrafts ordered
Air India	Airbus and Boeing	570
IndiGo	Airbus	530
Akasa Air	Boeing	226

Overall, Indian carriers now have over 1,300 aircrafts on order, with deliveries stretching through the mid-2030s.

Globally, significant deals are also being inked, such as Qatar Airways' massive USD 96 billion order for up to 210 Boeing widebody jets in May 2025, marking the largest widebody deal ever.

4. Defence Sector Expansion

Key Characteristics:

1. **Mission-Critical Applications**: Used in radar systems, electronic warfare (EW), missile guidance, avionics, communication systems, satellite control, border surveillance, and naval systems.
2. **High Precision and Reliability**: Requires rigorous standards (e.g., MIL-STD), long life cycles, and resistance to extreme environmental conditions.
3. **Security and Confidentiality**: Involves sensitive technologies that are often subject to export restrictions and require indigenization.
4. **Indigenous Development Push**: Strategic electronics is a priority area for India's "Atmanirbhar Bharat" mission, aiming to reduce dependence on imports in defence tech.
5. **High Entry Barriers**: Characterized by long onboarding timelines, strict qualification procedures, and critical regulatory and defence approvals; making market entry difficult for new players.

As the Defence sector scales up domestic manufacturing under initiatives like 'Make in India' and focuses on self-reliance (Atmanirbhar Bharat), suppliers of critical components like special wires, cables, and distribution systems are positioned for sustained growth. Their products form the backbone of high-performance, rugged, and secure military platforms.

In the Union Budget for fiscal 2026, the Ministry of Defence received a total allocation of Rs 6,810 Billion, or 13.45% of the total budget.

Table 16: Budget allocation for Capital Expenditure (Rs crore)

Major Head	FY24 BE	FY24 RE	FY25 BE
Capital Acquisition	**1,32,301.27**	**1,29,528.26**	**1,40,691.24**
Land & Works of 3 Services (including Married Accommodation Projects)	16,113.73	13,436.59	16,581.76
DRDO, DGOF and Other Defence Departments	14,185.00	14,263.35	14,727.00
Total Capital	**1,62,600.00**	**1,57,228.00**	**1,72,000.00**

Source: 3rd Report, Standing Committee on Defence, Ministry of Defence

Table 17: Details of Budget Estimate and procurement made from Domestic and Foreign procurement from Capital Acquisition (Modernisation) Budget (In Rs Crores)

Year	Total Capital Procurement (Budget Estimates)	Domestic Capital Procurement	Foreign Capital Procurement	Total Procurement
FY20	80,959.08	52,920.70	38,156.83	91,077.53
FY21	90,047.80	76,073.98	42,786.54	1,18,860.52
FY22	1,13,717.58	74,130.25	39,651.02	1,13,781.27
FY23	1,24,408.66	79,060.43	38,123.84	65,859.98
FY24	1,32,301.27	93,376.78	35,746.70	1,29,123.48
6M-FY25	1,40,691.24	39,517.93	4,906.46	44,424.39

Source: 3rd Report, Standing Committee on Defence, Ministry of Defence

The Indian Government's push for self-reliance in the defence sector in the short term, with a long-term vision of becoming a major exporter, is fuelling investment across all segments of the Indian Special Forces. This strategic shift prioritizes domestic suppliers and Make in India initiatives, creating significant opportunities for Indian-based companies with the required capabilities and regulatory clearances. Firms engaged in defence-related machinery, equipment, and ancillary products or services are well-positioned to benefit from the growing demand and policy support in the years ahead.

Table 18: Capital Acquisition across different Defence services (In Rs Crores)

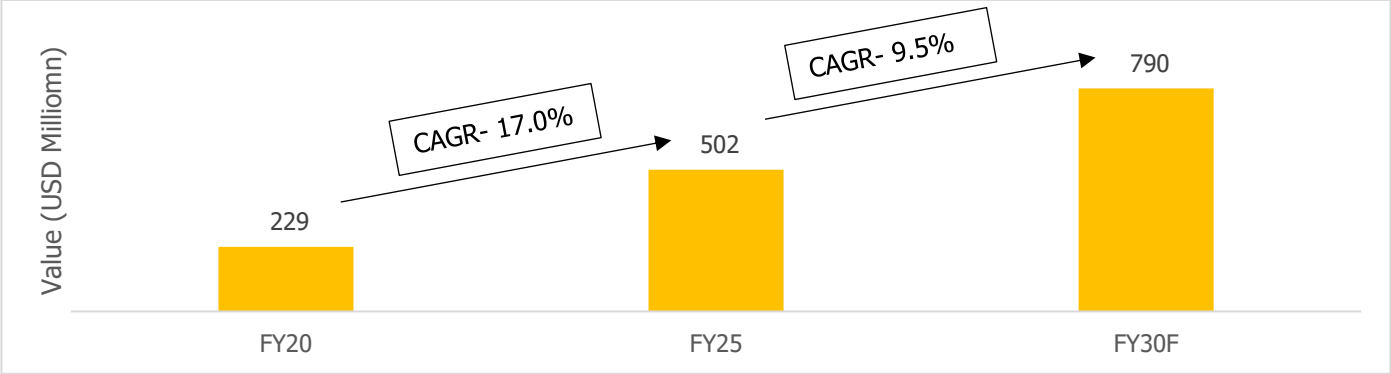
Service	FY24 BE	FY25BE
Army	30,163.00	27,421.33
Navy	47,515.00	57,950.00
Air Force	598.90	750.00
Jt. Staff	54,024.37	54,569.91
Total	**1,32,301.27**	**1,40,691.24**

Source: 3rd Report, Standing Committee on Defence, Ministry of Defence

The Defence manufacturing industry of special wires and cables, as well as electrical and electronic distribution systems, stands to benefit significantly from the rising defence requirements in India. Army tanks, for instance, require rugged and shielded cabling systems to support critical functions such as power distribution, communication, surveillance, and targeting. Similarly, both surface and air-to-air missiles demand compact, heat-resistant, and highly reliable wiring for ignition, control systems, and telemetry. These components must operate in extreme environments, increasing the need for precision and durability. Additionally, the growing emphasis on secure and resilient defence communication systems will drive demand for high-bandwidth, interference-free, and encrypted cabling solutions.

Even the Naval vessels and submarines require highly specialized and durable electrical systems that can function reliably in harsh and demanding marine environments. This includes power distribution networks, communication systems, control wiring, navigation systems, and safety-critical electronic circuits. The indigenization push and increasing defence budget allocations for naval expansion further support this trend, opening up opportunities for domestic manufacturers to supply high-specification cabling and distribution systems for both surface and underwater vessels.

Chart 55: Market size of Specialized Wires, Cables and Harness for Aerospace and Defence industry



Source: Imarc Research
Note: This includes Commercial and Defence aviation

The market for specialized cables for Aerospace and defence industry is estimated to increase by around 9-10% CAGR during the FY25-30 period.

Companies equipped with the necessary approvals, defence certifications, and advanced manufacturing capabilities are strategically positioned to benefit from the rising demand in the defence sector. Their adherence to stringent quality standards and readiness to deliver technologically advanced solutions enable them to supply mission-critical components such as specialized wires, cables, and electronic distribution systems. These firms can effectively meet the evolving requirements of modern defence platforms, ranging from tanks and missile systems to secure communication

infrastructure. This positions them for long-term growth as India strengthens its defence preparedness and prioritizes domestic sourcing under key government initiatives.

For example, a new BrahMos missile manufacturing unit has been inaugurated in Lucknow with an investment of ₹300 crore by BrahMos Aerospace. Additionally, the Uttar Pradesh government has allocated 117.35 hectares of land to 12 companies within the Defence Corridor. Among them, Aeroloy Technologies has received 20 hectares and has already completed the first phase of its Rs 320 crore investment. The company's components are being used in prominent Indian defence and space programs, including Chandrayaan and fighter aircraft. These projects are projected to create over 3,000 jobs and transform Lucknow into a significant manufacturing hub for ammunition, missile systems, defence packaging, drones, and small arms. Furthermore, the Titanium and Super Alloys Materials Plant, Strategic Materials Technology Complex, will produce high-grade materials for aerospace and defence applications, supporting missions like Chandrayaan and fighter jet development. The site will also host the Defence Testing Infrastructure System (DTIS), which will play a critical role in testing and certifying defence products.

Also, a contract was signed between the ministry of defence and ammunitions and missile systems manufacturer Bharat Dynamics Limited (BDL) for the supply of Medium-Range Surface-to-Air Missiles (MRSAM) for the Indian Navy. MRSAM system is a standard fit onboard multiple Indian Naval Ships and is planned to be fitted on the majority of the future platforms planned for acquisition.

Such initiatives are central to the 'Make in India' and 'Aatmanirbhar Bharat' campaigns, aimed at reducing import dependency, encouraging domestic production, generating employment, and boosting participation from private players, MSMEs, and startups. These developments are expected to significantly benefit the strategic electronics industry by creating strong demand for high-performance, defence-grade electronic components and systems.

Fighter Jets

India needs to manufacture 35 to 40 fighter jets annually to phase out its aging fleet and maintain optimal combat readiness. Hindustan Aeronautics Limited (HAL) has committed to producing 24 Tejas Mk1A aircraft per year starting next year. According to the Indian Air Chief, additional output from Sukhoi production lines, coupled with potential private sector participation, could help bridge the shortfall in supply.

Meanwhile, India has initiated the process of developing its fifth-generation stealth fighter under the Advanced Medium Combat Aircraft (AMCA) project, a medium-weight, deep-penetration aircraft featuring advanced stealth technologies. The Aeronautical Development Agency (ADA), under the Ministry of Defence, has issued an Expression of Interest (EOI) for prototype development. The AMCA, along with the Tejas light combat aircraft, is expected to form the backbone of the Indian Air Force in the coming decades.

Implication for special wire and cable companies:

This surge in indigenous fighter aircraft development and production is expected to significantly benefit the strategic electronics industry, which supplies mission-critical components such as wiring harnesses, avionics connectors, radar systems, power management units, and electronic warfare subsystems, opening up long-term opportunities for domestic manufacturers.

This surge in aircraft procurement and airport infrastructure expansion will directly benefit companies manufacturing special wires and cables, electrical connectors, and electronic distribution systems. Aircraft and airport facilities require advanced, lightweight, and high-performance wiring for avionics, power supply, lighting, and communication systems. Additionally, increased investment in terminal upgrades, hangars, and maintenance facilities further boosts demand for such electrical infrastructure components, ensuring steady growth for manufacturers in this segment.

As per Defence Ministry, India's defence exports reached a record high of Rs. 23,622 crore in FY25, with the private sector contributing approximately 65% of the total. The country has set an ambitious target of Rs. 50,000 crore in defence exports by 2029. To support this goal, the government has introduced several policy reforms over recent years, including the simplification of industrial licensing procedures, removal of parts and components from the licensing regime, and extension of license validity. Additionally, the Standard Operating Procedure (SOP) for export authorisation has been streamlined with new provisions added in the last fiscal year to further encourage exports. These initiatives present a significant opportunity for private sector players to leverage their capabilities and expand their footprint in global defence markets.

5. Shipbuilding

The demand for shipbuilding will remain steady since the yard's capacity is likewise fully booked for the next two to three years. With the government's emphasis on indigenization, shipbuilding in India is expected to continue at its historic peak, driven primarily by orders from the defence sector.

Unlike other manufacturing industries, shipbuilding industry usually follows a 'make to stock inventory model' i.e. it follows an order driven industry in which each vessel is custom built on receiving a shipbuilding order. Hence, a healthy order book is essential for growth of this industry. There have been improvements in order books of Cochin Shipyard and Garden Reach Shipbuilders.

The growth in world trade and commerce drives the order book for commercial ships that spurs the demand for new ships. The pickup in the trading activities across the world are expected to improve the order book further. Additionally, the emerging environment - friendly international regulations are also demand factors for replacement of old ships.

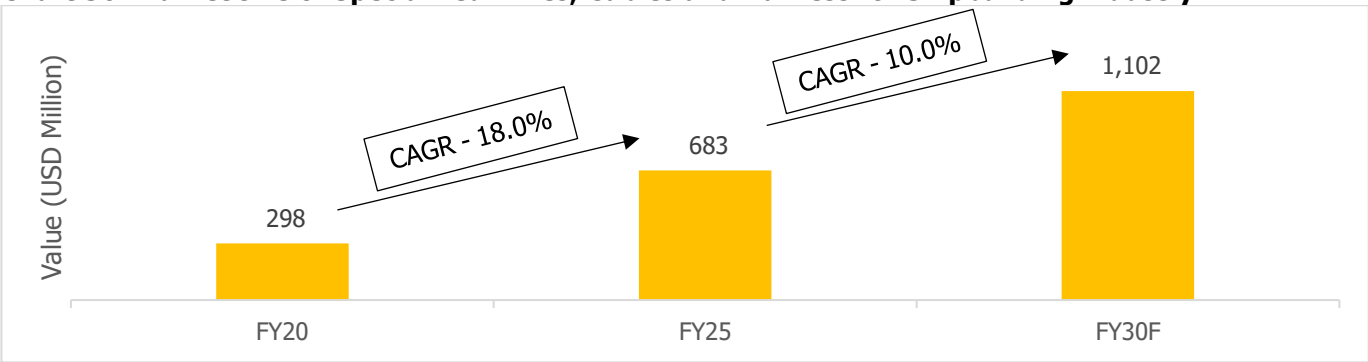
Budgetary Support

As a part of Atmanirbhar Bharat, government has been constantly supporting shipping industry. Budgetary allocation for the assistance to Ship Building, Research and Development has been provided every year. During the Union Budget 2025-26, Rs 365 Cr has been allocated to ship building industry an increase of 265% from previous year's budget.

The Government's Atmanirbhar policy will help in improving infrastructure, providing better access to financing needs and ease of doing business in the country. To promote the demand of the ships built in India, priority in chartering of vessels is now given to vessels built in India, flagged in India and owned by Indians under the amendments in the guidelines of ROFR (Right of First Refusal). The right of first refusal to import-export coal, fertilisers, crude & gas will be given to Indian made ships instead of companies registered in India. This will encourage shipbuilding in the country.

Rising shipbuilding activity, especially under defence orders and Atmanirbhar Bharat, boosts demand for specialized wires and cables used in ship systems. Custom-built ships need high-quality, made-to-spec cabling, and with increased budgetary support and order books, cable manufacturers will see higher orders and growth.

Chart 56: Market size of Specialized Wires, Cables and Harness for Shipbuilding industry



Source: Imarc Research
Note: This includes Commercial and Defence shipbuilding

The market for specialized cables for shipbuilding industry is estimated to increase by around 10% CAGR during the FY25-30 period.

6. India's Space Push: Creating Opportunities

As India aims to strengthen its position in the global space economy, there is a growing demand for reliable, high-quality components used in satellites, launch vehicles, ground systems, and other space infrastructure. Private participation allows companies with technical capabilities and defence-grade certifications to collaborate with ISRO and new-age space startups, supplying mission-critical components that meet stringent safety and performance standards. This not only diversifies revenue streams for such companies but also positions them as integral players in India's rapidly expanding aerospace and defence ecosystem.

The Union Budget 2025–26 allocated Rs 13,416 crore to the Department of Space, underscoring the government's commitment to advancing ambitious space exploration, satellite development, and infrastructure expansion. This allocation reflects a strong push toward greater private sector involvement, enhancement of geospatial capabilities, and deeper integration of AI and emerging technologies in space initiatives. The government's emphasis on fostering innovation through dedicated support for startups, including the creation of a Rs 1,000 crore venture capital fund for the space sector, is a pivotal move toward building a competitive and self-reliant space ecosystem. Initiatives under the "Atmanirbhar Bharat" mission such as extending the PLI scheme to critical space-grade components and offering GST exemptions further reinforce the push for indigenous manufacturing.

Also, ISRO's commercial arm, NSIL, has begun awarding contracts to private players for manufacturing satellites, payloads, and even full PSLV rockets. Policy reforms like permitting 100% FDI in satellite components, simplifying licensing through IN-SPACe, and encouraging public-private partnerships are rapidly transforming India's space program from a government-dominated domain into a dynamic, innovation-driven ecosystem.

For companies involved in manufacturing strategic electronic components such as specialized wires, harnesses, and connectors, these developments offer substantial opportunities. As satellite systems, launch vehicles, and communication infrastructure grow more complex and indigenized, the demand for high-reliability, space-grade electronic components will rise sharply. Participation in this ecosystem will position such companies as critical enablers in India's evolving space ambitions.

ISRO's Gaganyaan project:

The Gaganyaan project aims to demonstrate India's human spaceflight capability by sending a crew of three astronauts into a 400 km orbit for a three-day mission, followed by a safe return to Earth with splashdown in Indian sea waters.

The mission adopts a strategic approach, leveraging in-house expertise, the capabilities of Indian industry, the intellectual contributions of academic and research institutions, and advanced technologies sourced from international collaborations. Key prerequisites for the mission include the development of critical technologies such as a human-rated launch vehicle to ensure crew safety, and a Life Support System that provides an Earth-like environment in space.

A series of precursor missions are being conducted to establish Technology Readiness Levels (TRLs) ahead of the actual human spaceflight. These include the Integrated Air Drop Test (IADT), Pad Abort Test (PAT), and multiple Test Vehicle (TV) flights. Prior to the manned mission, unmanned missions will validate the safety and reliability of all systems.

ISRO's LVM3 rocket, its proven heavy-lift launcher, has been designated as the launch vehicle for the mission. The LVM3 consists of a solid stage, a liquid stage, and a cryogenic upper stage. The Orbital Module (OM), which orbits the Earth, comprises the Crew Module (CM) and the Service Module (SM). The OM is equipped with cutting-edge avionics systems, designed with multiple redundancies to ensure the safety of the astronauts.

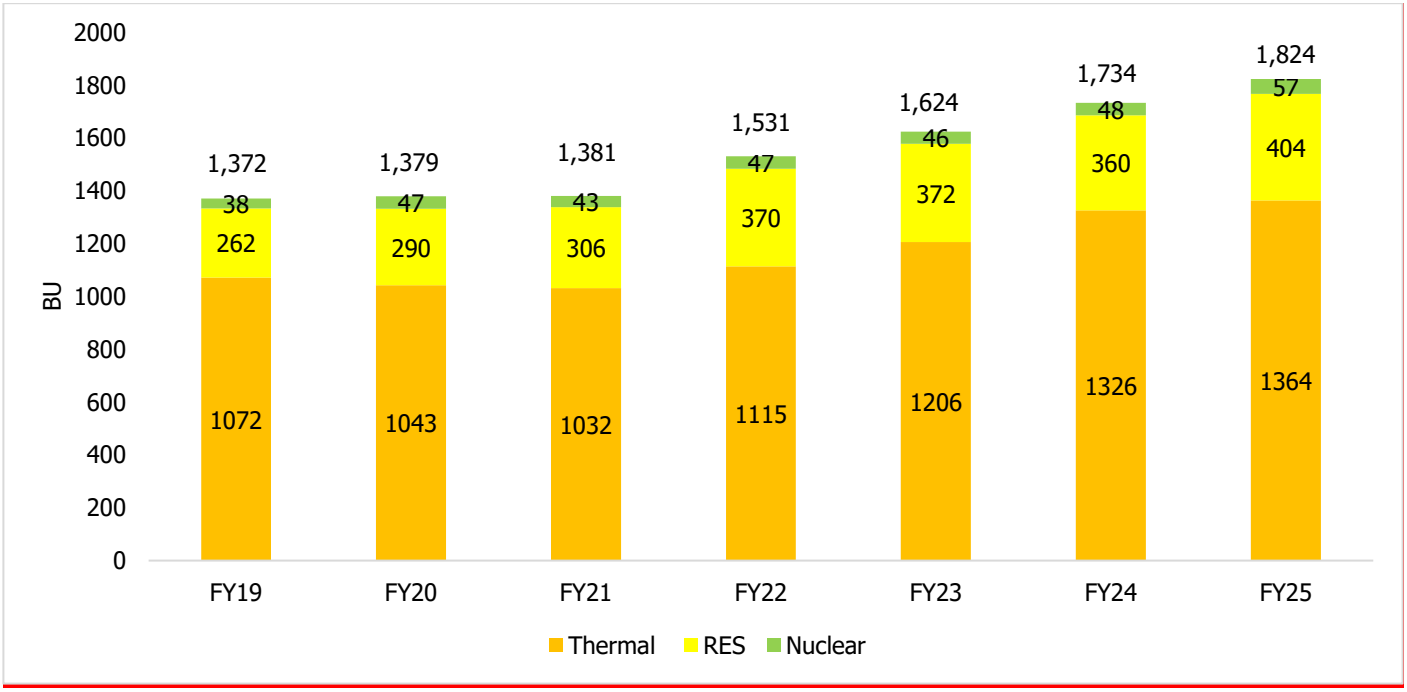
This ambitious mission will significantly benefit the strategic electronics industry, particularly in the areas of space-grade wiring harnesses, high-reliability connectors, advanced avionics, onboard control systems, telemetry, power management modules, and safety-critical electronic subsystems. The development and integration of these technologies will not only strengthen domestic manufacturing capabilities but also open up new avenues in aerospace and defence electronics on a global scale.

7. Renewable Energy Sector

India's electricity sector is one of the most diversified in the world. India’s power generation sources range from conventional sources such as coal, lignite, natural gas, oil, nuclear and hydro power to viable unconventional sources such as wind, solar, agricultural and household waste.

Electricity generation in India increased from 1,372 BU in FY19 to 1,824 BU in FY24, implying a compounded annual growth rate (CAGR) of 4.9%. Electricity generation increased by about 5.2% y-o-y to 1824 BU during April 2024 to March 2025. Thermal power forms the largest source of power in the country with about 75% of the electricity consumed being generated from thermal power plants. There are different types of thermal power plants, out of which coal based thermal power plants account for highest amount of electricity followed by gas and diesel. Renewable Energy Sources (RES) including solar, wind and hydro are quickly increasing their share, and their contribution has increased from 19.1% in FY19 to 22% in FY25.

Chart 57: Power Generation Over the Years

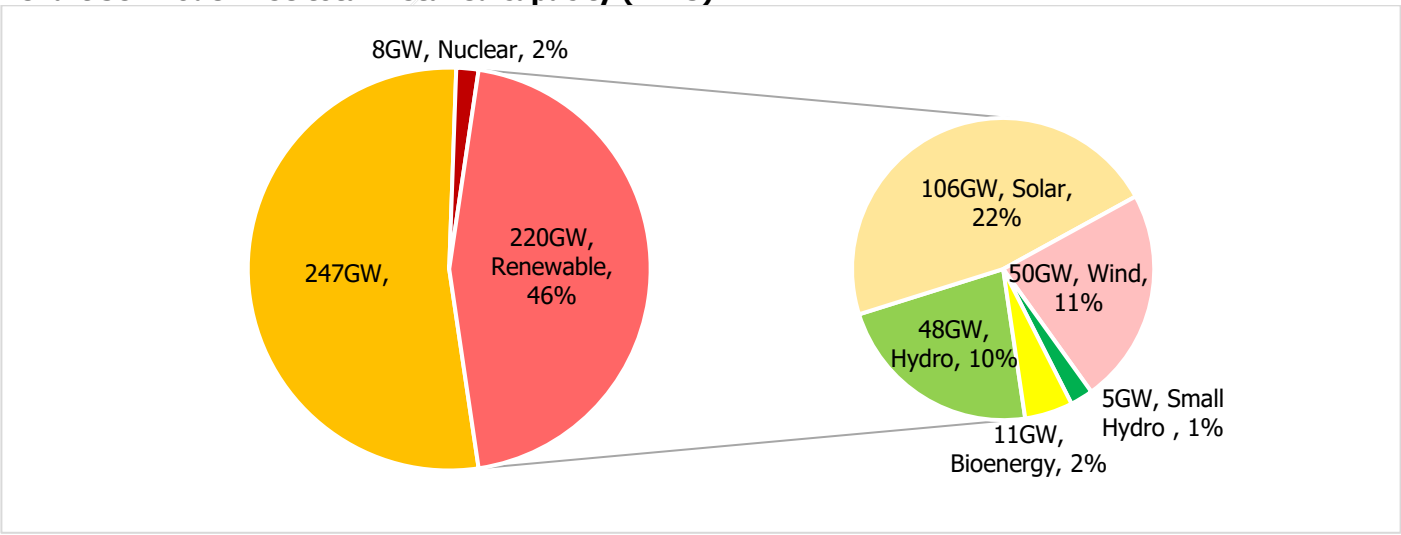


Source: CEA; RES refers to power generated from Hydro, Wind, Solar, Small hydro and Bioenergy projects

As per IEA, the current share of India in global primary energy consumption is 6.1% and is likely to increase to about 9.8% under stated policies scenario by 2050. India has been ranked third largest primary energy consumer in the world. The installed power generation capacity in India has increased from 370 GW in FY20 to 475 GW in FY25 at a CAGR of 5%.

Further, conventional sources currently account for 54% of installed capacity in India as on March 2025. The Government of India has ambitious projects and targets for renewable energy and power generated from RES including hydro, which currently accounts for 46%. However, only 21% of energy is generated from it. With a consistent focus on the renewable sector, the percentage share of installed capacity is expected to shift towards renewable energy.

Chart 58: Mode-wise total installed capacity (FY25)



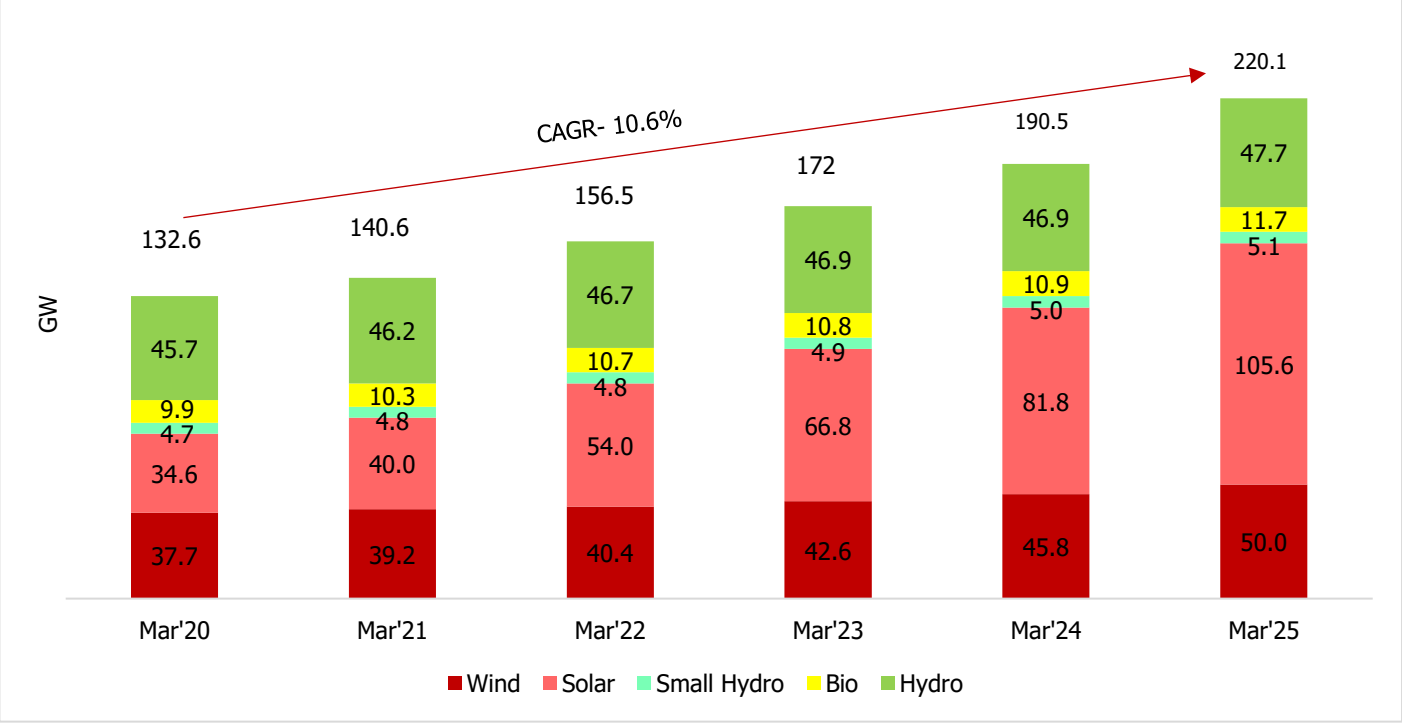
Source: CEA

India has committed to decrease the emissions intensity of its Gross Domestic Product (GDP) by 45% by 2030, compared to 2005 levels. Additionally, India aims to attain a non-fossil fuel-based installed power generation capacity of approximately 50% (500 GW) by 2030. These targets were proposed at the 26th session of the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC), which took place in Glasgow, the United Kingdom, in November 2021. The ultimate objective is to achieve a net-zero emissions target by 2070. This further reiterates India's commitment and focus on renewable energy additions in the future.

Moreover, the Government of India has highlighted priority areas for Renewable Energy (RE) generation, including RE component manufacturing (solar modules, hydrogen electrolysers, battery storage, among others), green energy corridor, green hydrogen production, utility-scale battery storage, pumped storage hydro, and rooftop solar power. Furthermore, with the announcement of 500 GW RE capacity installation by 2030 and Net-Zero emissions by 2070, India has set itself on one of the most accelerated energy transition trajectories in the world.

The renewable energy sector shows potential for substantial and rapid growth in India and has the potential to meet India's growing energy demand. Traditionally, thermal power has been the preferred source of power. However, a strong government focus on renewable energy, lower tariffs (due to lower capital costs, domestic manufacturing and improved efficiency) and focus on sustainable energy generation has led to the expansion of renewable energy capacity. Renewable installed capacity has grown from 87 GW in FY20 to 143.6 GW in FY24 growing at a CAGR of 13.4% and 16% y-o-y as of December 2024.

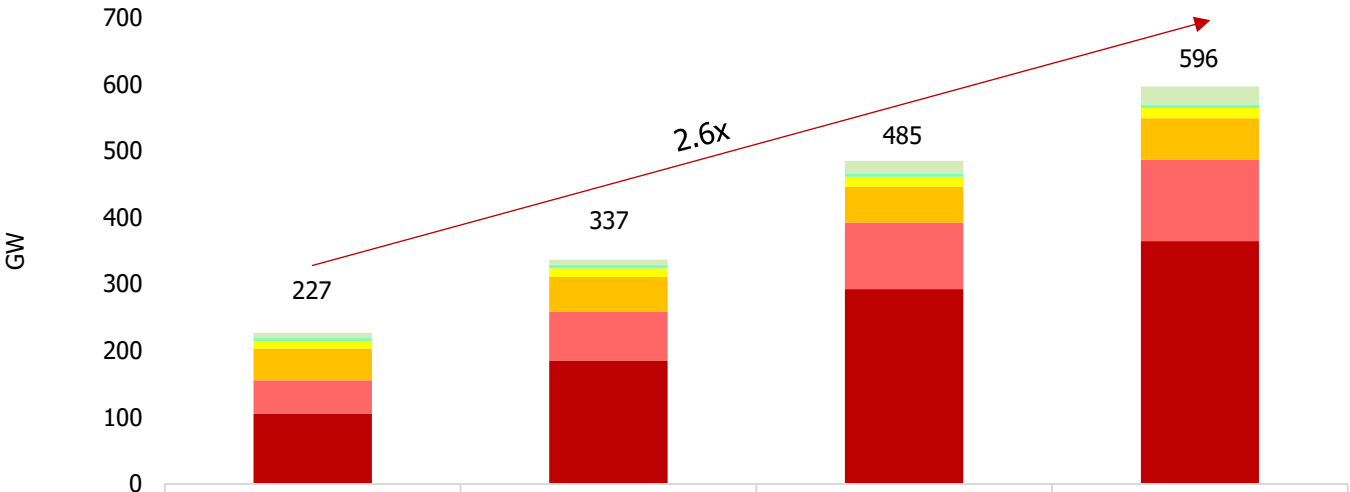
Chart 59: Installed Capacity - Renewable Breakup



Source: CEA

Note: Small Hydro denotes projects up to 25 MW, Hydro Power Plants denotes projects more than 25 MW

Chart 60: India's RE capacity target to grow by 2.6x by 2032



	FY25	FY27	FY30	FY32
PSP	7.5	7.4	19.0	26.7
Small Hydo	5.1	5.2	5.3	5.4
Bio	10.7	13.0	14.5	15.5
Hydro	47.7	52.5	53.9	62.2
Wind	50.0	72.9	99.9	121.9
Solar	105.6	185.6	292.6	364.6

Solar Wind Hydro Bio Small Hydo PSP

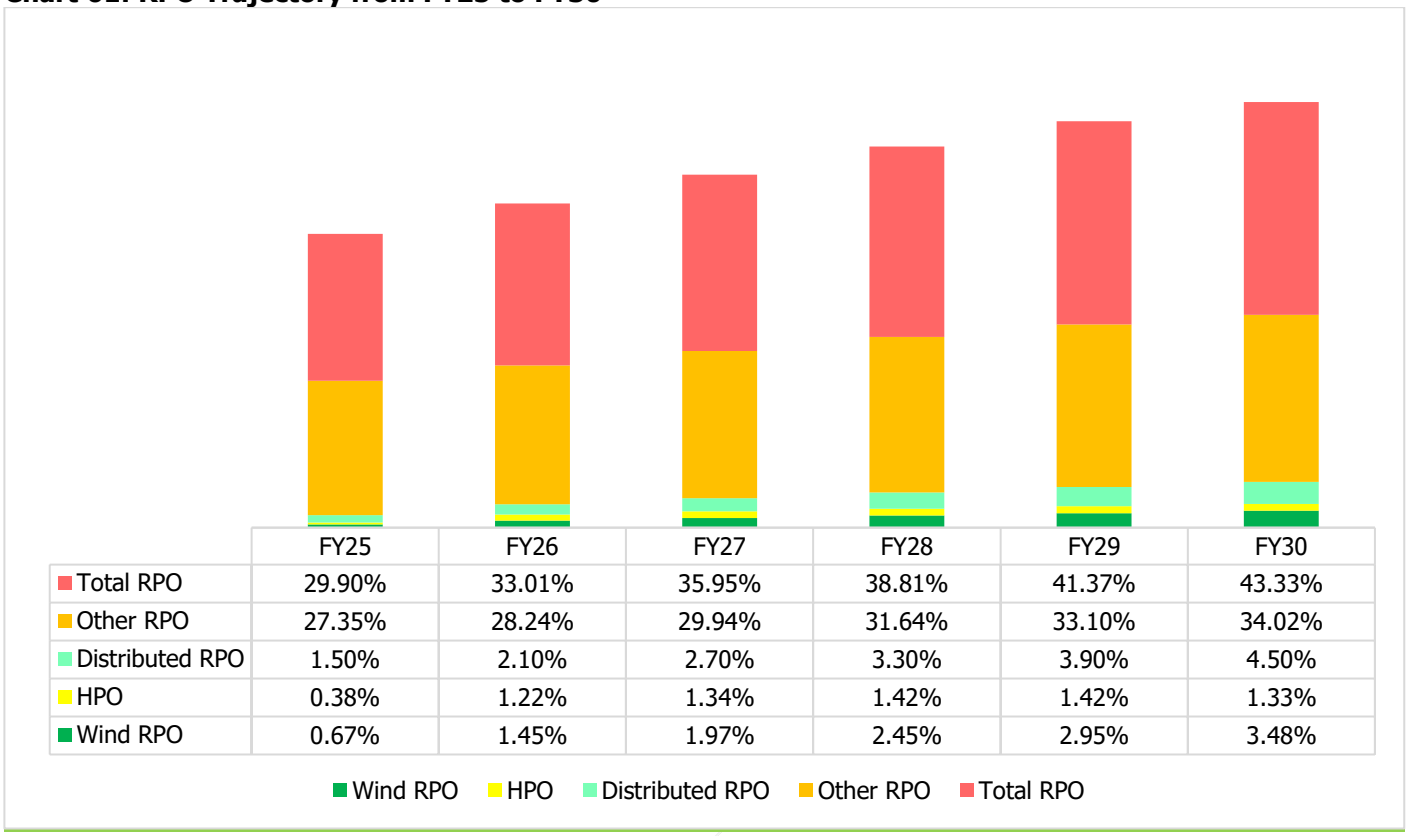
Source: CEA, NEP Volume I, CareEdge Research
Note: Small Hydro denotes projects up to 25 MW, Hydro Power Plants denotes projects more than 25 MW

India has reached a significant milestone in its renewable energy journey, with the country's total renewable energy capacity crossing the 200 GW (gigawatt). This remarkable growth aligns with the country's ambitious renewable energy target of achieving 500 GW from non-fossil sources by 2030. This achievement underscores India's growing commitment to clean energy and its progress in building a greener future. India's total renewable energy installed capacity is expected to be around 596 GW by end of FY32. MNRE increased its budget allocation for FY26 and is at Rs 265 billion which represents a 50% y-o-y increase, while for FY25 the revised estimate is at Rs 179 billion. The Ministry of Power along with MNRE has specified the lastest RPO trajectory beyond FY22 on October, 2023. As per the targets set, an RPO of 43.33% is proposed to be achieved by FY30.

Under Section 86(1) (e) of the Electricity Act 2003 and the National Tariff Policy 2006, Renewable Purchase Obligation (RPO) is a mechanism wherein the obligated entities are obliged to purchase a certain percentage of electricity from renewable energy sources, as a percentage of the total consumption of electricity or buy, in lieu of that, renewable energy certificates (REC) from the market.

RPOs were earlier categorised as solar and non-solar RPOs. However, as per the latest targets, RPOs are categorized as Wind RPO, Hydro RPO, Distributed RPO, and Others. Obligated entities [which include distribution companies (or DISCOMs), open access consumers and captive power producers] are obligated to purchase a minimum share of their electricity from renewable energy sources as per RPO targets.

Chart 61: RPO Trajectory from FY25 to FY30



	FY25	FY26	FY27	FY28	FY29	FY30
Total RPO	29.90%	33.01%	35.95%	38.81%	41.37%	43.33%
Other RPO	27.35%	28.24%	29.94%	31.64%	33.10%	34.02%
Distributed RPO	1.50%	2.10%	2.70%	3.30%	3.90%	4.50%
HPO	0.38%	1.22%	1.34%	1.42%	1.42%	1.33%
Wind RPO	0.67%	1.45%	1.97%	2.45%	2.95%	3.48%

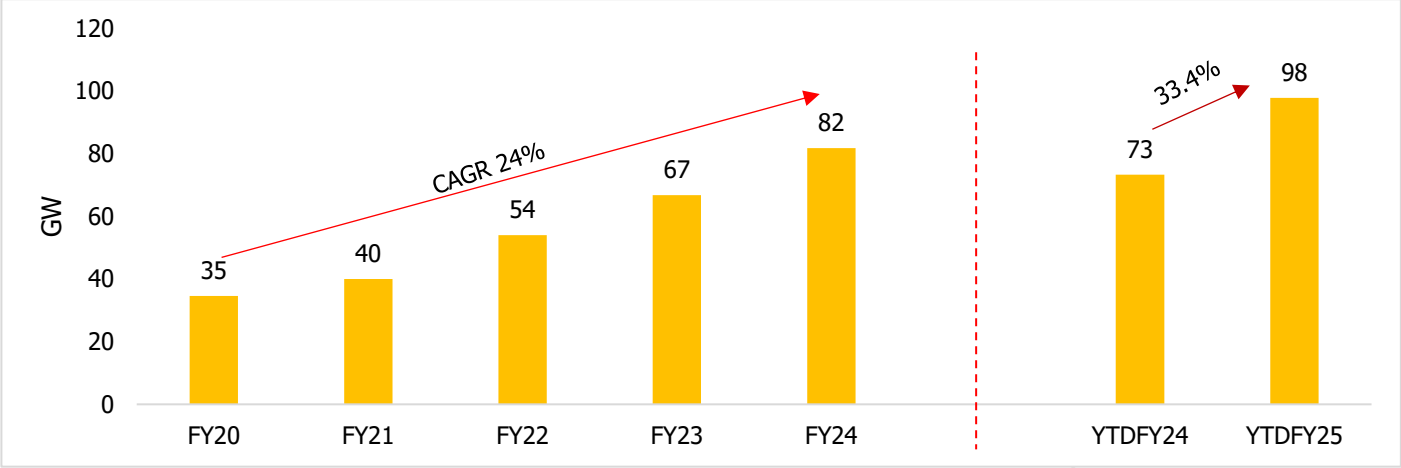
Source: Renewable Purchase Obligation and Energy Storage Obligation Trajectory Report dated 20th October, 2023, Ministry of Power

1. Solar Energy

Solar energy accounted for 51.35% of the renewable energy basket (excluding Hydro Power) as of March 2024. Over the previous years, the solar power industry has experienced strong growth. During FY20 to FY24, the segment added around 47.2 GW of capacity, registering a CAGR of 24%, albeit on a low base. A total of about 16 GW of solar capacity was added in Q3FY25 from FY24. Solar capacity addition contributed to about 66% of the total renewable capacity added in the period. The surge was due to the rush to complete projects before the reinstatement of Approved List of Models and Manufacturers (ALMM) from April 1st, 2024, delayed projects getting commissioned and falling module prices.

The increase in installed capacity is also the result of favourable market conditions and strategic policy interventions and technological innovations.

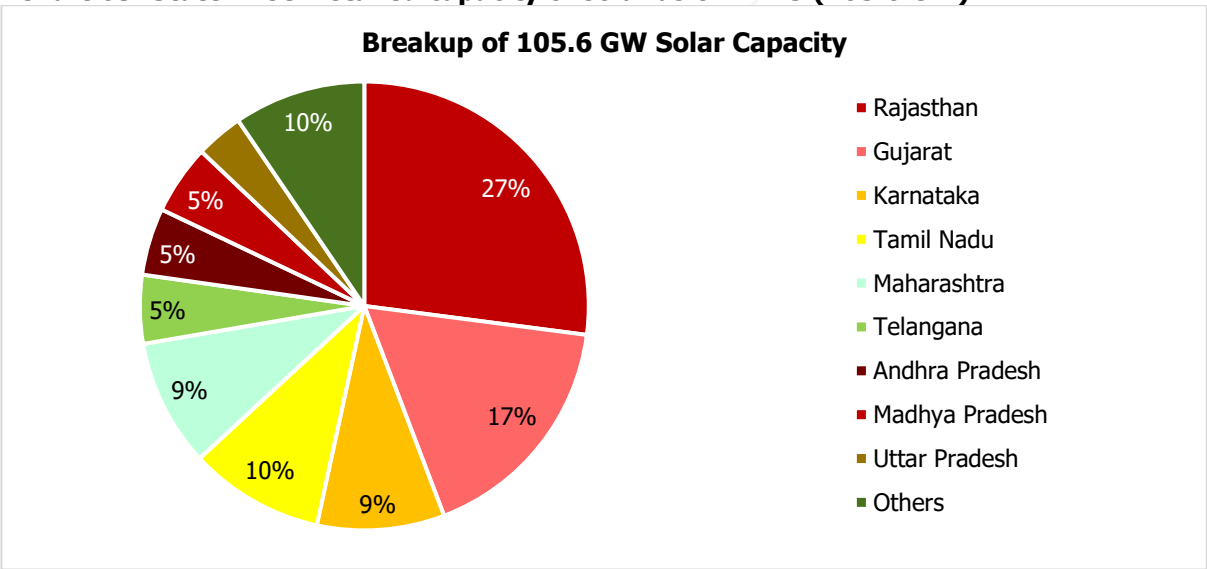
Chart 62: Trend in Solar Installations



Source: CareEdge Research, CEA
Note: YTD refers April to December

Out of the total installed capacity of 97.8 GW, Rajasthan has the highest installed capacity of 26 GW constituting a 27% share followed by Gujarat at 17 GW and Karnataka at 9 GW. Other states which hold a major share in the installed capacity of solar power are Tamil Nadu, Maharashtra, Telangana, Andhra Pradesh, Madhya Pradesh, and Uttar Pradesh. While the other states together hold only a 10% share in installed capacity which is around 9 GW.

Chart 63: State-wise installed capacity of solar as on FY25 (105.6 GW)



Source: MNRE, CareEdge Research

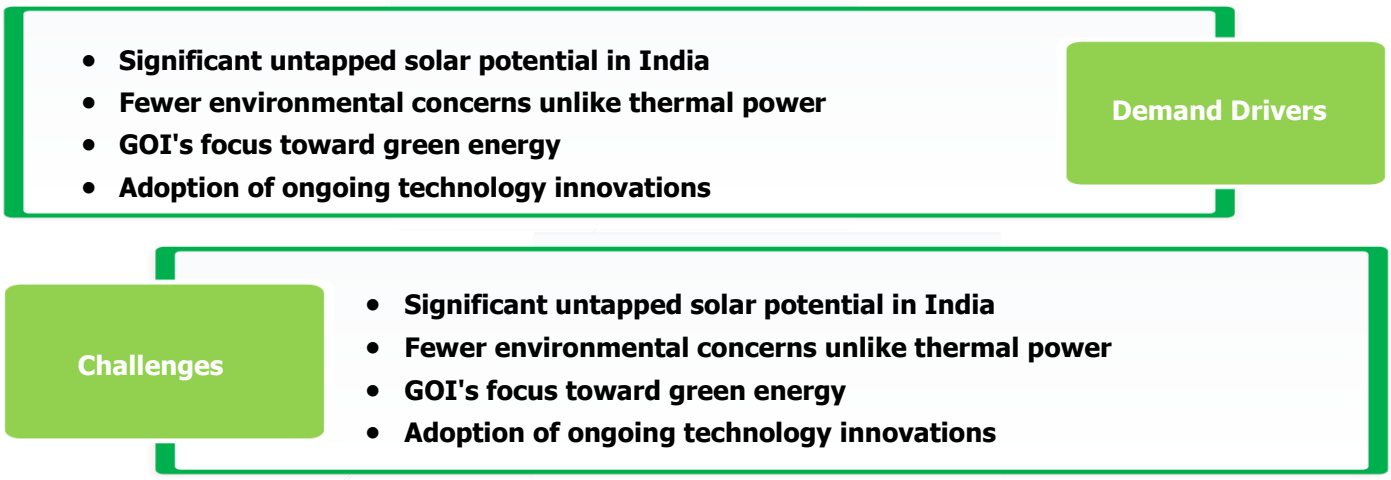
Cables are necessary elements for transmitting power. Such (specialized) cables are designed to connect solar panels to the electrical grid, enabling the widespread adoption of solar power. They are manufactured to withstand extreme weather conditions, resist UV rays, and handle high electrical loads, making them an essential component in the development of solar power systems. Also, these cables are designed to provide higher flexibility, durability, and reliability.

Further, the cables used in solar power stations are mostly laid outdoors. The environment where they are used is very harsh. The material of the cable is selected based on the degree of ultraviolet rays, ozone, severe temperature changes, and chemical corrosion such as acid and alkali in the environment. If ordinary cables are used, working in harsh environments for a long time will cause damage to the cable sheath and even decomposition of the cable insulation layer, resulting in cable short circuits and fire accidents. Therefore, it is imperative to use photovoltaic cables in solar power stations.

Photovoltaic cables and ordinary cables undergo different radiation steps. Radiation significantly improves the thermal properties, mechanical properties, and chemical properties of the cable insulation material. They can withstand more ultraviolet rays, radiation, severe temperature differences, and chemical corrosion.

Further, India's solar energy sector has emerged as a key participant in grid-connected power generation capacity over the past decade. It contributes significantly to the government's objective of sustainable growth while emerging as a key anchor in meeting the nation's energy demands and ensuring energy security.

Moreover, the global solar industry is rapidly growing and so is the demand for specialty cables. India has a large amount of solar energy potential. Approximately 5,000 trillion kWh of energy is incident over India's geographical area each year. Throughout the years, India's solar energy sector has emerged as a key participant in grid-connected power generation capacity.

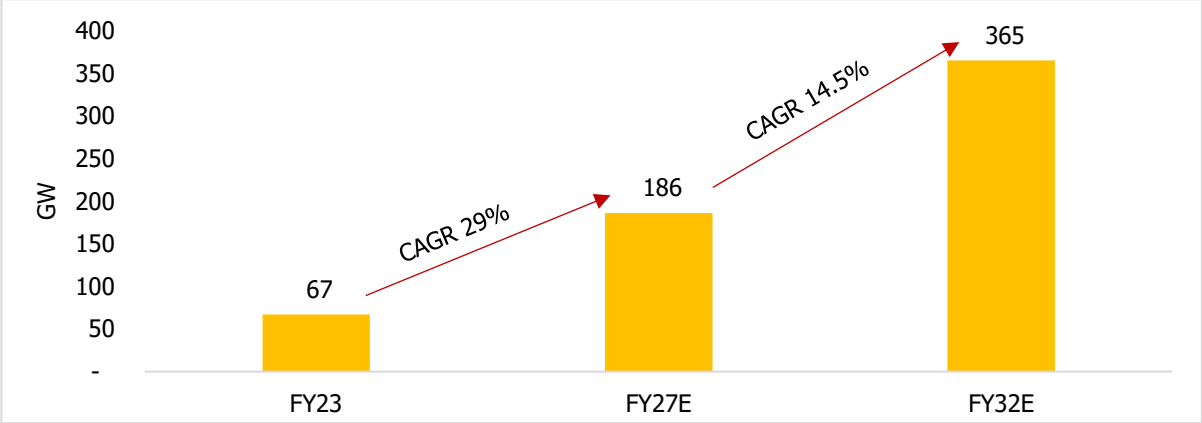


India has made a commitment to decrease the emissions intensity of its Gross Domestic Product (GDP) by 45% by 2030, compared to 2005. Additionally, India aims to attain a non-fossil fuel-based installed power generation capacity of approximately 50% (500 GW) by 2030. Under this, in April 2023, the Government of India announced that it will invite bids for 50 GW of renewable energy capacity annually for the next 5 years (up to FY28) in order to achieve COP26 targets of 500 GW of electricity capacity from non-fossil fuels by 2030.

Further, the domestic production of solar modules is expected to increase, driven by government initiatives such as the PLI scheme, which will lower the dependence on imports for critical components, thereby addressing supply chain challenges and lowering the capital cost of solar power projects.

As per the National Electricity Plan Vol-1 (March 2023), 186 GW of installed solar power capacity is expected to be achieved by FY27 and 365 GW by FY32.

Chart 64: Solar Power- Trend in Future Installed Capacity Additions



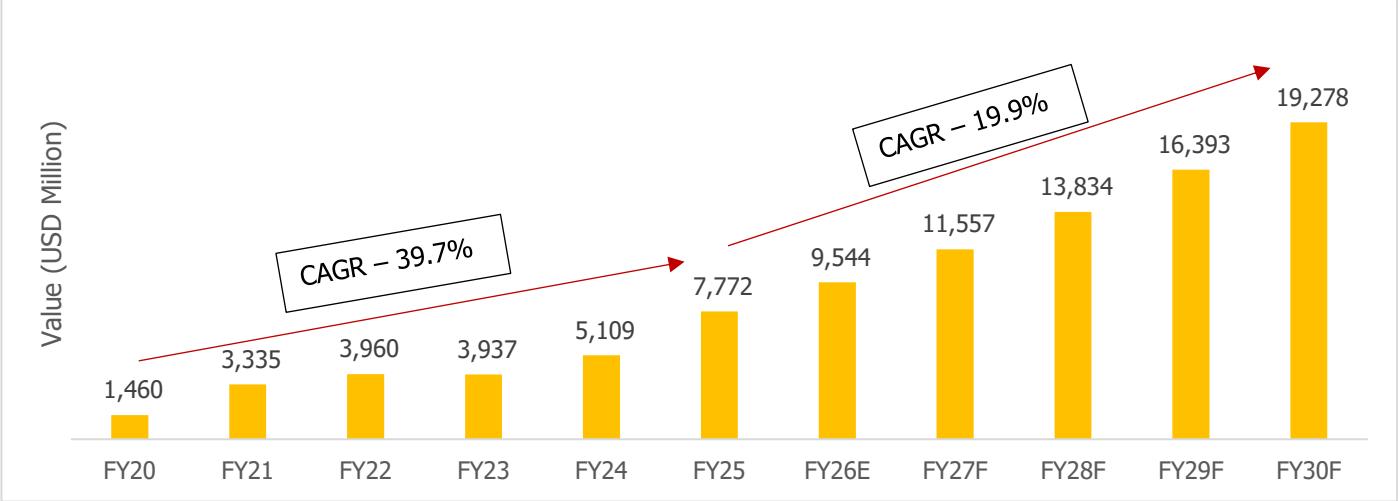
Source: National Electricity Plan Vol-1 (March 2023), CareEdge Research

Accordingly, the government's thrust on the sector, ambitious renewable energy targets, consistently growing power demand, and the security of government-backed 25-year power purchase agreements (PPAs) are the key factors attracting the interest of global investors to the renewable energy sector in India.

With the rapid development of high-performance, low-cost PV technology, India may be able to continue to lead the global solar revolution in the future.

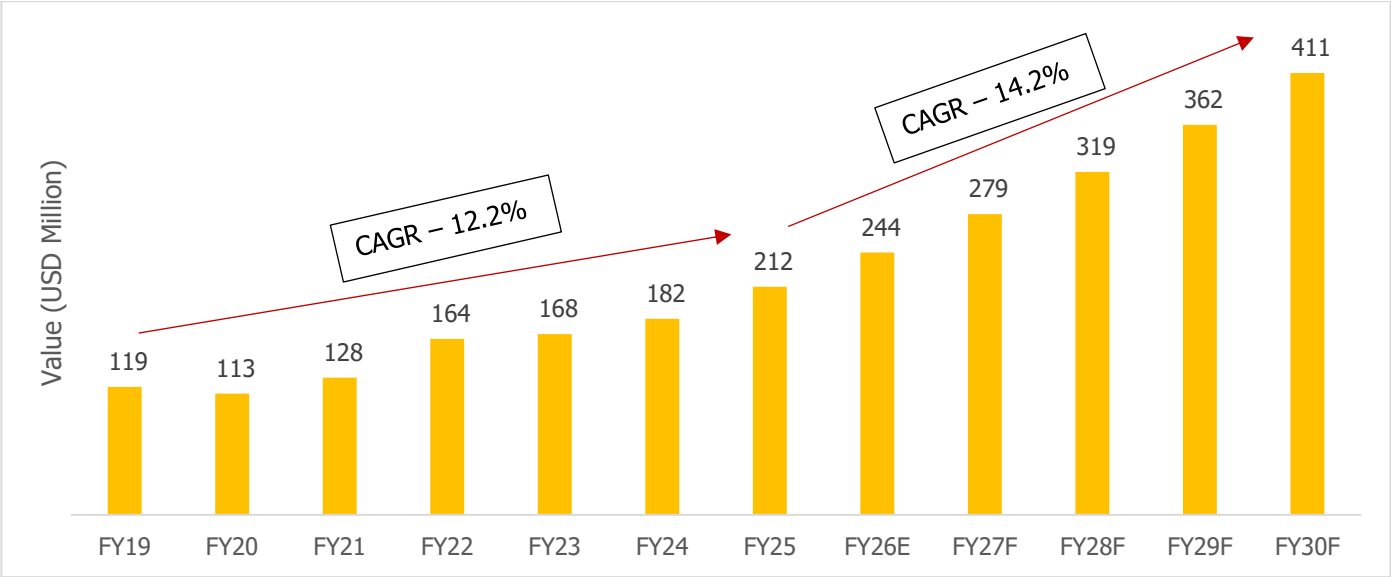
Domestic Rooftop Solar Market

Chart 65: Domestic Rooftop Solar Market Trend



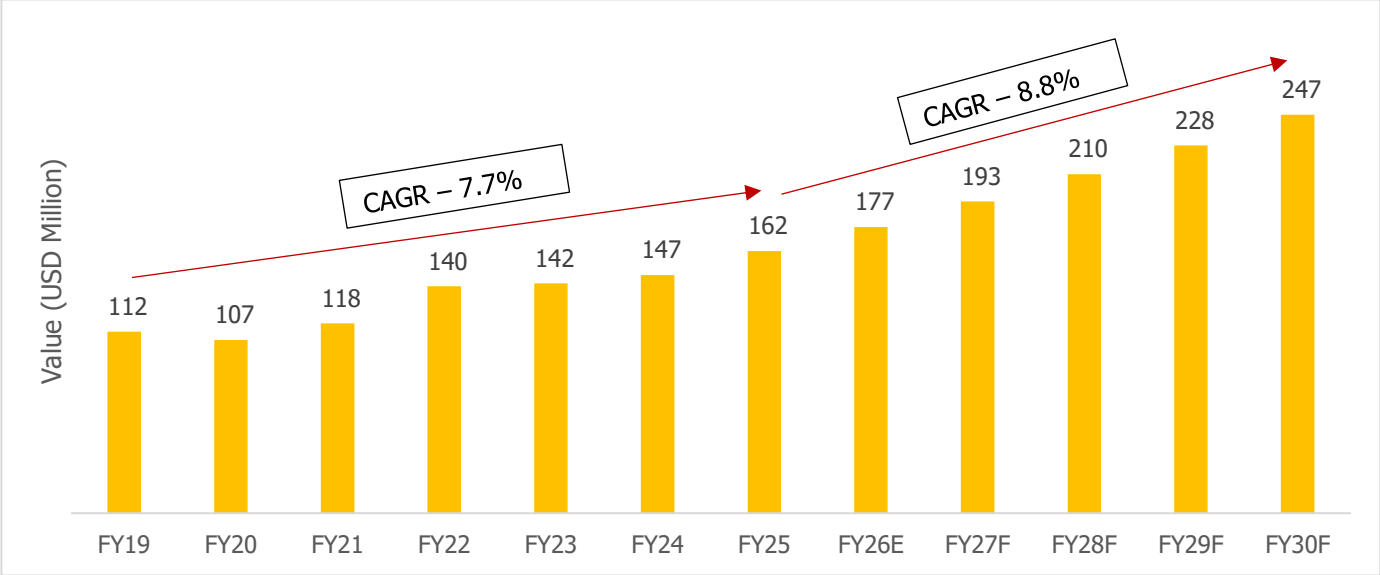
Source: CareEdge Research

Chart 66: Domestic Solar Cables Market Trend



Source: CareEdge Research

Chart 67: Domestic Solar Junction Box Market



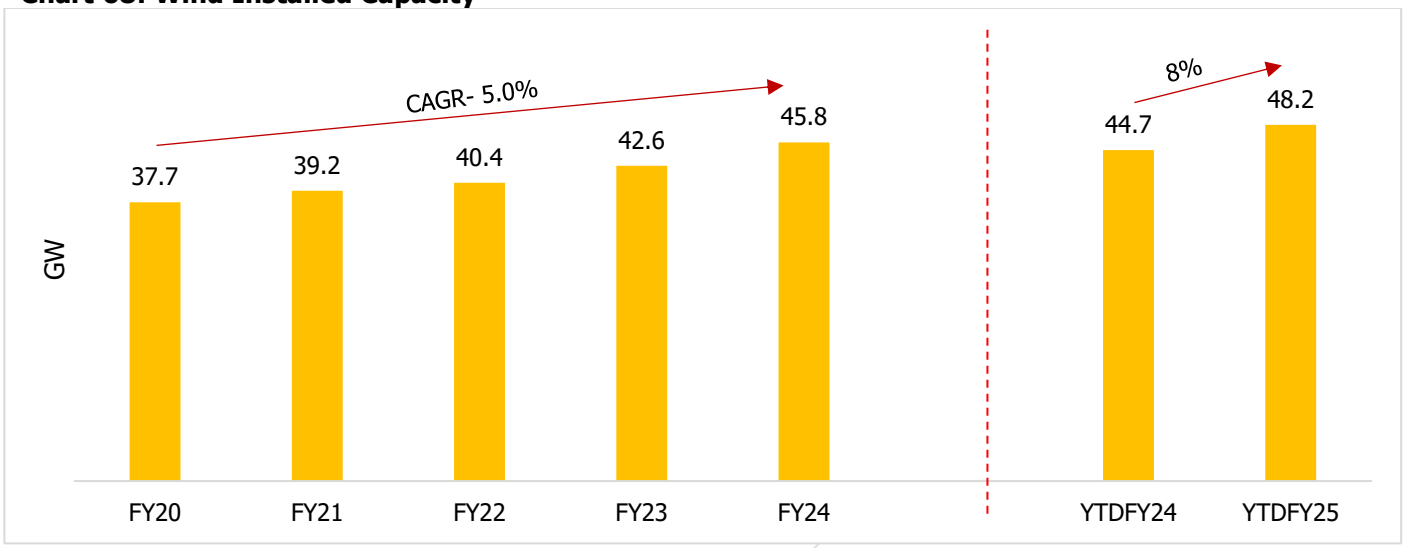
Source: CareEdge Research

The domestic rooftop solar market, along with the solar cables and solar junction box segments, is expected to witness strong growth in the coming years. This is driven by supportive government policies, such as subsidies under the PM Surya Ghar Yojana, increased affordability due to declining costs of solar components, and rising awareness of clean energy benefits. Additionally, the push for mandatory rooftop installations in new residential and commercial buildings and the growing emphasis on energy self-reliance are further accelerating demand. As a result, the need for essential components like solar cables and junction boxes is also set to rise significantly.

2. Wind Power

With a total installed capacity of 45.9 GW (as of March 2024) India currently ranks fourth in the world in terms of installed capacity of wind power. The wind power industry's growth has resulted in a robust ecosystem, project operating capabilities, and a domestic manufacturing base of around 10,000 megawatts per year as per MNRE.

Chart 68: Wind Installed Capacity



Source: CEA
Note: YTD refers April to December

Wind is an intermittent and site-specific resource of energy, and therefore, an extensive wind resource assessment is essential for the selection of potential sites. The government, through the National Institute of Wind Energy (NIWE), has installed over 800 wind-monitoring stations all over the country and issued wind potential maps at 50m, 80m, 100m, and 120m above the ground level. The recent assessment indicates a gross wind power potential of 302 GW in the country at 100 meters and 696 GW at 120 meters above ground level. Most of this potential exists in seven windy states.

India has a coastline of about 7,600 km surrounded by seawater on three sides and has tremendous power generation potential from offshore wind energy.

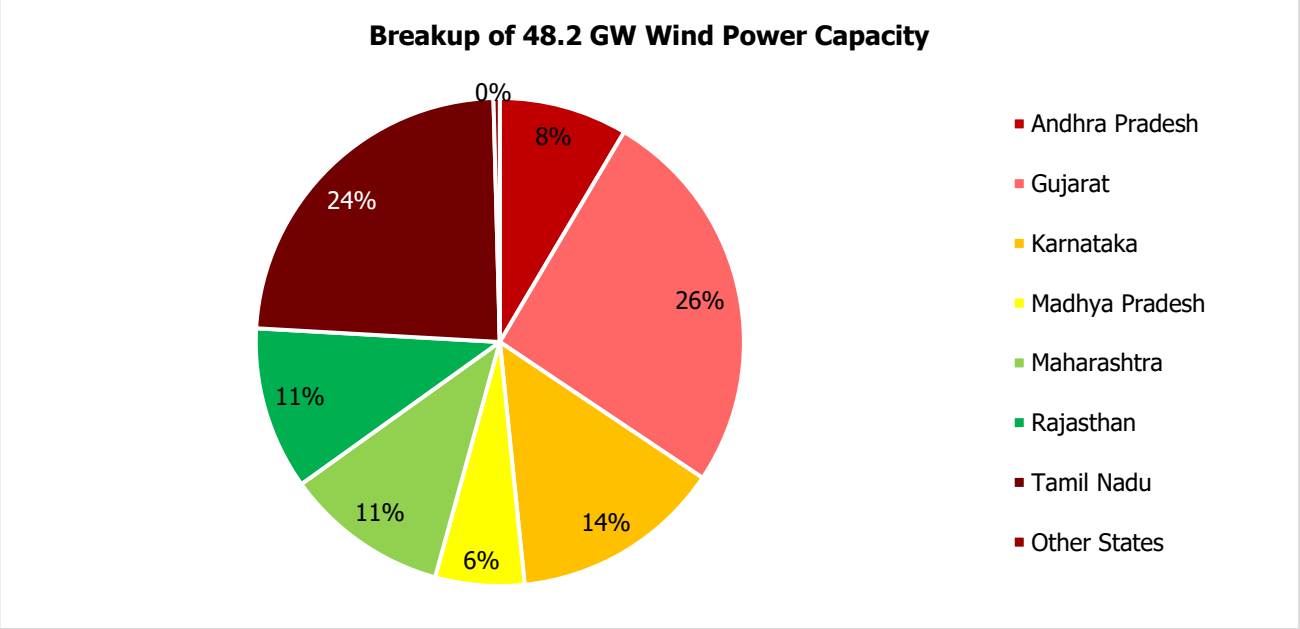
As per the Ministry of New and Renewable Energy, based on the early analysis of satellite data and data from other sources, eight zones in Gujarat and Tamil Nadu have been identified as possible offshore wind energy exploitation zones. The potential for offshore wind energy is estimated to be 174 GW (technical resources) across fixed bottom and floating potential mainly off the coast of Gujarat and Tamil Nadu.

India has the 4TH highest wind- capacity in the world. Capacity additions in wind power have benefited from accelerated depreciation and the GBI Scheme available for wind projects that were completed before March 31, 2017, which supported robust capacity additions in the past, apart from the presence of feed-in-tariff. Hence, the capacity additions were healthy between FY15 and FY17.

The transition to competitive bidding from a feed-in-tariff mechanism affected wind capacity additions leading to a drop since FY18. In addition, the highly competitive tariffs in the wind power sector and the unavailability of favourable wind sites have led to a slowdown in capacity additions for the wind sector.

Furthermore, wind installed capacity has increased from 23 GW in FY15 to about 43 GW in FY23 and to 48.2GW as of Dec'24, with most of the capacity additions during FY15-FY17.

Chart 69: India- Cumulative Wind Power Installations by States as of December 2024 (48.2GW)



Source: MNRE, CareEdge Research

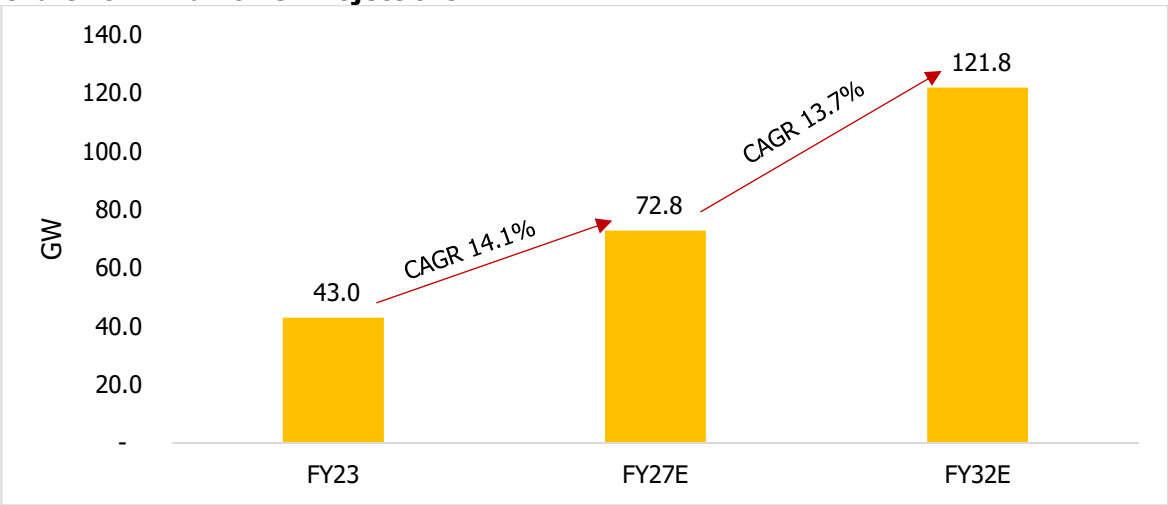
Wind capacity additions have slowed down in the recent past, due to challenges in pricing, grid availability, scarce availability of windy sites, land availability, and payment delays. While the cost competitiveness of wind continues to be strong compared to conventional power and the government pushing capacity additions through wind-solar hybrids, storage, and round-the-clock supply, constraints on land and transmission infrastructure are likely to continue to impact near-term capacity additions. Also, the declaration by governments of ultra-mega power parks for wind might alter the wind deployment strategy in the future.

Further, India's wind power accounts for 10% of the country's total installed capacity and 25% of its total renewable capacity. India ranks fourth in the world in terms of installed wind capacity. The government is preparing to annually allocate approximately 10 GW of wind projects, commencing in the fiscal year 2024. These initiatives are directed toward achieving the ambitious goal of reaching 500 GW in renewable capacity by 2030. India aspires to meet nearly half of its electricity requirements through renewable energy sources by 2030.

Moreover, India has a strong wind potential of around 302 GW at 100m and around 695 GW at 120m. The wind potential is mainly concentrated in the top 7 windy states including Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, and Tamil Nadu.

As per the National Electricity Plan Vol-1 (March 2023), 72.8 GW of installed wind power capacity is expected to be achieved by FY27 and 121.8 GW by FY32.

Chart 70: Wind Power Projections



Source: National Electricity Plan Vol-1 (March 2023), CareEdge Research

Over the medium term, wind capacity additions are expected to be driven by capacity additions in wind-solar hybrids and offshore wind projects. Apart from favourable project economics, hybrid projects play a key role in round the clock generation of renewables. In addition, the change in policy from the reverse auction and the increasing renewable purchase obligations (RPO) are some of the positive steps to rejuvenate the wind sector that has been stagnant for several years.

Further, India has set a target of 500 GW of non-fossil fuel installed capacity and fulfil 50% of its energy requirements by renewable sources by 2030. India expects to create 30 GW of offshore wind electricity by 2030. However, development has been slow due to a lack of developed port infrastructure and transmission infrastructure and increased expenses of placing turbines in the sea. India currently has no offshore wind energy plants in operation.

Key innovations such as wind solar hybrid and offshore wind farms, ultra-mega renewable energy parks, repowering, and round-the-clock supply are expected to be the key drivers for wind capacity additions.

3. Hydro Power

Hydroelectric power is electricity produced from generators driven by turbines that convert the potential energy of falling water from rivers, rivulets, artificially created storage dams or canal drops into mechanical energy. Hydropower projects are classified as large and small hydro projects based on their sizes and in India, hydropower plants of 25MW or below capacity are classified as small hydro. They come under the purview of the Ministry of New and Renewable Energy.

Further, India has the fifth-largest installed hydroelectric power capacity in the world. India's installed utility-scale hydroelectric capacity was 46.9 GW as of March 2024, accounting for 11% of the country's total power-generating capacity. At a 60% load factor, India's hydroelectric power potential is projected to be 148 GW.

Government-owned companies produce 92.5% of hydropower generated in India including National Hydroelectric Power Corporation (NHPC), Northeast Electric Power Company (NEEPCO), Satluj Jal Vidyut Nigam (SJVNL), THDC India, and NTPC. With the growth of hydroelectric power in the Himalayan mountain ranges and Northeast India, private sector participation is projected to increase as well. Hydropower plants have also been built by Indian firms in Bhutan, Nepal, Afghanistan, etc.

The energy generated from hydropower was around 7.74% of the total power generated in the country in FY24. The share of overall hydropower generation has been declining over the years, from 12% in FY15 to around 9% in YTD FY25 (April- December).

39 Hydro PSPs of 47 GW are being pursued to be commissioned by 2029-30. Currently, PSPs with aggregate capacity of 2.7 GW are under construction in the county and another 50 GW is under various stages of development. It is projected that PSP capacity shall increase from 4.7 GW to around 55 GW by 2031-32.

Various steps have been taken by the government in order to ensure that Pumped Storage Projects (PSPs) get commissioned on a fast track for accelerating the growth of the renewable energy sector of India.

These include:

- Revamped process for approval of pumped storage projects
- Single window clearance
- Speeding up environmental clearance
- Compressed timelines for approval of DPRs

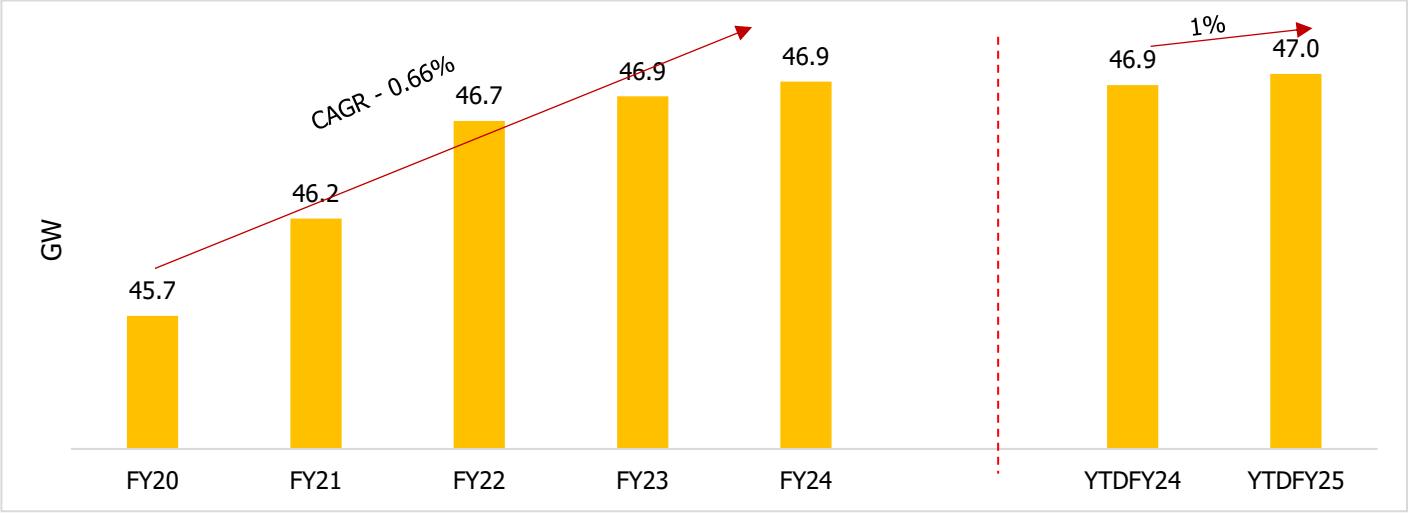
The Central government issued a waiver of ISTS charges for PSP and Battery Energy Storage Systems (BESS) projects in order to promote the commissioning and optimum utilization of storage projects on 21st June 2021. The scheme also waived transmission charges for the trading of electricity generated/supplied from Solar, Wind, PSP and BESS in the Green Term Ahead Market (GTAM) and the Green Day Ahead Market (GDAM) till 30th June, 2023.

The Inter-State Transmission System (ISTS) charges for power supplied from Hydro PSP or BESS projects shall be levied gradually as follows:

i) 25% of Short-Term Open Access (STOA) charges for initial 5 years of operation.
ii) After 5 years, the charges will be increased in steps of 25% every 3rd year to reach 100% of STOA charges from the 12th year onwards.

Over FY20 to FY24, only 1.2 GW of hydropower capacity has been added, representing a CAGR of a mere 0.66% and 1% y-o-y in YTDFY25 (April- December). The sector has been suffering from project delays caused by complex planning procedures, land acquisition and settlement problems, long-term financing, etc. The government has been providing support to hydro power with the help of budgetary support toward the cost of enabling infrastructure alongside significant reforms like Hydro Project Policy 2008 to encourage private sector participation.

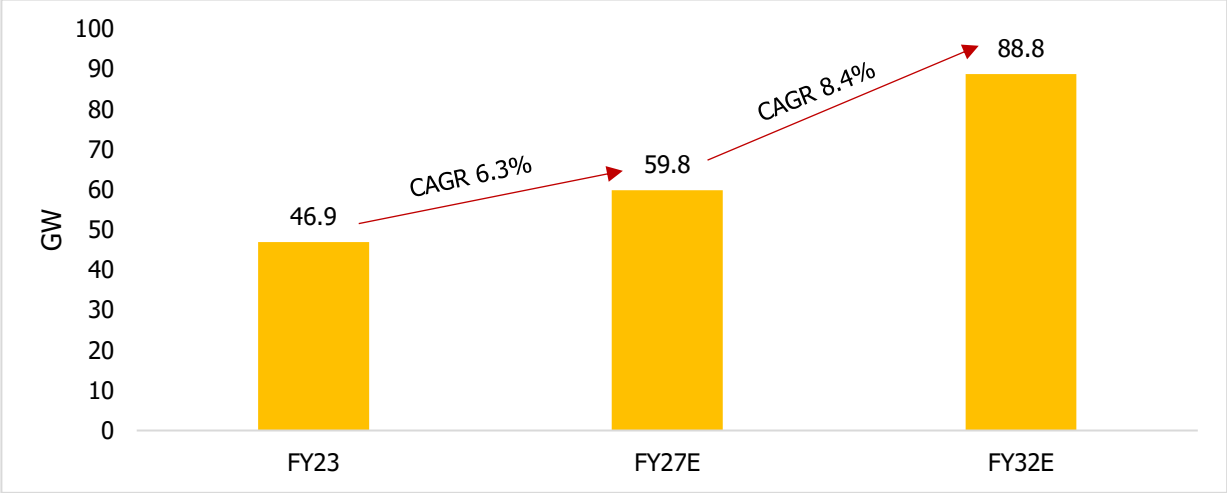
Chart 71: Trend in Hydro Power Installations



Source: CEA, CareEdge Research
Note: YTD refers April to December

There has been a subdued increase in the installed hydropower capacity due to various challenges like hydropower projects being site-specific, lengthy processes for detailed project reports, environmental clearances, geological surprises, etc. To meet the country's energy demand at a faster pace and achieve the targeted 500 GW of non-renewable energy, there needs to be an increase and shift of dependence on hydropower. As a result, the development of Mega hydro projects is essential. Furthermore, the hydropower capacity is expected to grow at a CAGR of 6.3% from FY23 to FY27, reaching 59.8 GW, while in FY32, the installed capacity is expected to reach 88.8 GW.

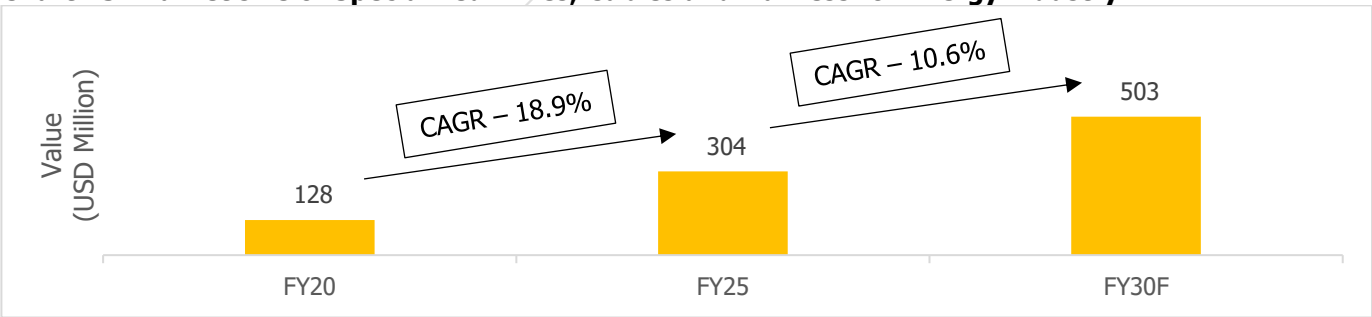
Chart 72: Hydro Power Projections (Excluding Small Hydro)



Source: National Electricity Plan Vol-1 (March 2023), CareEdge Research

The growing demand for renewable energy is expected to drive significant growth in the strategic electronics market, particularly for components used in grid management, energy storage, and smart metering systems. This shift will create new opportunities for domestic manufacturers to supply advanced control systems and power electronics essential for clean energy infrastructure.

Chart 73: Market size of Specialized Wires, Cables and Harness for Energy industry



Source: Imarc Research

Note: This includes Conventional, Renewable and Nuclear Energy

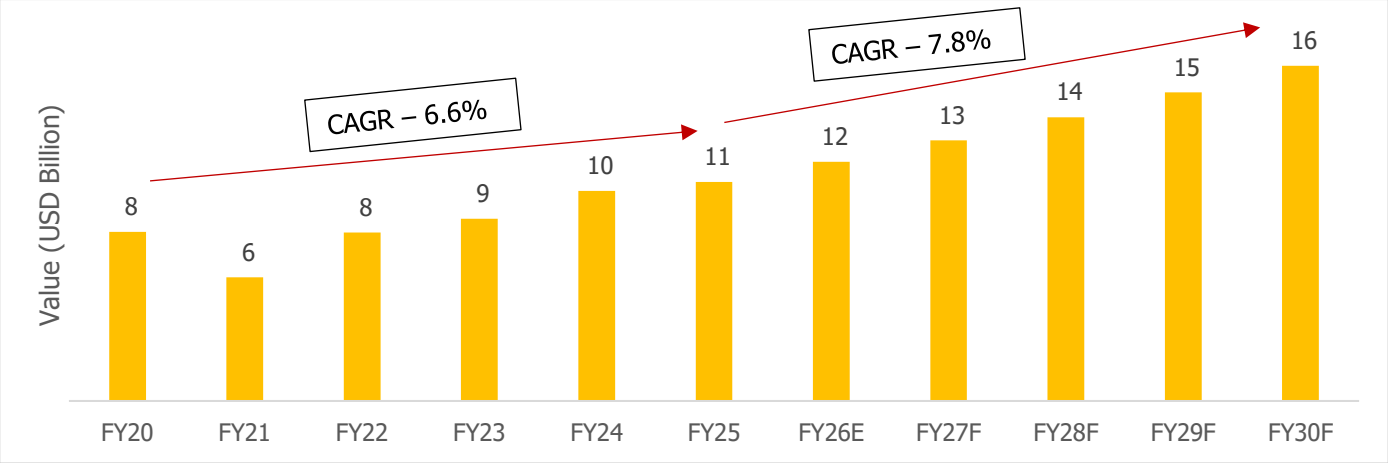
The market for specialized cables for Energy sector is estimated to increase by around 10-11% CAGR during the FY25-30 period. The demand is mainly driven by nuclear energy which consumes more than half of the total demand from the Energy sector. Around 40% demand comes from Renewables, and the rest comes from conventional energy.

8. Road-based Public Transportation Market

The market share of Heavy Passenger Vehicles as a percentage of total sales over the past five years has been around 12-13%, largely driven by the growth of E-Buses, fuelled by government initiatives promoting electric public transport. Furthermore, the industry has a clear segmentation in demand, with vehicles >16.2 tons (M&HCVs & Multi-Axle vehicles) used mainly for transportation on the highways and <= 3.5 tons used for intra-city transport. Similarly, in the case of passenger commercial vehicles, there is an increasing demand for luxury buses from the private players unlike earlier when the demand used to be largely driven by the State Transport Undertakings. In September 2024, the government approved the PM E-Drive scheme with a budget of Rs.10,900 crore over two years, providing Rs.3,679 crore in subsidies to incentivize E2Ws, E3Ws, e-ambulances, e-trucks, and other emerging EVs. The scheme aims to support 24.79 lakh E2Ws, 3.16 lakh E3Ws, and 14,028 e-buses, while also allocating Rs.780 crore to enhance vehicle testing infrastructure. The scheme proposes the installation of 1800 fast chargers for e-buses. The vehicle scrappage policy for commercial vehicles will improve replacement demand, and schemes like PLI initiatives could revive the industry. The impetus on public transport, green technology, and zero fossil-fuel initiatives will enhance adoption of EV passenger carriers and buses.

The growing adoption of e-buses and other electric commercial vehicles, driven by government subsidies and green transport initiatives, will boost demand for strategic electronics like wires, cables, and PCBAs. This creates strong growth opportunities for suppliers catering to EV components and vehicle electrification/charging systems.

Chart 74: Road based Public Transportation Market Trend



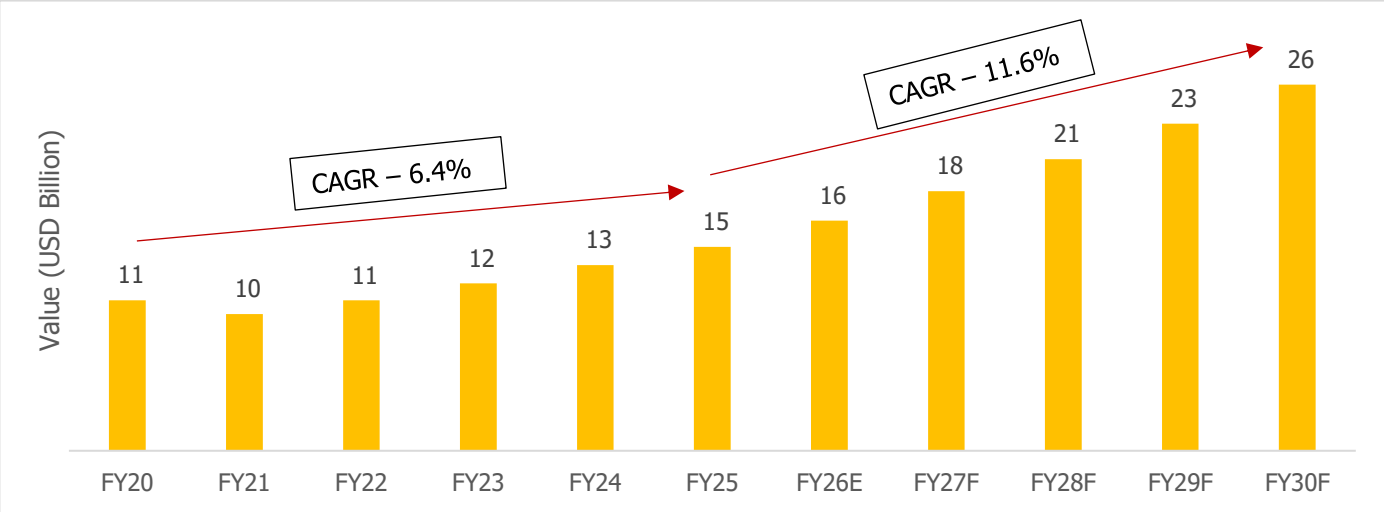
Source: Imarc Group, CareEdge Research
Note: E: Estimate, F: Forecast

9. India Industrial Automation Market

India's industrial automation market is witnessing robust growth, primarily fueled by advancements in technology and the growing demand for enhanced productivity, operational efficiency, and workplace safety. A broad range of industries including automotive, electronics, pharmaceuticals, and manufacturing are increasingly integrating automation tools such as robotics, control systems, and artificial intelligence (AI) into their operations. This upward trend is further supported by government initiatives like "Make in India" and "Atmanirbhar Bharat," which aim to boost domestic capabilities and attract investments in automation. Moreover, the need for energy-efficient operations, cost optimization, and reduction of manual errors is accelerating the shift toward automated systems, with businesses adopting these solutions to improve process quality and streamline supply chains.

The rise in industrial automation boosts demand for strategic electronics like wires, cables, and PCBAs, as industries adopt more robotics and control systems. This benefits manufacturers by expanding market opportunities, supported by initiatives like "Make in India" and the push for domestic, energy-efficient, and tech-driven operations.

Chart 75: India Industrial Automation Market Trend



Source: Imarc Group, CareEdge Research
Note: E: Estimate, F: Forecast

10. India ICT Market

Information Technology and Information Technology Services (IT/ITES) industry plays a key role by contributing to positioning the country as a preferred investment destination for global investors. The industry also creates large scale employment and generates significant export revenues. Emerging technologies and rise in demand for collaborative applications, application platforms, security software, system & service management software, and content workflow & management applications now offers an entire gamut of opportunities for top IT firms in India through cost-effectiveness, speedy deliveries, high reliability, great quality. Increasing digitisation and rise in demand for emerging technologies like 5G, Advanced Data Analytics, Artificial Intelligence, Cloud Computing, Cyber-Security, Robotics and Blockchain provide growth opportunities for Indian IT/ITeS firms.

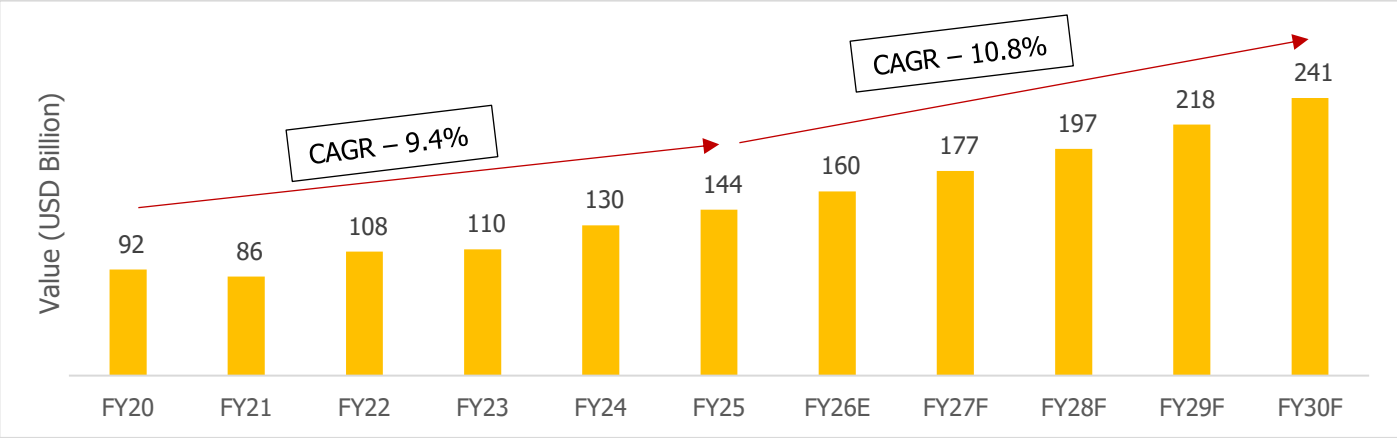
The Indian ICT sector is expected to see a decent growth over the long term. This is flanked by a rising demand for emerging technologies like cloud transformations, data analytics, generative artificial intelligence (AI) cyber security, engineering, research, and development (ER&D), and global capability centres (GCCs). There has been surge in investments in these emerging technologies which are expected to prompt companies to start spending on non-core and tech-enabled services.

Further, there has been a huge demand for sustainability offerings like consulting services and adapting to the climate crisis alongside exponential growth in sustainable financing. Climate change is leading to increased instances of heatwaves, floods, and natural disasters. It has become an important topic for boardroom discussion and investors seeking disclosures like TCFD, IR, and most recently – SFDR and CSRD in Europe and BRSR in India.

Accordingly, IT services companies launched internal sustainability-related practices & technologies and provided ESG consulting to help customers baseline and build a roadmap and help them meet the targets with IoT-based solutions like energy and renewable energy management.

The rise of IT/ITES and emerging technologies like 5G, AI, and cloud computing increases demand for electronic components such as wires, cables, and PCBAs. As IT firms expand in areas like data centres, IoT, and ESG solutions, it creates new business opportunities for electronics manufacturers. This also drives local sourcing, boosting growth and long-term demand for strategic electronics.

Chart 76: India ICT Market Trend



Source: Imarc Group, CareEdge Research
Note: E: Estimate, F: Forecast

6.2 India's Strategic Electronics Market Segmentation

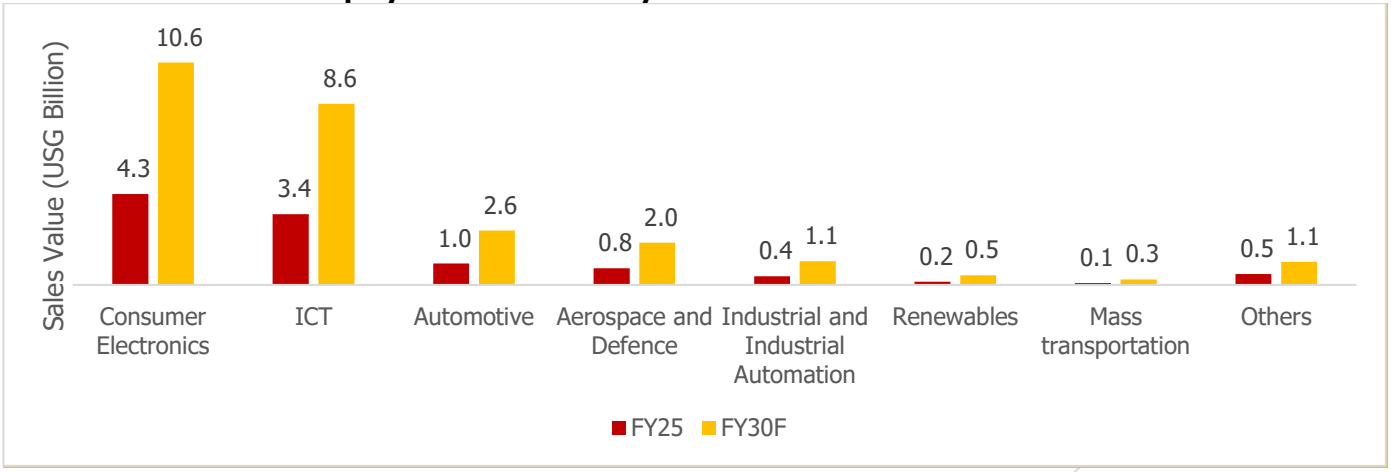
6.2.1.1 By End user

In 2025, the domestic defence industry makes up about 41% of the overall market for strategic electronics and is the largest consumer. The aerospace industry is next at 13%, followed by railways and metro systems at 10%, industrial usage at 9%, and shipbuilding at 7%. Together, these five industries make up close to 80% of the national demand for strategic electronics.

This focus arises from the imperative need for advanced, mission-critical systems in these industries. The defence and aerospace industries require advanced technologies in order to enable surveillance, secure communications, electronic warfare, and navigation. At the same time, the continuous modernisation of railways, metro lines, and industry infrastructure continues to spur demand for automation, control systems, and safety electronics. The shipbuilding industry also relies on precision electronics for navigation, radar capabilities, and onboard defence systems.

Additionally, the growing adoption of renewable energy sources such as solar power plants and wind farms has increased the need for reliable electronics in energy conversion, grid synchronization, monitoring, and fault detection. These industries emphasize dependability, security, and the development of indigenous capabilities, reinforcing the strategic role of electronics in strengthening national security and critical infrastructure.

Chart 77: Market Breakup by End-user Industry



Source: Imarc Group, CareEdge Research

Note:

1. E: Estimate, F: Forecast
2. ICT or Information and Communications Technology includes IT and Telecom
3. Automotive includes EVs as well
4. Aerospace and Defence includes Commercial, Defence and Space
5. Renewables include Solar, Wind and Hydro
6. Mass transportation includes Railways & Metros, Road-based Public Transportation
7. Others include the remaining industries other than mentioned above

6.2.1.2 By Types of Specialized

Table 19: Breakup of Strategic Electronic Products' Market: By End-User Industry (FY25)

Type	Aerospace & Defence	Railways & Metros	Industrial and Industrial Automation	Merchant Shipbuilding	Mass Transportation
Box built Electronic/ ICT products	27%	35%	28%	-	-
PCB Circuit Boards	25%	19%	22%	28%	26%
Specialized Wires & Cables	19%	13%	11%	27%	19%
Harness	13%	12%	8%	25%	18%
Panels	9%	13%	21%	12%	21%
Others	7%	8%	10%	8%	16%

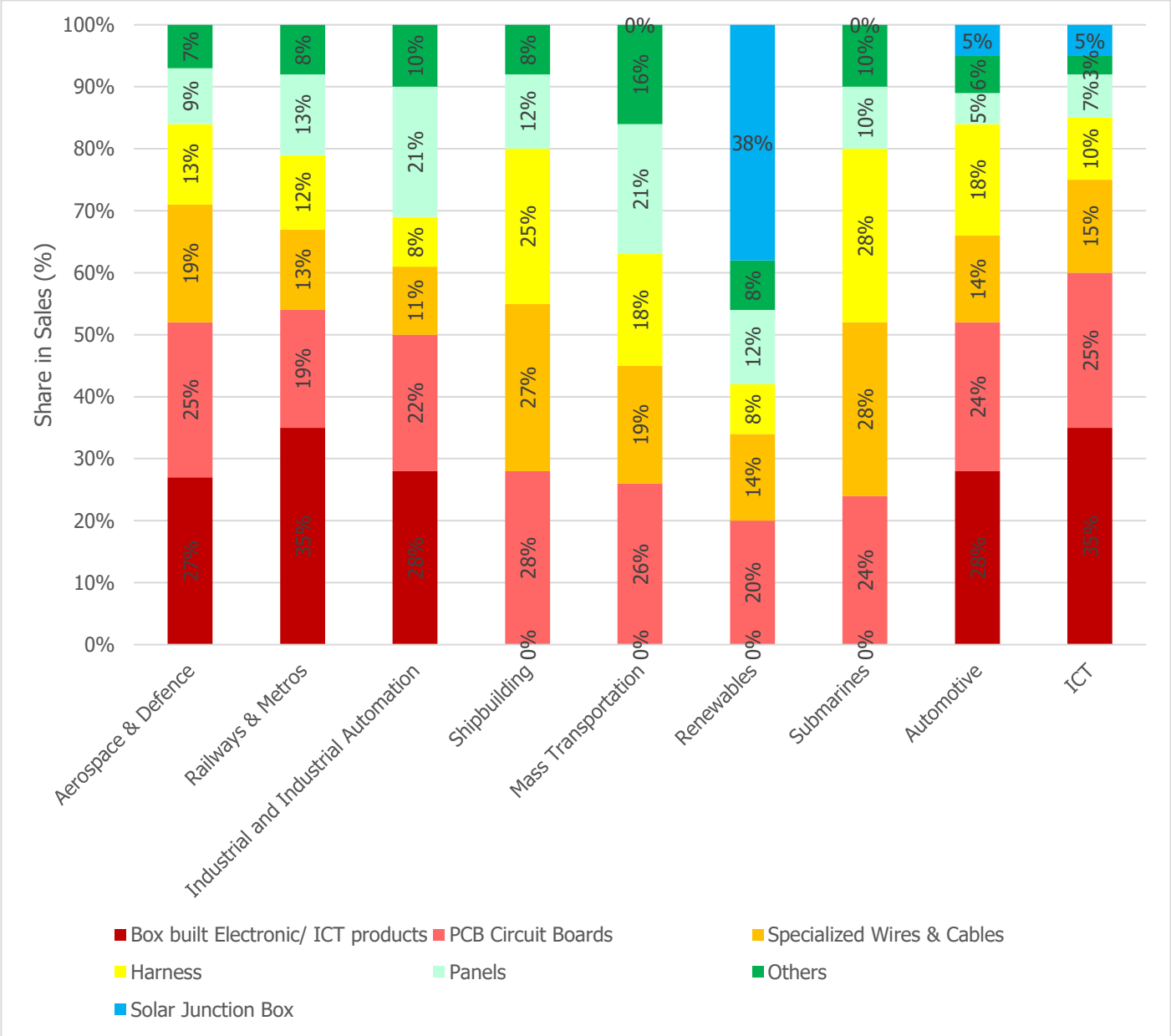
Type	Renewables	Submarines	Automotive	ICT
Box built Electronic/ ICT products	-	-	28%	35%
PCB Circuit Boards	20%	24%	24%	25%
Specialized Wires & Cables	14%	28%	14%	15%
Harness	8%	28%	18%	10%
Panels	12%	10%	5%	7%
Others	8%	10%	6%	3%
Solar Junction Box	38%	-	5%	5%

Source: Imarc Group, CareEdge Research

Note:

1. Mass transportation includes Road-based Public Transportation
2. ICT or Information and Communications Technology includes IT and Telecom
3. Automotive includes EVs as well
4. Renewables include Solar, Wind and Hydro
5. Aerospace and Defence includes Commercial, Defence and Space
6. Others include the remaining industries other than mentioned above

Chart 78: Breakup of Strategic Electronic Products' Market: By End-User Industry (FY25)



Source: Imarc Group, CareEdge Research

Note:

1. ICT or Information and Communications Technology includes IT and Telecom
2. Automotive includes EVs as well
3. Aerospace and Defence includes Commercial, Defence and Space

4. Renewables include Solar, Wind and Hydro
5. Mass transportation includes Railways & Metros, Road-based Public Transportation
6. Shipbuilding means Merchant shipbuilding

1. In FY25, PCB circuit boards led the defence segment within India's domestic strategic electronics market, contributing approximately 34% to the total share. When combined with specialized wires and cables, these components accounted for nearly 60% of the segment. Their dominance stems from their critical role in sophisticated defence systems such as radar, avionics, missile guidance, electronic warfare, and secure communication. The demand for high reliability, compact design, and electromagnetic compatibility in defence hardware underscores the vital importance of advanced PCBs and specialized interconnects in such applications.

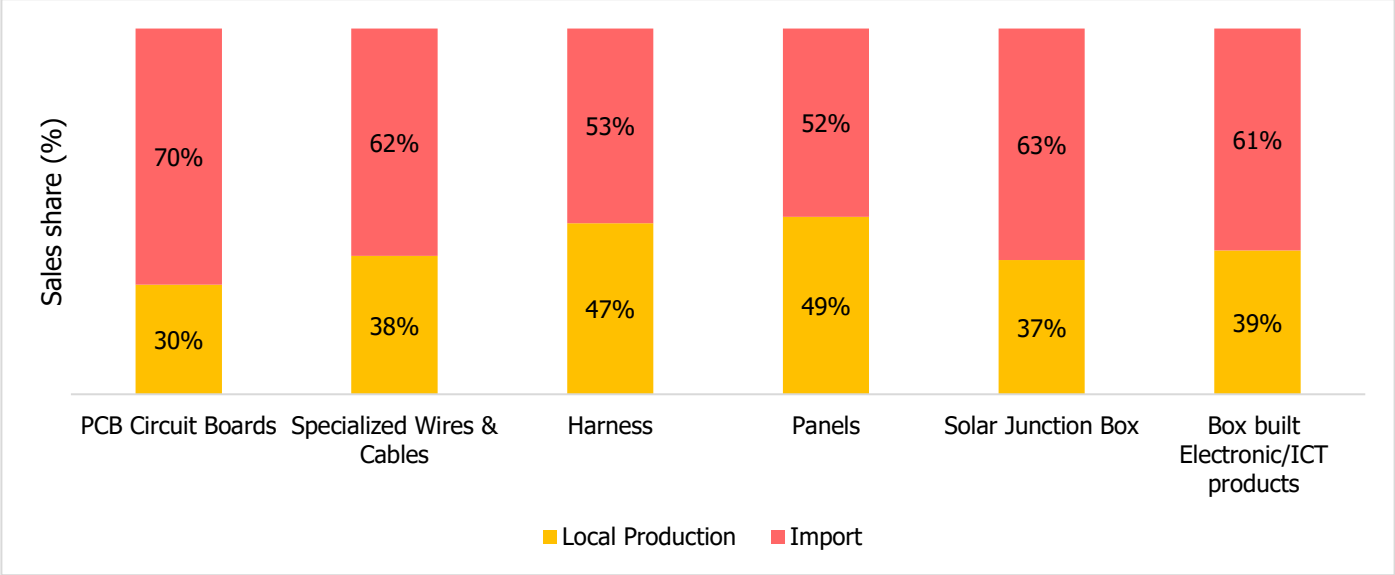
2. Similarly, in the Aerospace & Defence segment, PCB circuit boards and specialized wires and cables together accounted for approximately 60% of the market share. Their dominance is driven by their essential role in supporting critical aerospace functions such as flight control systems, navigation, satellite communication, and onboard instrumentation where precision, durability, and reliability are paramount.

3. In the Railways & Metros segment, PCB circuit boards and specialized wires and cables together accounted for approximately 47% of the share. This is primarily due to their vital role in modern railway systems, including automated signalling, train control systems, communication networks, and safety monitoring equipment. The increasing electrification and digitalization of railway infrastructure have driven the demand for reliable, durable, and high-performance electronic components.

4. The Industrial & Industrial Automation segment was dominated by strategic electronic products like PCB boards and panels because these components are essential for automation, control systems, and industrial IoT applications. As industries increasingly adopt smart manufacturing practices and integrate advanced machinery, the need for reliable electronic interfaces, control panels, and embedded systems rises sharply. PCB boards serve as the foundation for these technologies, while panels facilitate power distribution, process control, and equipment monitoring, making them integral to efficient and modern industrial operations.
5. The shipbuilding industry is driven by PCB circuit boards, specialized wires & cables, and harnesses because modern defence vessels and merchant ships require advanced navigation, communication, propulsion control, and surveillance systems. PCB circuit boards are at the core of these electronic systems, enabling automation and secure signal processing. Specialized wires, cables, and harnesses ensure reliable power distribution and connectivity across complex onboard systems, withstanding harsh marine conditions such as humidity, corrosion, and vibration. These components are critical for both surface and underwater vessels, supporting mission-critical operations and onboard safety.

6.2.1.3 Local VS Import

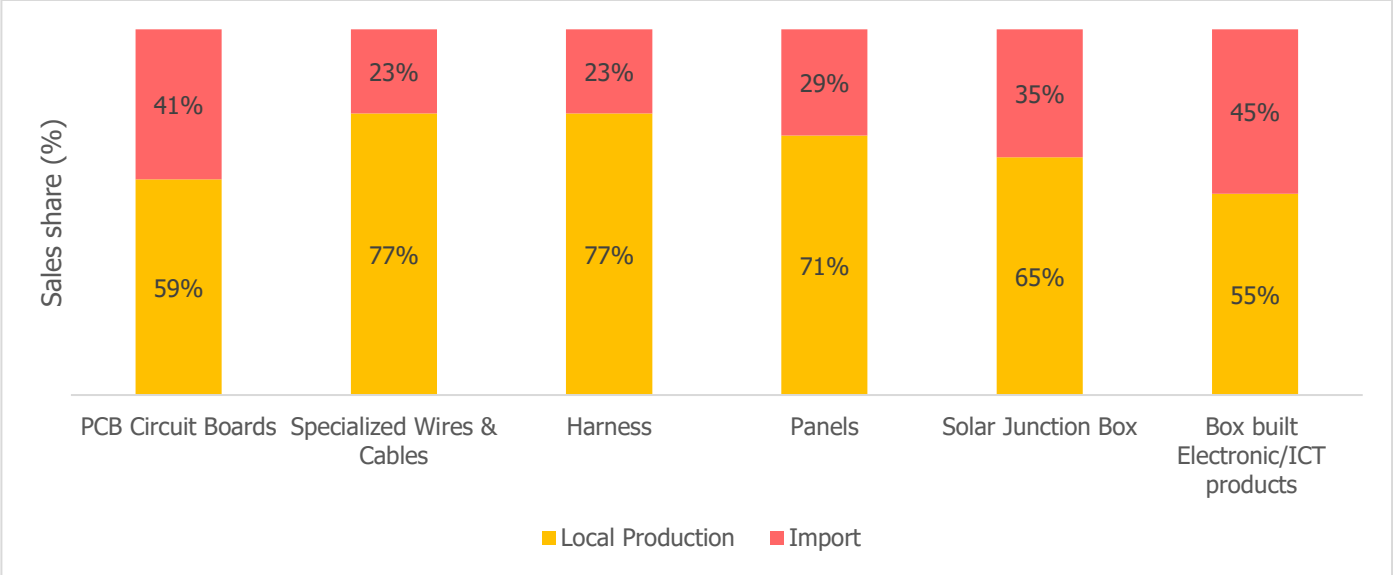
Chart 79: Subsegment-wise Market Split by Domestic Production vs Imports: Sales Share in FY25



Source: Imarc Group, CareEdge Research

A large share of these components is currently imported due to various factors. However, with the government's push for Make in India and OEMs seeking to reduce import dependence amid geopolitical challenges, domestic players with proven manufacturing capabilities and experience are well-positioned to seize this opportunity.

Chart 80: Subsegment-wise Market Split by Domestic Production vs Imports: Sales Share in FY30F



Source: Imarc Group, CareEdge Research

However, domestic production is anticipated to grow, supported by proactive government initiatives and rising private sector investments in the electronics manufacturing space.

6.3 Supporting Government policies and Key Market Drivers

- **Defence Modernisation & National Security**: For FY26, Rs 1,120 Billion i.e., 75% of defence modernisation budget has been earmarked for procurement through domestic sources and 25% of domestic share i.e., Rs 27,886.21 crore has been provisioned for procurement through domestic private industries. Earlier, under the Capital Acquisition (Modernisation) head, Rs 1,410 billion was earmarked in the Budget Estimates (BE) for 2024-25, out of which approximately Rs 44,424.39 crore was spent during the first six months of the fiscal year as per Ministry of Defence.

  The increasing emphasis on indigenizing defence technologies and upgrading the armed forces is propelling the demand for sophisticated electronic systems such as radars, electronic warfare solutions, and secure communication networks. Furthermore, with India's growing focus on boosting defence exports, OEMs and defence PSUs are expected to increasingly rely on certified domestic suppliers for strategic electronic systems to ensure adherence to stringent quality and compliance norms. This trend creates a significant growth opportunity for companies possessing advanced technical expertise and requisite regulatory approvals and certifications to deliver high-performance, mission-critical electronic components.

  India's push to lead in the global space economy is driving demand for high-reliability components, creating growth opportunities for certified private firms to supply mission-critical systems to ISRO and emerging space players.

- **Government Policy Support**: India's push for self-reliance through initiatives like Atmanirbhar Bharat, Make in India, and the Defence Production Policy is driving domestic manufacturing, R&D, and strategic partnerships in defence electronics. Allowing up to 74% FDI under the automatic route has encouraged foreign investment and tech transfer, boosting innovation and reducing import reliance. Simultaneously, in civil aviation and electronics, schemes like UDAN and NCAP aim to expand regional air connectivity and develop aviation infrastructure. Complementing this, the PLI Scheme, EMC 2.0, and the Semicon India Programme promote high-tech, domestic electronics and semiconductor manufacturing, positioning India as a global manufacturing and innovation hub.

  To promote self-reliance in defence technology and foster innovation, it is essential to actively involve private players and strengthen the country's start-up ecosystem. In line with this objective, Rs 449.62 crore has been allocated by the government to the iDEX scheme, including its sub-scheme-Acing Development of Innovative Technologies with iDEX (ADITI), to fund various projects under this initiative. This allocation marks a nearly threefold increase over the past two years, highlighting the government's growing emphasis on indigenous technological advancement in the defence sector.

  These schemes not only strengthen India's industrial base but also create opportunities for companies in ancillary sectors like wires & cables, electronics, and electrical distribution systems, as demand grows in aviation infrastructure, and electronic manufacturing facilities.

- **Supply chain diversification & China+1**: Rising geopolitical tensions worldwide have intensified the need to diversify supply chains and localize component production. This has led transnational manufacturers in the Defence and Aerospace sectors to adopt the China+1 strategy, creating significant opportunities for Indian manufacturers to expand their role as reliable and competitive suppliers in the global value chain.

  For example, the Indian Coast Guard (ICG) has been allocated Rs 9,676.70 crore under the Capital and Revenue Heads for FY 2025–26, marking a 26.5% increase over the FY 2024–25 BE allocation. Notably, the Capital Budget saw a 43% jump—from Rs 3,500 crore to ₹5,000 crore, enabling the procurement of Advanced Light Helicopters (ALH), Dornier aircraft, Fast Patrol Vessels (FPVs), training ships, and interceptor boats. This surge in capital spending is expected to drive higher demand for specialty cables and harnesses used in these advanced platforms, thereby creating growth opportunities for domestic players engaged in cable manufacturing.

- **Growth in Aerospace & Avionics**: Expansion in domestic aerospace, satellite communication, and UAV (drone) programs is fuelling demand for sophisticated electronics used in control, navigation, and mission-critical systems. India's aviation market remains significantly underpenetrated and hence tapping this market the leading aviation players have placed bulk order with Boeing and Airbus for various plane models, to meet the expected rise in demand over the next decade.

  At Aero India 2025 in Bengaluru, Safran Aircraft Engines signed a contract with HAL for producing turbine forged parts for LEAP engines, building on a 2023 MoU under the "Make in India" initiative. The companies had already established a joint venture in 2022 for LEAP and M88 engine components. Safran is expanding its aerospace ecosystem in India, with a sixth facility for LEAP engine MRO opening in 2025. India is CFM's third-largest market, with over 2,000 engines on order. Safran also plans to collaborate on military engines as India looks for alternative engine for its Tejas Fighter Aircraft Program, and expand R&D in advanced tech.

  This expansion of India's aerospace, satellite, and UAV programs, is driving demand for high-performance, reliable wiring and electronic systems. Companies manufacturing special wires, cables, and distribution systems will benefit by supplying mission-critical components needed for aircraft, drones, satellites, and engine systems, supporting power, control, and communication functions.

- **Rapid Technological Advancements**: Advancements in AI, IoT, and 5G are creating new applications in strategic domains like autonomous systems, smart factories, smart defence systems, driverless mass-transportation, network-managed controls, enhanced risk/safety management. These applications require specialized wiring and distribution systems with superior shielding, real-time responsiveness, and durability. As these advanced systems scale up, the demand for precision-engineered electrical infrastructure will grow, opening up sustained business opportunities for such manufacturers across defence, transport, and industrial sectors.

- **Private Sector Participation & Innovation**: Entry of private players and start-ups, coupled with DRDO and ISRO led collaborations and technology transfers, is enhancing innovation and local capability building.

- **Export Opportunities:** India's growing capability in manufacturing high-quality, cost-competitive defence electronics opens export opportunities to friendly foreign nations. Additionally, rising global demand in segments like electronics manufacturing and EV charging infrastructure further expands opportunities for Indian manufacturers to tap into international markets. As per the Defence Ministry, India recorded defence exports worth Rs 23,622 crore in FY25, with the private sector contributing about 65%. The nation has set a target of Rs 50,000 crore in defence exports by 2029.

- **Real Estate Driving Demand for E-Beam cables:** The Commercial Real Estate Construction sector grew at a CAGR of 2.93% from Rs 3,500 crore in FY20 to Rs 4,045 crore in FY25 and is projected to expand at a CAGR of 6.1%, reaching Rs 5,124 crore by FY29. This growth is driven by rising demand for commercial office spaces.

  Meanwhile, the Residential Real Estate Construction sector saw a stronger CAGR of 11.2% between FY20 and FY25, growing from Rs 31,200 crore to Rs 53,090 crore. However, its growth is expected to moderate to a CAGR of 6.3% through FY29, reaching Rs 67,848 crore, slightly below the overall industry average of 7.5%, due to higher borrowing costs and softening demand. Nonetheless, the expanding urban population and supportive government housing initiatives are expected to sustain demand for residential homes.

  This rapid expansion of India's real estate sector is driven by urbanization, smart cities, and commercial infrastructure, and is fueling demand for safer, long-lasting, and high-performance electrical systems. Electron beam (E-beam) cross-linked cables are increasingly preferred due to their superior thermal stability, flame resistance, and longer life, making them ideal for high-rise buildings, commercial complexes, and green buildings.

- **Data Center Expansion:** The investments in data centres in India is estimated to reach USD 5 billion by end of 2025, indicating a CAGR of 5% between 2019-25, which is 2x faster than the global average. With respect to development as well as operating expenses, India enjoys a significant cost advantage over developed nations. As per CareEdge Research, data centre capacity in India is expected to increase from around 1000 MW in 2024 to 1800+ MW by 2026, a CAGR of ~34%.

  India's booming data center industry, propelled by the growth of digital services, cloud computing, and government initiatives on data localization, requires highly reliable and efficient power and communication infrastructure. E-beam cables are well-suited for data centers as they ensure minimal downtime, withstand high temperatures, and offer excellent insulation and durability under continuous load conditions. These applications make E-beam cables a key enabler in building resilient, high-performance infrastructure for India's next-gen urban and digital ecosystem.

- **Renewables**

  Solar: The Jawaharlal Nehru National Solar Mission (JNNSM) is a flagship program under India's National Action Plan on Climate Change aimed at promoting sustainable growth and energy security. It is supported by schemes such as the Solar Park Scheme, PM-KUSUM, CPSU Scheme, Rooftop Solar Programme, and incentives for domestic module manufacturing and grid integration. The International Solar Alliance (ISA), a treaty-based intergovernmental body, aims to mobilize over USD 1,000 billion by 2030 to scale global solar deployment and help member countries meet climate goals. The Rooftop Solar (RTS) Programme, launched in 2015, targets 40 GW capacity, offering financial incentives up to 40% subsidy for small-scale residential installations. As of November 2023, 2.65 GW has been installed under Phase II. In February 2024, the Government launched PM-Surya Ghar: Muft Bijli Yojana with an outlay of Rs 750.21 billion to provide 300 units of free electricity per month for one crore households through rooftop solar. It offers subsidies up to Rs 78,000 and low-interest collateral-free loans via a National Portal, streamlining vendor selection and installation.
  These initiatives will significantly boost demand for high-quality, weather-resistant, and durable cables required in solar installations. Manufacturers of specialized wires and cables stand to benefit from increased volumes, indigenization push, and rising rooftop and utility-scale solar deployments.

  Hydro: Tariff Rationalization Measures- Tariff rationalization measures were introduced to bring down the hydropower tariffs. The measures include providing flexibility to the developers to determine the tariff by loading of tariff after increasing the project life to 40 years, increasing the debt repayment period to 18 years and introducing an escalating tariff of 2%. Budgetary support for funding flood moderation component of hydropower on a case-to-case basis. Budgetary support for cost funding for infrastructure i.e. roads and bridges limited to Rs. 15 million per MW for up to 200 MW projects and Rs. 10 million per MW for above 200 MW projects.

  Wind: Duty Exemption Certificate for manufacturing of Wind Turbines- The ministry is issuing concessional custom duty exemption certificates (CCDC) to the manufacturers of wind-operated electricity generators. For this purpose, the eligible turbine and component manufacturers need to get the bill of material for the Revised List of Models and Manufacturers (RLMM) listed turbine models approved and then apply in prescribed formats to the ministry for a CCDC certificate for their import consignments. Based on MNRE's recommendation, CCDC for several wind turbine components has been extended till March'25 by the Ministry of Finance. This duty exemption encourages increased domestic manufacturing of wind turbines, thereby boosting demand for specialized wires and cables used in nacelles, control systems, and grid connectivity. Manufacturers of such components will benefit from higher order volumes and integration opportunities in approved turbine models.

6.4 Challenges

Challenge	Description
• **High Dependence on Imports**	A significant portion of raw materials and critical electronic components continues to be sourced internationally, making the sector vulnerable to supply chain disruptions and foreign exchange fluctuations.
• **Insufficient R&D and Innovation Infrastructure**	Limited investment in indigenous research and product innovation restricts the industry's ability to move up the value chain and compete globally with cutting-edge technologies.
• **Capital-Intensive Manufacturing**	Setting up and scaling manufacturing facilities for high-precision electronics and cable systems involves substantial upfront investment in machinery, testing, and quality assurance infrastructure.
• **Talent Shortage in Niche Skills**	The industry faces a scarcity of skilled professionals trained in niche areas like high-frequency signal transmission, ruggedized wiring design, embedded systems, and complex PCB assembly.
• **Complex Regulatory Processes**	Strict requirements and lengthy approval processes, licensing challenges, and certification bottlenecks delay market entry and impact business scalability.
• **Weak Supply Chain Collaboration**	A fragmented ecosystem with limited integration between OEMs, component suppliers, and system integrators hampers efficiency, innovation, and cost optimization across the value chain.

6.5 E-Beam Cable Market

6.5.1 Overview

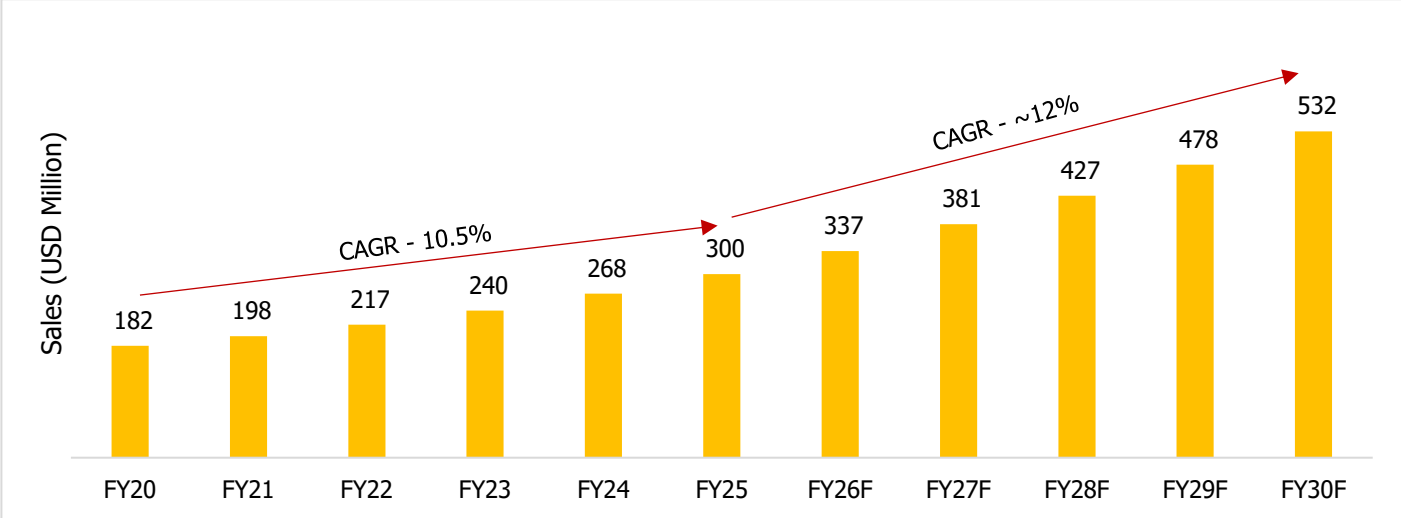
E-beam (Electron Beam) cables are high-performance cables cross-linked using electron beam radiation instead of traditional chemical methods. This process enhances the cable's thermal, mechanical, and electrical properties without using harmful additives. These special cables manufactured through E-beam technology exhibit high resistance against fire, cold, heat, oil, diesel, acidic and alkaline environment, making them ideal for applications where reliability and performance under extreme conditions are essential.

Benefits in Key Industries

- **Railways & Metro Systems:** Offer superior fire resistance, reduced smoke emission, and durability under high temperatures, making them ideal for safety-critical transit infrastructure.
- **Renewable Energy (Solar & Wind):** Withstand UV exposure, heat, and harsh weather, ensuring long-term reliability in outdoor installations.
- **Defence & Aerospace:** Provide excellent insulation, lightweight strength, and resistance to radiation and chemicals—crucial for mission-critical applications.
- **Industrial & Manufacturing:** Perform well in high-stress, high-heat, and corrosive environments, ensuring long life and minimal downtime.

6.5.2 Market Size and Segmentation

Chart 81: Domestic Market Trend



Source: Imarc Group, CareEdge Research

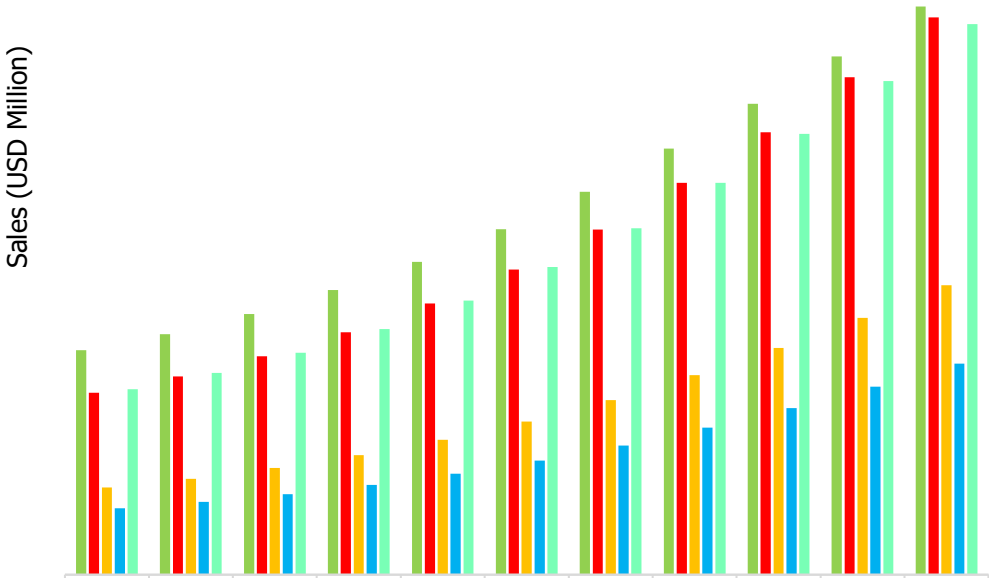
Note: Market size- Production plus import less export of finished goods

The E-beam cable market in India is projected to grow by around 12% CAGR in the coming five years due to a convergence of favourable trends:

1. **Rising demand from strategic sectors**: Expansion of railways, metro networks, renewable energy (solar/wind), and defence modernization is driving demand for high-performance, durable cabling solutions where E-beam cables excel.
2. **Stringent safety regulations**: New standards emphasizing fire resistance, low smoke emission, and environmental sustainability are pushing adoption of E-beam cables in infrastructure and public transport projects.
3. **Growth in EVs and industrial automation**: Increased electrification and automation across industries are boosting the need for cables with higher thermal stability and longer service life.
4. **Government focus on import substitution**: Under Make in India, there is policy support for local manufacturing of advanced components, including E-beam cables, reducing costs and expanding domestic production.

These factors collectively signal a stronger growth trajectory for the E-beam cable market going forward.

Chart 82: E-Beam Cable Market Breakup by Application



	FY20	FY21	FY22	FY23	FY24	FY25	FY26F	FY27F	FY28F	FY29F	FY30F
Railways & Metro Systems	55	59	64	70	76	85	94	104	115	127	139
Renewable Energy (Solar & Wind)	44	49	53	59	66	75	84	96	108	122	136
Defense & Aerospace	21	23	26	29	33	37	43	49	55	63	71
Industrial & Manufacturing	16	18	20	22	25	28	32	36	41	46	52
Others	45	49	54	60	67	75	85	96	108	121	135

Railways & Metro Systems Renewable Energy (Solar & Wind) Defense & Aerospace

Industrial & Manufacturing Others

Source: Imarc Group, CareEdge Research

Note: Others include Marine, Automotive, Building Wiring, Data Centers, Healthcare, etc.

The Defence & Aerospace sector demands highly reliable, radiation-resistant, and durable cables for critical systems like avionics, communication, and weapon control—making E-beam cables an ideal choice. This segment grew at a CAGR of 11.9% during FY20–25, driven by rising defence modernisation, increased procurement under "Atmanirbhar Bharat", and growing aerospace investments. Going forward, it is expected to expand at an even higher CAGR of 13.6% during the FY25–30 period.

Similarly, the Industrial & Manufacturing sector grew at a CAGR of 11.4% during the FY20-25 period, is seeing increased adoption of automation and robotics, where E-beam cables offer superior thermal stability, chemical resistance, and longer service life, making them essential in harsh operational environments. Going forward, it is expected to expand at a higher CAGR of 13.1% during the FY25–30 period.

In the Railways & Metro Systems space, grew at a CAGR of 9.0% during the FY20-25 period, E-beam cables are critical for enhanced safety, fire resistance, and durability in rolling stock and signaling applications, amid rising capex in urban transit and high-speed rail. Going forward, it is expected to expand at a CAGR of 10.5% during the FY25–30 period.

The Renewable Energy sector is expanded at a CAGR of 10.9% during the FY20-25 period, where E-beam cables are preferred for their weather resistance and extended lifespan in outdoor, high-UV environments. Going forward, it is expected to expand at a CAGR of 12.8% during the FY25–30 period.

Other segments, grew collectively at a CAGR of 10.6% during the FY20-25 period, also benefit from the technical superiority of E-beam cables, particularly in applications demanding high reliability, reduced maintenance, and extended service life. Going forward, it is expected to expand at a CAGR of 12.4% during the FY25–30 period.

6.5.3 Technical Difficulty in Manufacturing E-Beam Wires and Cables

- **High Capital Investment**: Setting up electron beam (E-beam) cross-linking facilities requires significant capital expenditure on specialized equipment and radiation shielding infrastructure.
- **Limited Technological Know-how**: India lacks widespread indigenous expertise and skilled manpower in E-beam processing technology, leading to reliance on imported equipment and technical collaborations. However, lately few domestic manufacturers have ventured in this product.
- **Stringent Safety and Regulatory Requirements**: E-beam technology involves ionizing radiation, requiring strict adherence to quality of the cable, radiation safety norms, licensing from regulatory bodies (like AERB), and continuous monitoring.

6.6 Entry Barriers

- **Regulatory and Security Clearances**: Given the national security sensitivities, companies- particularly those dealing in defence and aerospace products, are required to adhere to stringent regulatory frameworks and secure multiple security clearances (like Bhabha Atomic Research Centre), a process that is often lengthy and restrictive.
- **IP and Licensing Constraints**: Dependence on foreign technology and the difficulty in accessing critical IP (Intellectual Property) or dual-use technologies function as major bottlenecks. However, these constraints also present a strategic advantage for domestic players, particularly those who have developed their own IPs, as they stand to benefit from growing demand for indigenous solutions and reduced reliance on imports.
- **Long Gestation Periods**: Strategic electronics projects often have long development and approval cycles (third party, field trials & customer-specific), which delay revenues & returns and make the sector unattractive for new entrants.
- **Established Market Players:** Established competition in the Indian strategic electronics industry acts as a significant entry barrier due to the dominance of well-entrenched players; both public sector entities like BEL and long-standing private firms with proven track records. These incumbents have strong relationships with defence and government agencies, technical capabilities, and preferred vendor status, making it difficult for new entrants to compete for large, mission-critical contracts.
- **Need for Indigenous Components**: Import dependence on critical components creates entry barriers by increasing costs, causing supply risks, and limiting control over production. It makes it hard for new companies to innovate and to meet strict security and reliability standards required in strategic electronics.
- **Technological Complexity**: The industry requires deep expertise in advanced, application-specific technologies tailored for sectors such as defence, aerospace, shipping, railways, industrial automation, and mass transportation. Gaining such capabilities is challenging without extensive experience across product life cycles and a thorough understanding of how real-world performance aligns with product specifications and testing standards.
- **Huge Capital Requirements**: The Indian strategic electronics industry demands significant capital investment due to the need for advanced manufacturing infrastructure, precision testing facilities, and R&D capabilities tailored to mission-critical applications. High initial costs in setting up production units, acquiring certifications, and complying with stringent quality and defence standards make entry challenging, especially for small and new players.

High regulatory barriers, delays in security clearances, and limited access to critical foreign technologies discourage new entrants. Long gestation periods and import dependence for key components increase costs and delay returns. The need for advanced technical expertise further raises entry challenges, making the sector less appealing for new entrants.

7 Peer Analysis

7.1 Business Overview

- **UKB Electronics Limited**

The Company was established in 2004. It is an integrated electronic manufacturing services ("EMS") provider with end-to-end capabilities in product design, prototyping and manufacturing electronic and electrical products and solutions. It is one of the leading manufacturers of specialized wires and cables in terms of product volume in Fiscal 2025, among peers considered. Also, it is one of the few companies in India equipped with E-beam radiation infrastructure duly approved by Atomic Energy Regulatory Board of India.

The Company's diverse product portfolio has enabled them to serve diverse industries across different sectors which makes it one of the few EMS providers in India capable of serving both business-to-business-to-consumer (B2B2C) and business-to-business-to-business (B2B2B) markets. Industries within the strategic electronics sector, such as aerospace and defence, and railways, are particularly challenging to enter due to their stringent safety standards, complex regulatory requirements, and the need for advanced technological capabilities. As of March 2025, the Company has obtained around 170 country-specific certifications across its product portfolio. It exports to more than 17 countries. Furthermore, of the total customers served by the Company between April 2022 and March 2025, 22 customers were India's Fortune 500 organizations, including 10 PSUs. Providing EMS solutions at global level to various marquee customers, the Company has also served one of the Global Fortune 500 company.

They are one of the leading manufacturers in India with end-to-end capabilities to manufacture e-mobility charging solutions. As per BIS, the Company became the first EMS manufacturer in India to receive BIS approval for solar cables on August 5, 2023. They are among the limited EMS players with a presence in the defence sector, a domain known for its stringent entry barriers. The company has supplied EMS products to Indian Space Research Organization (ISRO) and Goa Shipyard Limited after securing the requisite pre-certifications and approvals. The Company has also secured approvals for its products from Integral Coach Factory, a PSU in the mass transportation sector, and subsequently onboarded them as a client.

The Company has a total manufacturing capacity spread over 11 lakh sq. ft., solely dedicated to Electrical and Electronic products and solutions, exceeding the overall manufacturing capacity of the peers considered. It operates 11 manufacturing facilities strategically located across North, West, and South India. For example, their Noida facilities serve customers in Northern India, which is major electronics manufacturing hub. Also, their Pune facilities cater to customers across Western India and the Southern Indian region, which includes industries operating in the consumer electronics, aerospace and defence, and e-mobility sectors. The Company has an in-house design centre and over 50 assembly lines, enabling strong product integration and quality control.

As a result of their strategic expansion and integration, they have emerged as one of the few homegrown players in India (among peers considered), with the ability to cover the entire lifecycle of product manufacturing with capabilities for mould designing, wire and cables designing, manufacturing printed circuit board and brass components, injection and blow moulding and product assembly lines and testing facilities. It is an EMS provider of electrical and electronic distribution systems and appliance cords for the consumer electronics sector in India.

- **Kaynes Technology India Limited**

Kaynes Technology India Limited, incorporated in 2008, is integrated Electronics Manufacturing Services and IoT solutions provider. The company offers end-to-end capabilities, including conceptual design, process engineering, manufacturing, and life-cycle support, catering to industries such as automotive, aerospace & defence, industrial, railways, medical, and IT. Kaynes has also expanded into semiconductor assembly and testing (OSAT) and high-density interconnect (HDI) PCB manufacturing. With a presence across multiple manufacturing locations in India and a global

customer base, the company focuses on high-mix, low-to-medium volume, and mission-critical products. Its diversified portfolio positions it as a strategic partner for both domestic and export markets.

- **Avalon Technologies Limited**

Avalon Technologies Limited, incorporated in 1999, is an integrated Electronic Manufacturing Services provider offering end-to-end solutions, from design and engineering to manufacturing and after-sales support. The company operates across high-value, high-complexity sectors such as aerospace & defence, industrial, automotive, energy, and medical devices. Its capabilities span PCB assembly, sheet metal fabrication, machining, cable harnessing, and system integration. Avalon serves both domestic and global OEMs, leveraging facilities in India and the U.S. to cater to export-driven demand. The company focuses on high-mix, low-to-medium volume production, positioning itself as a strategic partner for mission-critical applications.

- **Dixon Technologies (India) Limited**

Dixon Technologies (India) Limited, incorporated in 1993, is a leading Electronic Manufacturing Services company engaged in manufacturing a diverse range of electronic products. Its operations span consumer electronics, lighting products, home appliances, mobile phones, security surveillance systems, and set-top boxes. The company offers services across product design, manufacturing, and repair & refurbishment, catering to major domestic and global brands. The company operates 23 manufacturing facilities across Noida, Dehradun, Ludhiana, and Andhra Pradesh.

- **PG Electroplast Limited**

PG Electroplast Limited, incorporated in 2003, is a provider of Electronic Manufacturing Services and plastic molding solutions in India. It specializes in Original Design Manufacturing, Original Equipment Manufacturing and Plastic Injection Molding, catering to 50+ leading Indian and Global brands. The company offers a comprehensive range of services, including plastic injection molding, printed circuit board assembly, and complete product assembly for sectors such as consumer durables, automotive, lighting, and sanitary ware. Its portfolio spans manufacturing of washing machines, air conditioners, LED lighting products, and other electronics. The company focuses on delivering customized manufacturing solutions for diverse end-use industries. leveraging multiple manufacturing facilities across India.

- **Amber Enterprises India Limited**

Amber Enterprises India Limited, incorporated in 1990, is a solutions provider for the air conditioning and consumer durables industry. The company offers a diversified product portfolio including room air conditioners (split, window, inverter, cassette, and ductable units), components such as heat exchangers, sheet metal parts, and plastic molding, as well as electronics like PCBs for automotive, telecom, defence, and aerospace applications. Amber also caters to the railways sector with subsystems including doors, gangways, pantry systems, couplers, driving gears, pantographs, and brakes. Serving major domestic and international OEMs, it operates multiple manufacturing facilities across India with backward integration process.

7.2 Operational Benchmarking

Table 20: Comparison of Product offerings (Fiscal 2025):

Benchmarking Parameters	UKB Electronics	Kaynes Technology India	Avalon Technologies	Dixon Technologies (India)	PG Electroplast	Amber Enterprises India
Product Portfolio & Offerings	Automotive: Wiring harnesses, Automotive special Cables and EV chargers Industrial & Automation: Instrumentation, control, high-temp, welding, flex, signal & trailing cables Consumer Electronics & Appliances: PCBAs, power cords, plugs, extensions, connectors Aerospace and Defence: Special wire, Cables and Electronic distribution system. Renewables: Specialty Cables and electronic distribution system.	Automotive electronics: cluster PCBA, lighting modules, switch assemblies etc. Industrial & EV systems: engine control panels, BLE modules, precision measurement devices etc. Railway signalling & control systems etc. Aerospace and strategic electronics: sonar, mission-critical assemblies etc. IoT and industrial devices: barcode scanners,	Aerospace components: engine parts, seating frames, lighting assemblies etc. Railway systems: signalling, braking, HVAC, collision prevention, platform doors etc. Automotive electronics: dashboards, telematics, battery systems etc. Solar energy systems: inverters, charge controllers, zone controllers etc.	Consumer electronics: LED TVs, PCB manufacturing etc. Lighting: LEDs, tube lights, indoor/outdoor drivers etc. Home appliances: semi/fully automatic washing machines etc. Mobile & EMS: mobile phones, hearables, wearables, laptops etc.	Consumer appliances: indoor/outdoor/window AC units etc. Washing machines: semi-automatic and fully automatic top load etc. Air coolers: window, desert, personal etc. LED TVs and interactive flat panel display etc.	Consumer durables: split, window, inverter, cassette, ductable Acs etc. Electronics: PCBs for automotive, IT/telecom, defence, aerospace, railways etc. RACs: split, outdoor, window, top-throw units etc. Railway subsystems: doors, gangways, pantry systems, couplers, pantographs, brakes etc.

Benchmarking Parameters	UKB Electronics	Kaynes Technology India	Avalon Technologies	Dixon Technologies (India)	PG Electroplast	Amber Enterprises India
		sensors, industrial tablets etc.				
Number of Plants	11	10	14	11	10	30
Total Installed Capacity (Sq. ft.)	11,02,914	5,07,155	5,75,000	8,60,000*	11,00,000	90,41,684*
Number of Export Countries	17+	26	18	10	0	6

Source: Company Reports
Note: *Capacity Expansion

Table 21: Revenue by geography (%)

Revenue by geography	UKB Electronics			Kaynes Technology India			Avalon Technologies			Dixon Technologies (India)			PG Electroplast			Amber Enterprises India		
	FY23	FY24	FY25	FY23	FY24	FY25	FY23	FY24	FY 25	FY23	FY24	FY 25	FY23	FY24	FY 25	FY23	FY24	FY25
Within India	93.76%	92.77%	93.51%	85.25%	90.73%	92.60%	37.17%	43.21%	-	91.66%	92.87%	-	99.91%	99.89%	-	99.65%	99.43%	99.38%
Outside India	6.24%	7.23%	6.49%	14.75%	9.27%	7.40%	62.83%	56.79%	-	8.34%	7.13%	-	0.09%	0.11%	-	0.35%	0.57%	0.62%

Source: Company Reports

Table 22: Revenue by sector (%)

Revenue by sector	UKB Electronics			Kaynes Technology India			Avalon Technologies			Dixon Technologies (India)			PG Electroplast			Amber Enterprises India		
	FY 23	FY 24	FY 25	FY 23	FY 24	FY 25	FY23	FY24	FY25	FY23	FY24	FY25	FY23	FY24	FY25	FY 23	FY 24	FY 25
B2B2B	0.14%	2.47%	5.48%	85.77%	92.90%	92.03%	100.00%	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	6.25%	8.79%	7.81%
B2B2C	99.86%	97.53%	94.52%	14.23%	7.10%	7.97%	0.00%	0.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	93.75%	91.21%	92.19%

Source: Company Reports
Note:
1. For classification purpose, Consumer Electronics segments such as smartphones, televisions, wearables, and appliances have been classified under B2B2C, while other segments such as Aerospace & Defence, ICT (IT & Telecom), Automotive, Industrial & Industrial Automation, Renewables, Mass Transportation and others have been considered under B2B2B.
2. For Kaynes Technology India, "IoT / IT, Consumer and Others" has been considered as B2B2C for all the three financial years.
3. For PG Electroplast, "Plastic and Others" & "Tool Manufacturing" has been considered as B2B2C for all the three financial years.

Table 23: Comparison of presence in various end-user industry

End-use Industries	UKB Electronics	Kaynes Technology India	Avalon Technologies	Dixon Technologies (India)	PG Electroplast	Amber Enterprises India
Consumer Electronics	✓	✓		✓	✓	✓
Aerospace & Defence	✓	✓	✓			✓
Automotive / EV	✓	✓	✓		✓	✓
Railways	✓	✓	✓			✓
Medical	✓		✓	✓		
Renewables	✓		✓			
Industrial Automation	✓	✓	✓			✓
Information Technology & Telecom	✓	✓	✓	✓		✓

Source: Company Reports
Note: All the above information has been compiled from publicly available documents and disclosures of the respective companies

Table 24: Comparison of Value Chain

Value Chain	UKB Electronics	Kaynes Technology India	Avalon Technologies	Dixon Technologies (India)	PG Electroplast	Amber Enterprises India
Design & Prototyping	✓	✓	✓			✓
Component Manufacturing / Sourcing	✓	✓	✓	✓	✓	✓
PCBA / Assembly	✓	✓	✓	✓	✓	✓
Box Build & Integration	✓	✓	✓	✓	✓	✓
Testing / QA / Reliability	✓	✓	✓	✓	✓	✓
Vertical Integration	✓	✓	✓			

Source: Company Reports
Note: All the above information has been compiled from publicly available documents and disclosures of the respective companies

7.3 Financial Parameters (Figures in INR Millions)

Table 25: Comparison of Revenue from Operations

Peers	FY23	FY24	FY25
UKB Electronics	5,295.46	5,793.66	7,872.71
Kaynes Technology India	11,261.14	18,046.19	27,217.52
Avalon Technologies	9,447.19	8,671.68	10,981.28
Dixon Technologies (India)	1,21,920.10	1,76,909.00	3,88,601.00
PG Electroplast	21,599.48	27,464.95	48,695.32
Amber Enterprises India	69,270.95	67,292.69	99,730.16

Table 26: Comparison of EBITDA

Peers	FY23	FY24	FY25
UKB Electronics	598.40	580.40	969.52
Kaynes Technology India	1,683.18	2,541.68	4,106.99
Avalon Technologies	1,126.24	625.48	1,148.80
Dixon Technologies (India)	5,143.70	7,078.70	19,849.40
PG Electroplast	1,761.56	2,617.90	4,840.54
Amber Enterprises India	4,179.33	4,895.37	7,334.32

Table 27: Comparison of EBITDA Margin

Peers	FY23	FY24	FY25
UKB Electronics	11.30%	10.02%	12.31%
Kaynes Technology India	14.95%	14.08%	15.09%
Avalon Technologies	11.92%	7.21%	10.46%
Dixon Technologies (India)	4.22%	4.00%	5.11%
PG Electroplast	8.16%	9.53%	9.94%
Amber Enterprises India	6.03%	7.27%	7.35%

Table 28: Comparison of PAT

Peers	FY23	FY24	FY25
UKB Electronics	191.77	267.48	460.18
Kaynes Technology India	951.96	1,832.89	2,934.33
Avalon Technologies	525.03	279.85	634.39
Dixon Technologies (India)	2,550.80	3,749.20	12,325.80
PG Electroplast	774.69	1,349.00	2,877.96
Amber Enterprises India	1,637.76	1,394.67	2,511.51

Table 29: Comparison of PAT Margin

Peers	FY23	FY24	FY25
UKB Electronics	3.60%	4.51%	5.82%
Kaynes Technology India	8.37%	9.85%	10.37%
Avalon Technologies	5.47%	3.17%	5.69%
Dixon Technologies (India)	2.09%	2.12%	3.17%
PG Electroplast	3.58%	4.89%	5.87%
Amber Enterprises India	2.35%	2.06%	2.50%

Table 30: Comparison of RoNW

Peers	FY23	FY24	FY25
UKB Electronics	14.97%	16.88%	22.52%
Kaynes Technology India	9.91%	7.37%	10.32%
Avalon Technologies	9.78%	5.11%	10.37%
Dixon Technologies (India)	19.86%	21.77%	35.53%
PG Electroplast	19.57%	13.00%	10.18%
Amber Enterprises India	8.38%	6.59%	10.87%

Table 31: Comparison of RoCE

Peers	FY23	FY24	FY25
UKB Electronics	23.29%	20.99%	27.78%
Kaynes Technology India	15.34%	9.16%	12.57%
Avalon Technologies	15.43%	6.60%	13.70%
Dixon Technologies (India)	27.96%	29.75%	47.99%
PG Electroplast	22.74%	17.56%	13.91%
Amber Enterprises India	11.02%	10.89%	15.45%

Table 32: Comparison of Net Debt to Equity

Peers	FY23	FY24	FY25
UKB Electronics	1.42%	1.11	1.14
Kaynes Technology India	0.11	0.12	0.29
Avalon Technologies	-0.22	0.22	0.12
Dixon Technologies (India)	-0.03	-0.03	-0.01
PG Electroplast	1.35	0.32	0.08
Amber Enterprises India	0.52	0.61	0.75

Table 33: Comparison of Net Debt to EBITDA

Peers	FY23	FY24	FY25
UKB Electronics	3.04	3.02	2.41
Kaynes Technology India	0.65	1.13	2.02
Avalon Technologies	-1.03	1.95	0.63
Dixon Technologies (India)	-0.07	-0.06	-0.01
PG Electroplast	3.03	1.26	0.46
Amber Enterprises India	2.44	2.66	2.35

Table 34: Comparison of Gross Fixed Asset Turnover Ratio

Peers	FY23	FY24	FY25
UKB Electronics	4.49	4.63	3.74
Kaynes Technology India	7.76	5.51	4.35
Avalon Technologies	8.18	6.13	NA
Dixon Technologies (India)	10.18	8.81	NA
PG Electroplast	3.36	3.30	NA
Amber Enterprises India	3.31	2.67	3.58

Table 35: Comparison of Net Working Capital Days

Peers	FY23	FY24	FY25
UKB Electronics	132	104	91
Kaynes Technology India	163	123	102
Avalon Technologies	187	223	182
Dixon Technologies (India)	2	-6	-5
PG Electroplast	66	56	68
Amber Enterprises India	17	-3	-4

Table 36: KPIs Definition

KPIs	Definition
Revenue from Operations	Revenue from Operations represents the scale of our business as well as provides information regarding our overall financial performance.
EBITDA	EBITDA provides a comprehensive view of our financial health. It facilitates evaluation of the year-on-year performance of our business and excludes other income.
EBITDA Margin	EBITDA Margin is an indicator of the profitability of our business and assists in tracking the margin profile of our business and our historical performance and provides financial benchmarking against peers.
PAT	PAT represents the profit/loss that we make for the financial year or during a given period. It provides information regarding the overall profitability of our business.
PAT Margin	PAT Margin is an indicator of the overall profitability of a business and provides financial benchmarking against peers as well as to compare against the historical performance of our business.
Net Worth	Net Worth is an indicator of a financial standing/ position as of a certain date. Net Worth is also known as Book Value or Shareholders' Equity.
Net Debt	Net Debt is a liquidity metric, and it represents the absolute value of borrowings net of cash and cash equivalents, bank balances and other cash and cash equivalents and current investments in the company.
Net Debt to EBITDA	Net Debt to EBITDA ratio enables us to measure the ability and extent to which we can cover our debt in comparison to the EBITDA being generated by us.
Net Debt to Equity	Net Debt to Equity is a measure of our Company's capital structure and financial leverage. It reflects the extent to which the Company is funded through debt versus Net Worth.
Return on Net Worth (RoNW)	RoNW represents how efficiently we generate profits from our Net Worth.
Return on Capital Employed (RoCE)	RoCE represents how efficiently we generate earnings before interest & tax from the capital employed.
Gross Block	Gross Block represents the total cost of all property plant and equipment.
Gross fixed Asset Turnover	Gross Fixed Asset Turnover Ratio indicates the efficiency with which the Company utilizes its gross fixed assets to generate Revenue from Operations. It reflects how effectively the investments in property, plant and equipment (excluding right of use assets) are contributing to the Company's sales.
Net Working Capital Days	Net Working Capital Days indicates the number of days the Company takes to convert its net working capital into revenue. It reflects the efficiency of working capital management and the operating cycle of the business.

Table 37: Formulas

KPIs	Formulas
Revenue from Operations	Revenue from Operations includes revenue from sale of products and services and other operating revenue
EBITDA	EBITDA is calculated as profit before tax plus depreciation and amortization expense plus finance cost less other income
EBITDA Margin	EBITDA Margin is calculated as EBITDA divided by Revenue from Operations
PAT	PAT means profit after tax for the year
PAT Margin	PAT Margin is calculated as PAT divided by Total Income. Total Income is calculated as Revenue from Operations plus other income
Return on Net Worth (RoNW)	RoNW is calculated as PAT by Net Worth. Net worth means aggregate value of the paid-up share capital and all reserves created out of the profits and securities premium account and debit or credit balance of profit and loss account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, derived from Restated Financial Information, but does not include reserves created out of revaluation of assets and amalgamation
Return on Capital Employed (RoCE)	RoCE is calculated as EBIT divided by capital employed. EBIT is calculated as profit before tax plus finance cost less other income. Capital employed is calculated as Net Worth plus non-current borrowings
Gross Fixed Asset Turnover Ratio	Gross Fixed Asset Turnover Ratio is calculated as Revenue from Operations divided by closing Gross Block. Gross Block represents the total cost of all property plant and equipment
Net Working Capital Days	Net Working Capital Days is calculated as inventory days plus receivable days less payable days. Inventory days is calculated as (Closing Inventory / COGS) * 365. Receivable days is calculated as (Closing Trade receivables / Revenue from Operations) * 365. Payable days is calculated as (Closing Trade payables / COGS) * 365. COGS is calculated as cost of materials consumed plus changes in inventories of finished goods, stock-in-trade and work-in-progress plus purchases of stock-in-trade
Net Debt to Equity	Net Debt to Equity Ratio is calculated as Net Debt divided by Net Worth. Net debt is calculated as non-current borrowings plus current borrowing less cash and cash equivalents
Net Debt to EBITDA	Net Debt to EBITDA Ratio is calculated as Net Debt divided by EBITDA. Net debt is calculated as non-current borrowings plus current borrowing less cash and cash equivalents

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