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Beyond battery packs: Localisation in manufacturing EV components

An assessment of India's progress in domestic EV component manufacturing, key localisation gaps, policy support, and future opportunities

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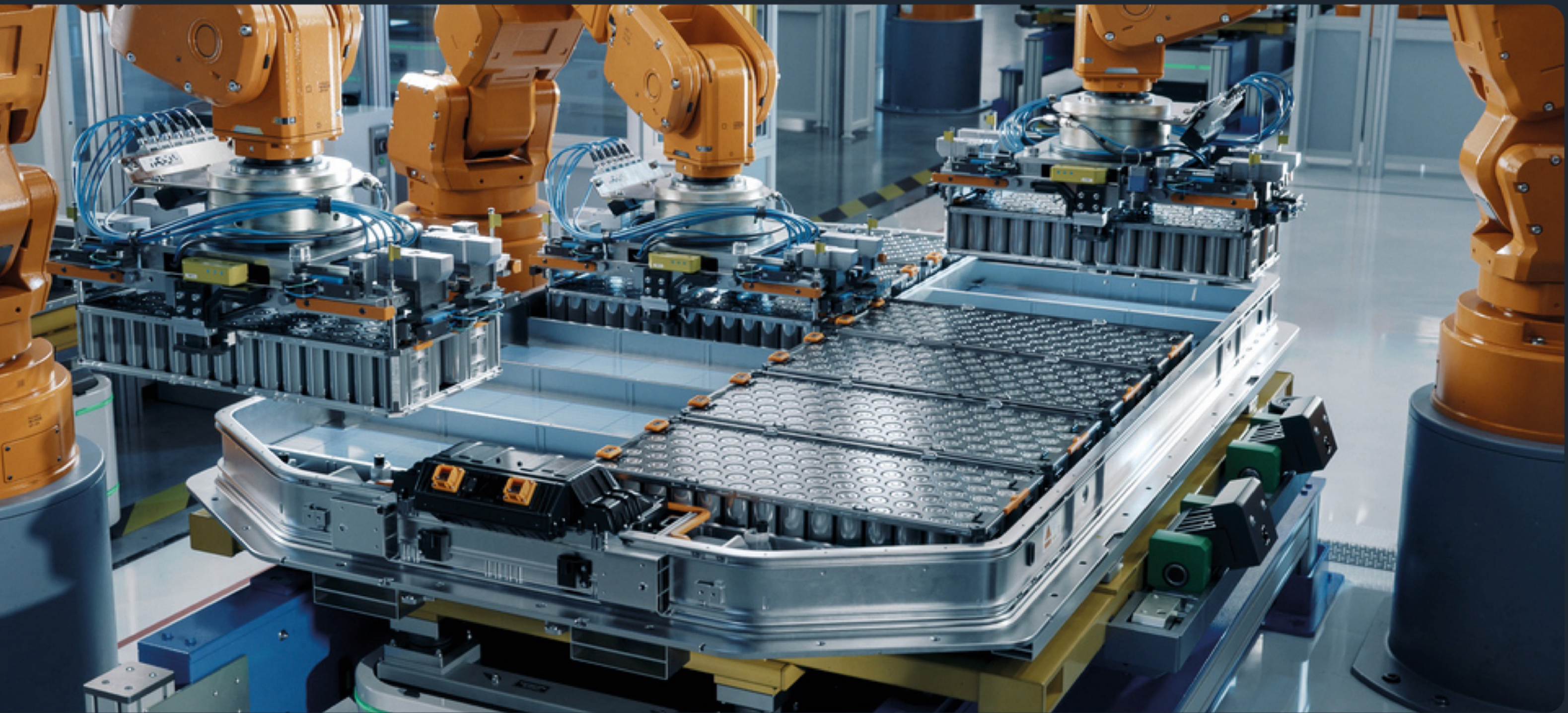

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List of acronyms

AAT - Advanced Automotive Technology
AC - Alternating Current
ARAI - Automotive Research Association of India
BIW - Body-in-White
BLDC - Brushless Direct Current
BMS - Battery Management System
CKD - Completely Knocked-Down
DC - Direct Current
DVA - Domestic Value Addition
E2W - Electric Two-Wheeler
E3W - Electric Three-Wheeler
ECMS - Electronics Components Manufacturing Scheme
EV - Electric Vehicle
FAME - Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles
FY - Financial Year
HGEL - High-Grade Electrical Steel
HVAC - Heating, Ventilation, and Air Conditioning
ICAT - International Centre for Automotive Technology
ICE - Internal Combustion Engine
IEA - International Energy Agency
IGBT - Insulated-Gate Bipolar Transistor
INR - Indian National Rupee
IP - Intellectual Property
ISM - India Semiconductor Mission
LCV - Light Commercial Vehicle
LEAF - Light Electric-Vehicle Acceleration Forum
MCU - Motor Controller Unit
MeitY - Ministry of Electronics and Information Technology
MOSFET - Metal-Oxide-Semiconductor Field-Effect Transistor
NdFeB - Neodymium Iron Boron
OEM - Original Equipment Manufacturer
PCB - Printed Circuit Board
PLI Auto - Production-Linked Incentive Scheme for Automobile and Auto Components
PM E-DRIVE - Prime Minister Electric Drive Revolution in Innovative Vehicle Enhancement
PMP - Phased Manufacturing Programme
PMSM - Permanent Magnet Synchronous Motors
R&D - Research and Development
REPM - Rare Earth Permanent Magnets
SGST - State Goods and Services Tax
Si - Silicon
SIAM - Society of Indian Automobile Manufacturers
SiC - Silicon Carbide
SKD - Semi Knocked-Down
SPMECS - Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors
TMS - Thermal Management Systems
VCU - Vehicle Control Unit

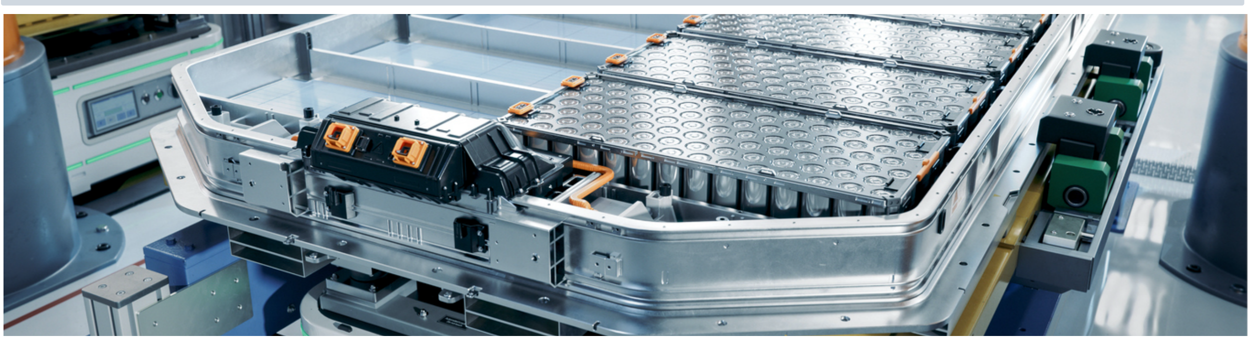
Key findings

Electric vehicle (EV)-specific systems other than batteries, such as motors, power electronics, thermal systems, chargers, and control units, account for a large share of vehicle value, making them important focus areas for domestic manufacturing.

Recent investments in EV component manufacturing in India are concentrated in powertrain, power electronics, and charging systems. This indicates that several of these segments could approach 90–100% domestic production by 2030 if new manufacturing capacities are commissioned and operated as planned.

Many recent manufacturing announcements have been made by companies approved under the Production-Linked Incentive Scheme for Automobile and Auto Components (PLI Auto), suggesting that government policies are supporting on-ground local production. However, less than 10% of the INR25,938 crore (USD2.98 billion) available under the scheme had been disbursed by early 2026. This indicates that progress in domestic manufacturing remains constrained by execution challenges and difficulties in meeting domestic value addition (DVA) requirements.

The most significant bottlenecks are in automotive chips and rare-earth magnets, where global production is heavily concentrated in China and Taiwan, respectively. This creates long-term supply chain risks for deeper localisation.



Executive summary

India's electric vehicle (EV) market has grown nearly 14-fold since financial year (FY) 2020 in areas including electric two-wheelers (E2Ws), electric three-wheelers (E3Ws), buses, and passenger vehicles. This rapid growth is transforming the value chain in India's automotive sector, with value shifting from traditional metal-based components to sophisticated electronic systems and advanced assemblies. While this presents substantial opportunities for the sector, it also introduces significant challenges that require strategic adaptation.

Localisation levels have also improved across EV segments, with many original equipment manufacturers (OEMs) now undertaking domestic assembly and local sourcing for structural and mechanical components. However, a deeper assessment of the supply chain reveals that localisation remains uneven at the component level, particularly for systems unique to EVs such as motors, battery packs, power electronics, and charging systems.

Recent policy measures and industrial investments indicate growing domestic capability in key EV components. Sustaining this momentum requires a stronger focus on indigenous research and development (R&D) into critical raw materials. The next phase of growth will be defined by India's ability to secure the upstream ecosystem for the core technologies that power modern EVs.

Localisation outcomes vary significantly across EV components, with categories aligned to India's established automotive manufacturing strengths such as chassis systems, structural parts, wiring harnesses, and thermal systems achieving high levels of domestic manufacturing. In contrast, components dependent on advanced electronics, specialised materials, and high-precision processes continue to record low localisation levels due to reliance on imported subcomponents, limiting India's share of component value despite increasing local manufacturing activity.

Several structural constraints continue to limit deeper localisation. Global supply chains for automotive chips, rare-earth magnets, and critical materials remain heavily concentrated in a few countries, creating risks related to supply security, pricing, and geopolitical disruptions. Domestic suppliers continue to face challenges around cost competitiveness, technology ownership, and achieving domestic value addition (DVA) requirements under existing incentive schemes.[1]

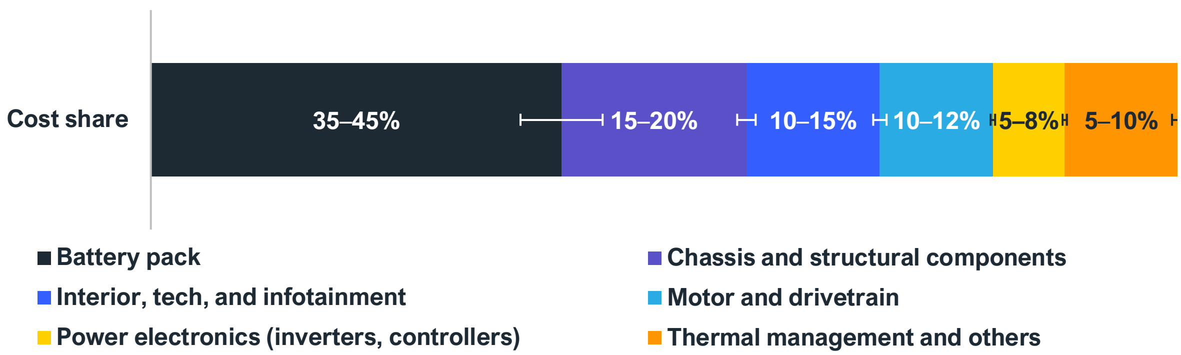
Going forward, advancement in localisation will require a transition from assembly-led manufacturing to stronger domestic capability in component design, advanced materials, and electronics. Achieving this will depend on broadening supplier participation, strengthening domestic R&D, improving manufacturing competitiveness, and accelerating development of critical materials. Translating India's large EV market into globally competitive manufacturing capability across the component value chain will ultimately determine the sector's long-term trajectory.

[1] Domestic value addition is the proportion of manufacturing value created within India relative to the total sales value of the eligible product.

Introduction

Developing a domestic manufacturing ecosystem for EV components has become a strategic priority for India in light of increased EV adoption and the rising importance of electric mobility in the country's energy transition. Beyond battery packs, EVs rely on a range of specialised components, including traction motors, motor controllers, power electronics, thermal management systems (TMS), and vehicle control electronics, which together represent 25–30% of vehicle value (see Figure 1).

Figure 1: Indicative value distribution across key EV components



Source: JMK Research

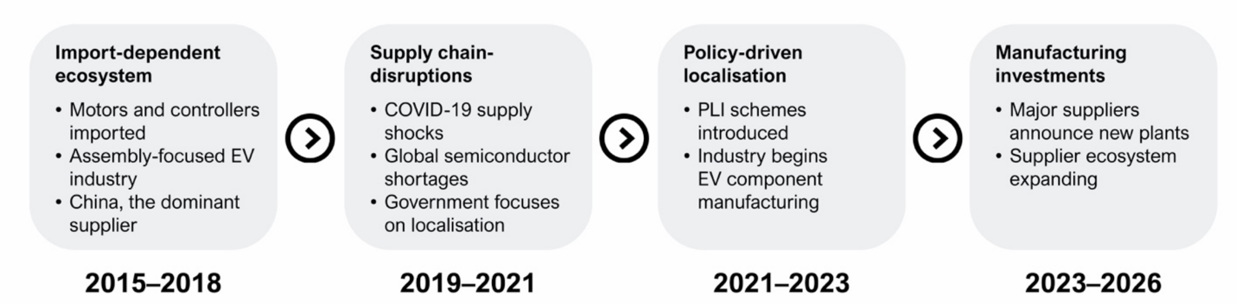
India's large and diverse automotive industry provides a strong foundation for the move toward EV manufacturing and localisation. The country is the third-largest automobile market globally, with domestic vehicle sales reaching around 25.6 million units in FY2025, according to the Society of Indian Automobile Manufacturers (SIAM).[2] This strong market scale reflects sustained demand across passenger vehicles, commercial vehicles, and two- and three-wheelers, indicating the depth of India's automotive ecosystem. In parallel, the auto component industry recorded revenues of approximately INR6.73 lakh crore (USD77.22 billion) in FY2025, supported by an extensive network of suppliers.[3,4] This established manufacturing base positions India to gradually expand into EV-specific components with the shift toward electric mobility.

However, India's EV supply chain has historically been heavily dependent on imports for several high-value components. In the early stages of EV adoption (2015–2018), the industry relied largely on assembling imported kits such as Completely Knocked-Down (CKD) and Semi Knocked-Down (SKD) (see Figure 2).[5,6] Many OEMs sourced critical subsystems such as motors, controllers, and power electronics from suppliers in China, Taiwan, and other East Asian markets. Domestic

[2] Autocar Professional, Auto sales grow to 25.60 million in FY2025. 15 April 2025.
[3] ACMA Press Release, Indian auto component industry clocks turnover of INR6.73 lakh crore in FY25. 8 July 2025.
[4] USD1 = INR87.16. Full year average of 2025, as per Reserve Bank of India.
[5] CKD – A vehicle is imported as fully disassembled parts and assembled locally in the destination country.
[6] SKD – A vehicle is imported in partially assembled modules (like engine/body fitted) and then completed through local assembly.

manufacturing remained mostly concentrated in mechanical and structural automotive components, while there was limited local production of electronics-intensive systems.

Figure 2: Evolution of EV component localisation in India



Source: News articles, JMK Research

Recent global disruptions, including the COVID-19 pandemic, semiconductor shortages, and rising geopolitical tensions, exposed the vulnerabilities associated with these import-dependent supply chains. These challenges, combined with the growing EV market, have strengthened the case for developing domestic capabilities in advanced automotive technologies.

The Indian government has introduced multiple policy initiatives to strengthen the EV manufacturing ecosystem and encourage local production. As a result, India's EV component ecosystem is gradually evolving from an import-dependent assembly model towards greater DVA.

India's EV market spans multiple vehicle segments from E2Ws, E3Ws, passenger cars, light commercial vehicles (LCVs), to buses and trucks. Each has distinct powertrain architectures and supply chain dynamics. The scope of this report is outlined below:

- **Segments covered**: E2Ws, E3Ws, and electric cars, which collectively accounted for approximately 99% of total EV registrations in FY2026 and represent the most relevant segments to assess India's EV component localisation landscape.[7]
- **Segments excluded**: Electric LCVs, electric buses, and electric trucks.
- **Components excluded**: Battery packs, as localisation trends in battery technology and cell manufacturing are well-documented in existing industry literature.

India's EV components ecosystem

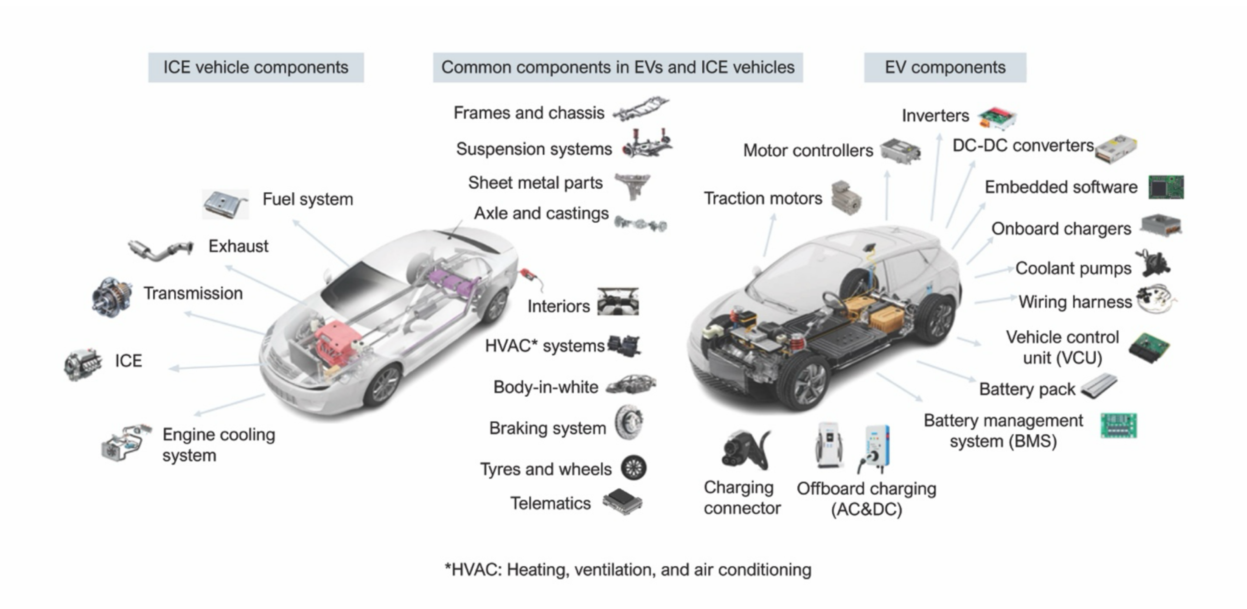
India's automotive component ecosystem is changing as the country moves towards electric mobility. As demonstrated in Figure 3 below, EVs need more advanced electronics, software, and electrical systems than traditional internal combustion engine (ICE) vehicles. As a result, the industry

[7] Vahan dashboard by Ministry of Road Transport and Highways.

today is a blend of India's mechanical parts manufacturing base and its growing ability to produce electric motors and electronics.

EV-specific components differ from traditional automotive parts in the technologies involved, their share in overall vehicle value, and the types of suppliers producing them. It is thus a more diverse ecosystem and requires manufacturers and suppliers to adapt to new technology, capabilities, and sourcing requirements.

Figure 3: ICE vehicles vs EV components



Source: Industry news articles, JMK Research

Components that are closely aligned with India's conventional strengths in automotive engineering and metal fabrication are already largely manufactured domestically. They benefit from a well-established automotive supply base that has 90% localisation across several conventional component categories, existing manufacturing infrastructure, and decades-long supplier experience. Examples include:

- Chassis and Body-in-white (BIW)
- Suspension and braking systems
- HVAC systems and other thermal components
- Sheet metal parts, castings, and structural assemblies

In contrast, local production is still limited in EV subsystems, where dependence on global supply chains continues. These components require specialised electronics, semiconductors, software, and advanced materials. Key examples include:

- Traction motors and motor controllers

- Inverters [direct current (DC) to alternating current (AC)] and DC-DC (high voltage to low voltage) converters
- Vehicle control units (VCUs)
- Embedded software and on board chargers
- Battery management system (BMS) and battery packs

Early progress in these areas has largely been supported by established automotive Tier 1 suppliers, who have leveraged their manufacturing capabilities, engineering expertise, and customer relationships to expand into emerging EV technologies.

Current state of play

Differences in the complexity of technology, supply chain readiness, and scale of manufacturing drive present localisation levels across component categories. Understanding these trends requires analysing the economic significance of individual EV subsystems and the level of participation by domestic suppliers in their production.

Indicative cost share estimates by JMK Research in Figure 1 show that a large portion of EV value lies in non-battery pack components that are more technology intensive and have relatively less domestic manufacturing. Chassis and structural components account for 15–20% of overall EV cost, while motors, drivetrains, power electronics, and thermal systems together account for 20–30%.

Core EV-specific components (battery, motor, power electronics, and thermal management) account for 60–70% of total vehicle cost. Localising these high-value subsystems is therefore essential to increase domestic value, reduce import reliance, and build a more resilient supply chain.

Localisation across key components

In several segments, domestic companies can assemble and integrate parts, but true localisation is still limited because important systems or key parts continue to be imported. At present, the depth of manufacturing varies widely depending on the complexity of the component. Table 1 and Figure 4 below present the current status of key EV components, along with their challenges and potential by 2030.

Table 1: Localisation landscape of key EV components

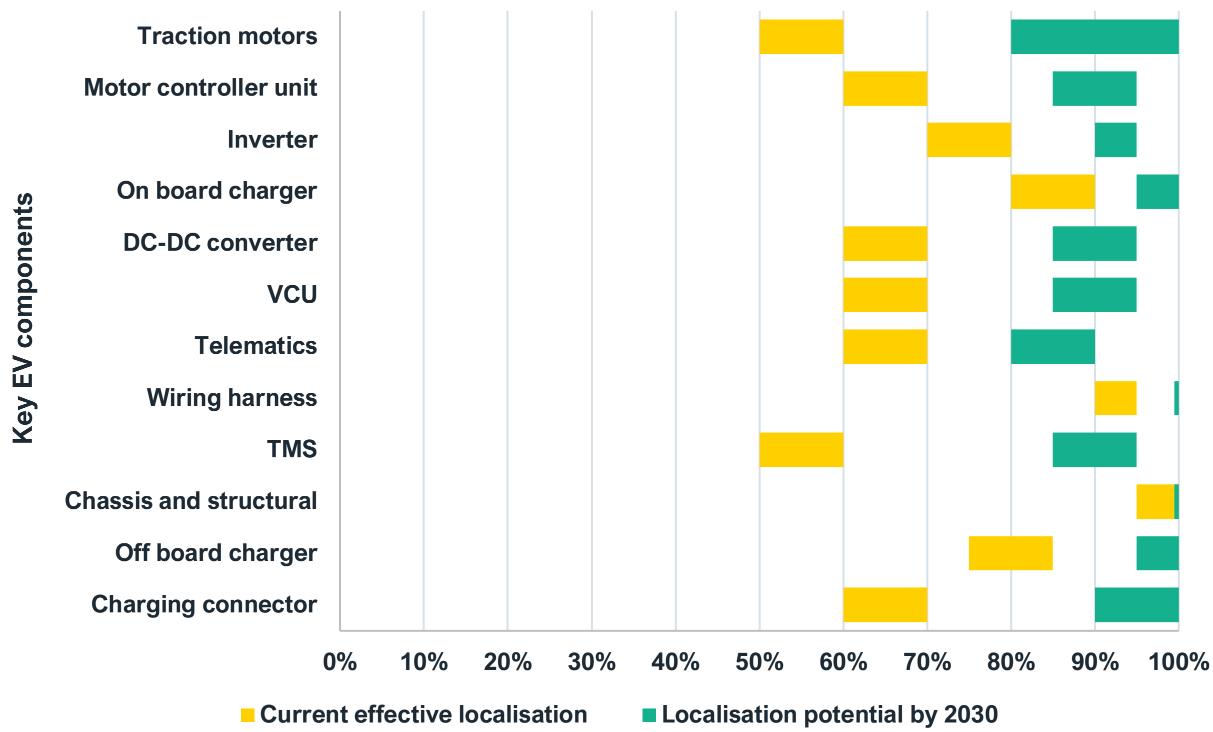
Component segment	Key components	Effective localisation status	Companies		Challenges	Global sourcing countries	Localisation potential by 2030
			Established	Emerging			
Powertrain systems	Traction motors	50–60%	Sona Comstar, Bosch, Tata AutoComp Systems, BorgWarner, Valeo	Tsuyo Manufacturing, Electra EV, Naxatra Labs, Chara Technologies	100% import dependence on rare-earth magnets[8] for Permanent Magnet Synchronous Motors (PMSM)	China, South Korea, Germany, Japan, UK	90–100% for rare-earth-free motors, but 80–90% for PMSM and Brushless Direct Current (BLDC) motors due to challenges related to rare-earth elements
Power electronics	Motor controller unit (MCU)	60–70%	Bosch, Uno Minda, Varroc Engineering, IRP Systems	Tsuyo Manufacturing, Vecmocon Technologies, Sterling E-Mobility	100% import dependence on semiconductor and 80–90% import dependence on printed circuit boards (PCBs)	China, South Korea, Germany, Japan, Taiwan, US	85–95% depending on policy push for semiconductor manufacturing
	Inverter	70–80%	Delta Electronics, Sona Comstar, Spark Minda, Valeo	Vecmocon Technologies	Limited challenges; key gaps remain in power semiconductor localisation and cost competitiveness against Chinese imports	China, South Korea, Germany, Japan, Taiwan, US	90–95% due to strong domestic capabilities in inverter market
	On board charger	80–90%	Uno Minda, Tata AutoComp Systems, Delta Electronics	Kazam Energy, Vecmocon Technologies, Solterra Technologies	Cost competitiveness with Chinese products; electronic component sourcing	China, South Korea, Germany, Taiwan, France, Italy	95–100%, semiconductor challenges would remain
	DC-DC converter	60–70%	Delta Electronics, Tata AutoComp Systems, Spark Minda	Virya Electric Powertrains, Sterling E-Mobility	Cost competitiveness with Chinese products; electronic component sourcing	China, Taiwan, South Korea	85–95%, due to improvements in cost parity

[8] Rare-earth magnets are high-strength permanent magnets made from rare-earth elements such as neodymium and samarium.

	VCU	60–70%	Bosch, Tata AutoComp Systems, Valeo	Vecmocon Technologies	100% import dependence on semiconductor and heavy import dependence on PCBs	China, Taiwan, South Korea, Germany, Japan	85–95%, depending on policy push for semiconductor manufacturing
Other electronics and electrical systems	Telematics	60–70%	Continental, Bosch, Spark Minda, Pricol	iTriangle Infotech, Vecmocon Technologies, Intangles lab	Chipset sourcing; hardware localisation	China, Taiwan, South Korea, Japan	80–90%, considering semiconductor and electronics sourcing
	Wiring harness	90–95%	Motherson Sumi Wiring India, Yazaki, Sumitomo Electric, UKB Electronics	Largely matured market	Cost competitiveness; copper price volatility	China, Japan, South Korea, Thailand, Vietnam	100% by 2030. Already matured market.
Structural and thermal system	TMS	50–60%	Subros, Mahle Anand Thermal Systems, Hanon Systems, Sanden Vikas	Exponent Energy, EMO Energy, Clean Electric, Euler Motors (working mainly on battery side of TMS)	EV-specific system optimisation; dependence on electronics sourcing for electrical cooling	China, South Korea, Taiwan	Already matured market on the mechanical side of TMS. 85–95% localisation on the electrical side.
	Chassis and structural	95–100%	JBM Auto, Sundaram-Clayton, CIE Automotive	Already matured market	Commodity pricing pressure; lightweight materials	Sourcing is largely domestic	Already matured market
Charging system	Off board charger (AC &DC)	75–85%	Delta Electronics, ABB, Servotech Renewable Power System, Exicom Tele-Systems, Lubi Electronics	Kazam Energy, Bolt Earth	High-power semiconductor modules and magnetics largely imported	China, South Korea, Taiwan, Europe	95–100%, driven by charging infrastructure expansion and policy push
	Charging connector	60–70%	Delta Electronics, UKB Electronics, Trinity Touch	IPEC India, JT Mobility	Precision contact plating technology for pins and terminals; global standard compliance	China, Taiwan, South Korea, Germany, Japan, US	90–100%, driven by charging infrastructure expansion and policy push.

Source: Industry stakeholders, news articles, company webpages, JMK Research.

Figure 4: Current localisation levels and 2030 potential



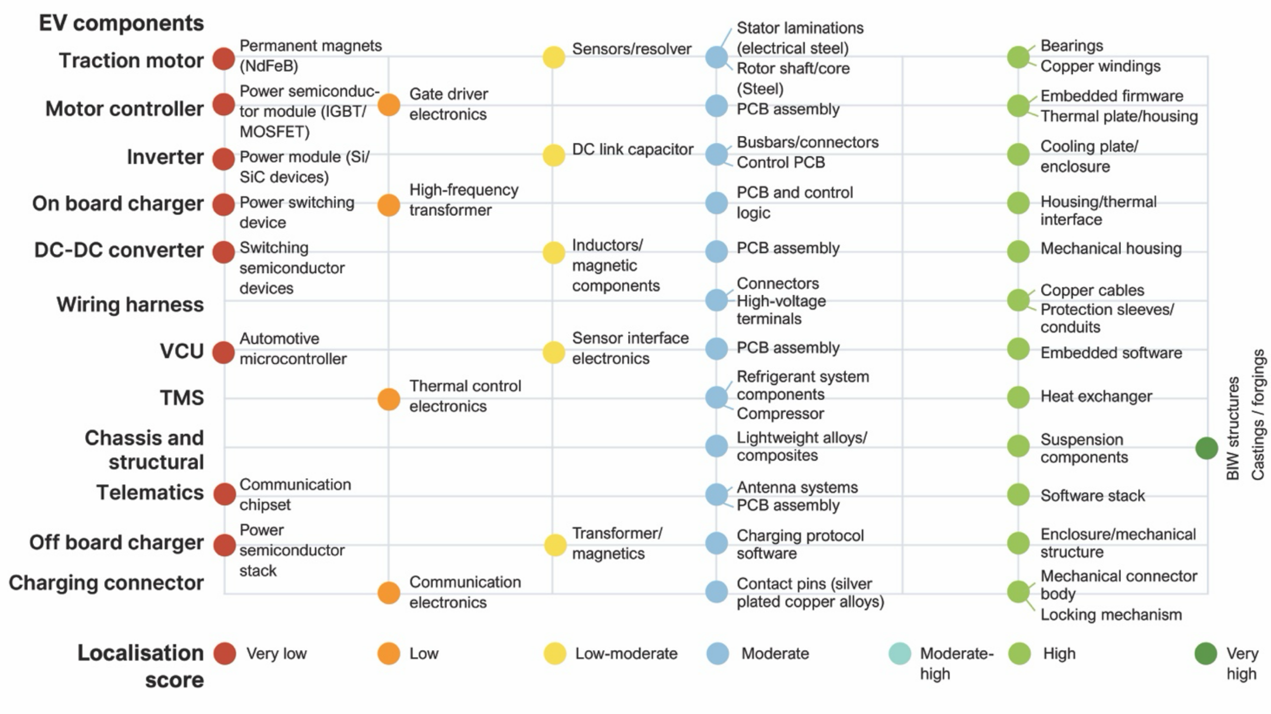
Source: Industry stakeholders, news articles, company webpages, JMK Research

More advanced electronics, such as motor controllers, inverters, and VCUs still depend heavily on imports. This is largely because the core building blocks, including semiconductors and specialised circuit boards, are not yet produced at scale within India.

PMSM localisation is expected to remain challenging in the near-term as limited domestic availability of high-quality permanent magnets keeps Indian OEMs significantly reliant on imports from China, where magnet manufacturing capabilities are more mature. However, the Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets (REPM) is likely to support gradual capability development, which could improve localisation prospects potentially by 2032–2035.[9]

[9] Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets (REPM) is a Government of India initiative of INR7,280 crore (USD835 million) over seven years (2025–2032) to establish domestic capacity of 6,000 metric tonnes per annum for high-strength magnets through a mix of capital subsidies and sales-linked incentives.

Figure 5: Current localisation level across EV subcomponents



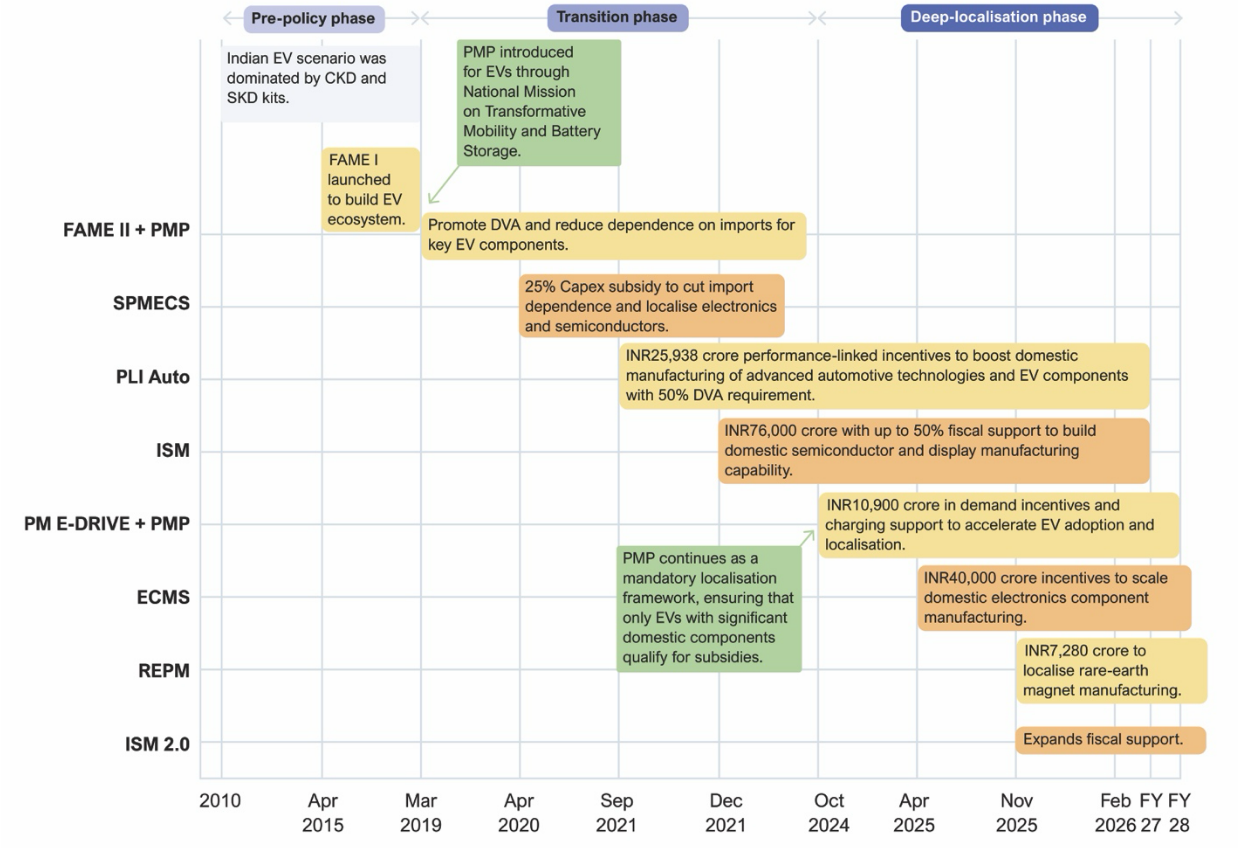
Source: Industry stakeholder interviews, news articles, company webpages, JMK Research

Localisation is shaped not only by the ability to manufacture final components but also by the domestic availability of critical subcomponents and raw materials. Across the 12 key EV components this report assesses, nearly 8 have subcomponents not currently produced in India, including power devices and rare-earth magnets (see Figure 5). While domestic manufacturing in certain electronics components has begun, domestic companies have to compete with the lower costs of established Chinese suppliers, which slows down wider market adoption.

Policy landscape

India’s approach to EV localisation has evolved through several policy stages. While early efforts focused on creating a basic market and encouraging people to buy EVs, more recent policies prioritise building strong domestic manufacturing. This shift shows a clear move towards closing supply chain gaps in critical EV components and rare-earth magnets to ensure that more of the vehicle’s value is created within India.

Figure 6: Roadmap of government policies driving EV component localisation



FAME II – Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles Phase 2
PMP – Phased Manufacturing Programme
SPMECS – Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors
PLI Auto – Production-Linked Incentive Scheme for Automobile and Auto Components
ISM – India Semiconductor Mission (Semicon India programme)
PM E-DRIVE – Prime Minister Electric Drive Revolution in Innovative Vehicle Enhancement
ECMS – Electronics Components Manufacturing Scheme
REPM – Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets

Ministry of Heavy Industries
Ministry of Electronics and Information Technology (MeitY)
Union Cabinet

Source: Ministry of Heavy Industries, Ministry of Electronics and Information Technology (MeitY), news articles, JMK Research

During the pre-policy period, domestic suppliers mostly provided conventional automotive components rather than new electric technology (see Figure 6). To stimulate the market, government policy focused on making EVs cheaper, but the lack of specific manufacturing incentives meant there was little investment in local EV-specific research or components.

A stronger push began with the introduction of the PMP under the FAME II scheme in March 2019. Since OEMs could avail incentives only if they met PMP localisation requirements, the policy created a clear impetus to reduce dependence on imported components and increase local integration of EV components.

Under the PLI Auto scheme, incentives were linked to sales of Advanced Automotive Technology (AAT) components achieving a minimum 50% DVA, which is verified at the time of product approval while claiming incentives. The scheme also encourages progressive localisation through a phased manufacturing approach.[10] Eligibility under the scheme is defined by a prescribed list of AAT products, which covers both EV and non-EV segments. This makes the scheme accessible to ICE manufacturers as well provided they produce AAT-listed components.[11] Conventional automotive components such as standard engines, gearboxes, or body parts fall outside the scheme's purview and attract no incentive. Overall, it has encouraged the automotive industry to invest in local manufacturing of AATs and expand domestic capacity for high-value components.

In parallel, the Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPMECS) and the India Semiconductor Mission (ISM) supported the electronics and semiconductor value chains' localisation by encouraging investments in domestic component manufacturing and reducing heavy reliance on imported chips, primarily from China and Taiwan.

The continuation of PMP under the Prime Minister Electric Drive Revolution in Innovative Vehicle Enhancement (PM E-DRIVE) scheme expands such efforts to electric buses, electric trucks, and charging infrastructure. Furthermore, the Union Cabinet approved the REPM scheme in November 2025 to address the supply chain risks linked to India's heavy dependence on imported rare-earth magnets and build a self-reliant ecosystem for EV motors, aligning with the 'Atmanirbhar Bharat' initiative.[12] With China accounting for nearly 90% of global permanent magnet production, improving domestic magnet manufacturing capability could lead to 80–90% localisation of PMSM traction motors over the long term.

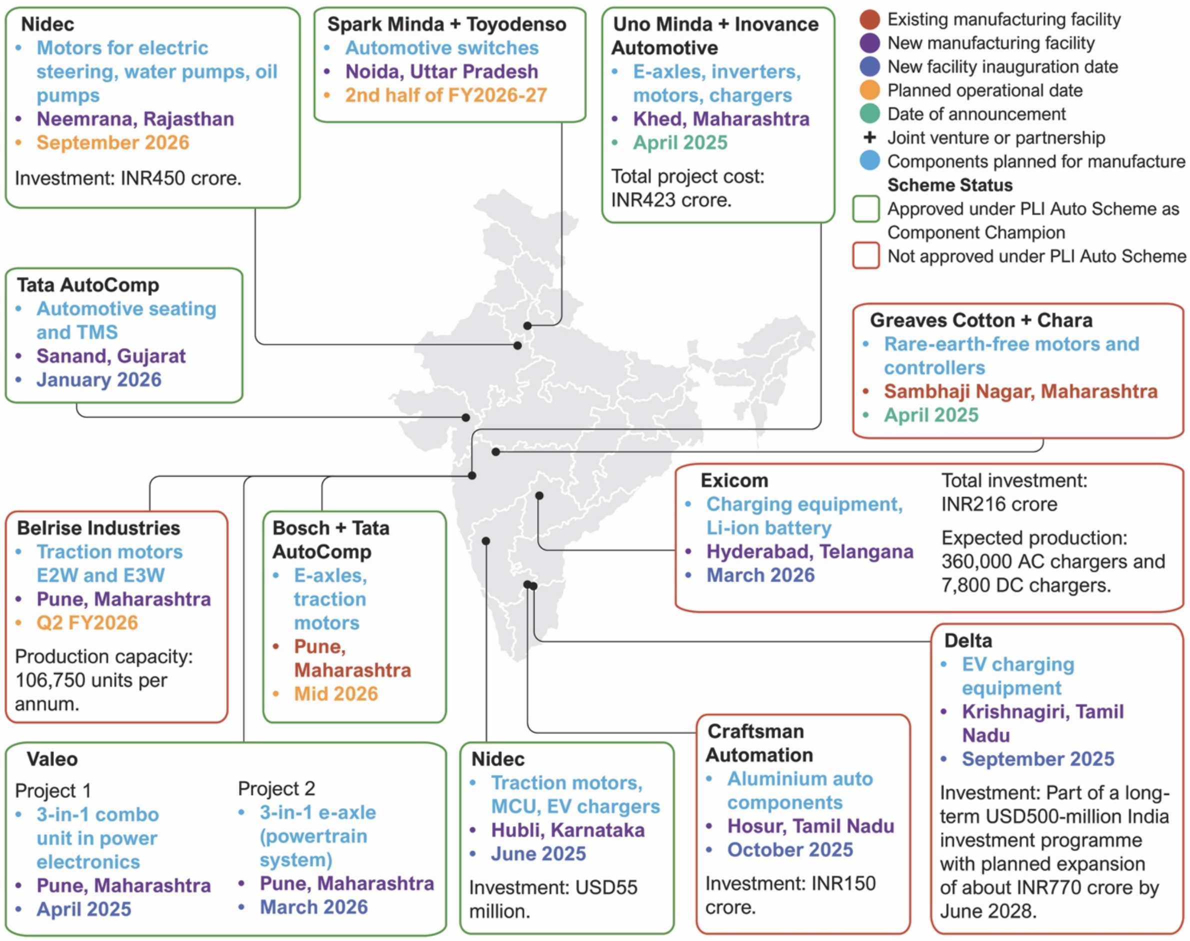
Developments in component manufacturing

Driven by policy incentives for domestic manufacturing, several companies have announced, commissioned, or expanded manufacturing facilities across various EV component sectors. Around 60% are from entities approved under the PLI Auto scheme (see Figure 7), indicating that government support is contributing to investment of capital in high-value parts of the supply chain. This is especially visible in highly import-dependent segments.

A large share of these investments is in established automotive hubs such as Maharashtra and Tamil Nadu. They currently host around 85 and 49 AAT manufacturing facilities, respectively.[13] These states could lead the next phase of component localisation due to their strong supplier base, skilled labour availability, port access, and state-level incentives such as land subsidies, electricity tax exemptions, and reimbursements on State Goods and Services Tax (SGST). Meanwhile, new manufacturing corridors in Karnataka, Gujarat, and Uttar Pradesh are also drawing an increasing share of EV component projects.

[10] The Gazette of India. PLI Scheme for Automobile and Auto Component Industry. 23 September 2021
[11] The Gazette of India. List of Advanced Automotive Technology Components eligible for PLI Auto. 9 November 2021
[12] Atmanirbhar Bharat is a national mission launched by Government of India to make India self-reliant by boosting domestic manufacturing, reducing import dependency, and fostering local innovation.
[13] Press Information Bureau. PLI Scheme for Automobile and Auto Component Industry. 9 December 2025

Figure 7: Component manufacturing landscape



Source: News articles, Ministry of Heavy Industries, JMK Research

Implications for localisation investments

Powertrain and power electronics

The powertrain and power electronics segment has received most of the new manufacturing investments. It is also the segment where India has historically faced highest import dependence. Companies such as Bosch (through its 50:50 joint venture with Tata AutoComp), Valeo, Uno Minda, Belrise Industries, and Nidec are all building domestic capability in e-axles, traction motors, inverters, and integrated powertrain units.[14,15,16,17,18,19] Valeo is taking a more integrated approach by manufacturing a 3-in-1 power electronics combo unit (power distribution unit, DC-DC converter, and

[14] ET Auto. Bosch partner with Tata AutoComp for local e-axle production. 18 March 2026
[15] Autocar Professional. Valeo inaugurates new plant in Pune to boost EV offerings. 4 April 2025
[16] ET Auto. Valeo inaugurates electric powertrain line at Pune plant. 31 March 2026
[17] Uno Minda. Uno Minda to setup greenfield plant for four-wheeler EV Powertrain products. 30 April 2025
[18] Manufacturing Today. Belrise Industries to open three new plants to boost EV component manufacturing. 17 May 2025
[19] Nidec Corporation. Nidec inaugurates new manufacturing Orchard Hub campus in Hubli, Karnataka, celebrates next step in India Growth strategy. 9 June 2025

on board charger) and a 3-in-1 e-axle (motor, inverter, and gearbox/reducer) as compact assemblies. This approach reduces system complexity, improves packaging efficiency, and can lower overall drivetrain cost compared to using separate components. Similarly, Belrise's technology agreement with a Chinese partner for hub motors is expected to increase the company's component value share per E2W from around 10–15% to 20–25%, supporting higher DVA. Meanwhile, Nidec's new Hubli facility expands domestic capability in EV motors, controllers, and chargers within a single manufacturing campus, indicating a shift toward integrated EV system manufacturing and positioning India as a potential export base for EV technologies.

Critical material and technology dependencies

Greaves Cotton has partnered with Bengaluru-based startup Chara Technologies to develop rare-earth-free synchronous reluctance motors. This may have direct implications for reducing India's dependence on rare-earth magnet imports, an area where China controls the dominant share of global processing capacity.[20] Nidec's Neemrana expansion is focused on precision motors for systems such as electric power steering, water pumps, and cooling fans. This suggests that domestic capability is expanding not only in EV-specific motors, but also in the broader automotive motor ecosystem that supports vehicle electrification and advanced vehicle functions.[21]

Charging infrastructure

Exicom's new Hyderabad facility manufactures a range of AC chargers, DC fast chargers, rectifiers, and controllers, while also hosting India's first EV charger interoperability testing centre.[22] Exicom is also localising Tritium TRI-FLEX charging modules, which use a modular architecture enabling dynamic power sharing across multiple vehicles from a single system, supporting ultra-fast charging with liquid-cooled technology. Delta Electronics' Krishnagiri plant demonstrates a deeper level of localisation with around 70% of output serving domestic demand and over 55% of components sourced from the Krishnagiri–Hosur corridor.[23] This level of supply chain integration, where both production and sourcing are substantially local, is a stronger indicator of localisation depth than plant investment alone. These developments directly support the expansion of India's charging network, reducing its current dependence on imported charging hardware.

Structural and lightweight components

Structural and lightweight components directly influence vehicle weight, driving range, and overall vehicle efficiency. Craftsman Automation's expanded Hosur facility deepens domestic capacity in aluminium castings, alloy wheels, and structural EV parts for two-wheeler and passenger vehicle

[20] Autocar Professional. Greaves Cotton and Chara Technologies Join Forces to Develop Rare-Earth-Free Motors. 9 April 2025
[21] Times of India. Nidec starts work on 3rd plant in Neemrana, to invest 450cr. 21 May 2025
[22] Autocar Professional. Exicom opens Hyderabad plant with INR216 crore investment. 16 March 2026
[23] The Hindu Businessline. Delta Electronics expands presence in Tamil Nadu with two new factory buildings in Krishnagiri. 11 September 2025

OEMs. This is a segment that supports the broader industry goal of lightweighting, which is directly linked to vehicle range improvement.[24]

Across all these segments, the investment pipeline reflects a mix of greenfield projects that build new EV manufacturing capacity and brownfield expansions that upgrade existing facilities to accelerate production. The concentration of investment in powertrain systems, power electronics, and charging equipment is particularly significant, as these are the areas that India has historically been most import-dependent in. Many of these categories could reach 90–100% localisation by 2030 if planned capacities are fully commissioned and ancillary supplier ecosystems are developed in parallel. The pace at which this translates into real DVA improvement will ultimately depend on how quickly ramp-up occurs and whether component-level localisation deepens into sub-component and materials sourcing in the regions where these facilities are taking root.

Risks and challenges

Despite growing policy support and a rise in manufacturing investment plans, complete localisation still faces several hurdles. Key challenges include limited supply of raw materials, difficulty competing with global prices, and inconsistencies in policy implementation (see Table 2). Additionally, many local suppliers still struggle to achieve the large-scale production needed to lower costs.

Table 2: Risks in component localisation: Impact vs challenge matrix

	Risks	Impact on EV localisation progress	Challenges in developing domestic capability	Risk category
1	Dependence on supply of rare-earth magnets	High	High	Critical
2	Dependence on semiconductor ecosystem	High	High	Critical
3	Cost-competitiveness gap with large global supply hubs	High	Medium	High
4	Challenges in reaching localisation thresholds to qualify for incentive	High	Medium	High
5	Delays in validation of locally developed EV components	Medium	Medium	Moderate
6	Fragmented EV platforms and lack of component standardisation	Medium	Medium	Moderate
7	Limited domestic ownership of core EV technologies	Low	Medium	Low

Source: News articles, JMK Research

The most difficult localisation challenges are found in the supply of critical subcomponents like semiconductors and rare-earth magnets (see Figure 8). As these parts are essential for traction

[24] The Hindu Businessline. Craftsman Automation starts commercial operations at new facility in Hosur. 16 October 2025

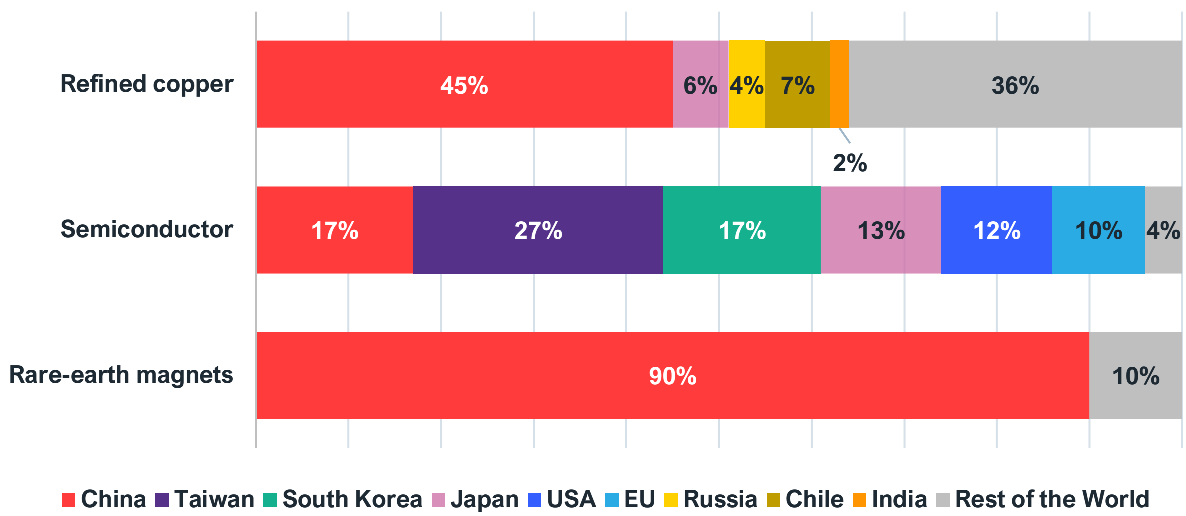
motors, power electronics, and vehicle control hardware, their scarcity directly slows down the domestic development of these larger systems.

1. **Rare-earth magnet processing remains highly concentrated**: This remains a major challenge for localisation of traction motors, especially as China controls around 90% of global REPM supply. While the government launched an INR7,280 crore (USD835.25 million) REPM scheme in 2025 to address this, it will take until at least 2027–28 to reach a meaningful production scale.

2. **Semiconductor ecosystem is also geographically concentrated:** Around 74% of global semiconductor capacity is located in Taiwan and East Asia.[25] This limits localisation of power electronics, charging hardware, and other electronics-intensive EV systems.

    - **Copper**[26] risk, as EVs use 2–4 times more copper than ICE vehicles. With China producing nearly 45% of the world's refined copper, supply concentration could increase cost pressure on motors, wiring, and charging systems[27].

Figure 8: Global supply concentration in critical EV materials and subcomponents



Sources: Global Critical Minerals Outlook 2025 by the International Energy Agency (IEA), article on South Korea's Semiconductor Industry by InvestKorea, Gartner 2025 report on semiconductor market share analysis, news articles, JMK Research.

Note: These are approximate market shares and not exact values.

Beyond supply concentration in critical EV materials, several policies, operational, and economic risks influence the effectiveness of localisation efforts.

[25] InvestKorea. South Korea's Semiconductor Industry and Investment Status. 2 October 2025
[26] International Copper Association. The Electric Vehicle Market and Copper Demand. June 2017
[27] IEA. Global Critical Minerals Outlook 2025. May 2025

3. **Cost competitiveness vs global suppliers**: Components sourced from large manufacturing ecosystems, particularly in China, can be nearly 20–30% cheaper due to their immense production scale.[28] Indian manufacturers find it difficult to match these competitive prices while simultaneously meeting the 50% DVA requirement to qualify for PLI benefits.

4. **Difficulty meeting localisation thresholds for incentives**: Several approved suppliers find it challenging to meet the mandated 50% DVA, particularly for complex electronics with high import reliance. This is reflected in the limited certification progress: by early 2026, only 18 of 82 approved applicants (8 OEMs and 10 component manufacturers) had received DVA certification.[29] These certification delays have directly restricted incentive eligibility, resulting in the disbursement of only 9% of the INR25,938 crore (USD2.98 billion) outlay in PLI Auto.[30] This underscores a significant execution gap linked to the scheme's strict localisation thresholds.

5. **Delays in validation of locally developed EV components**: Parliamentary committee reviews have highlighted capacity constraints at key testing agencies like Automotive Research Association of India (ARAI) and International Centre for Automotive Technology (ICAT).[31] Shortage of specialised EV infrastructure at these facilities often leads to long delays in validating newly localised parts. These testing bottlenecks slow down the formal approval process, making it difficult for suppliers to scale up production and meet national localisation targets on schedule.

6. **Fragmented EV platforms and lack of component standardisation:** India's EV market is characterised by a wide variety of OEM-specific designs, particularly in the two- and three-wheeler segments. This lack of standardisation makes it difficult to use common parts across different brands. Furthermore, India's production volumes are nearly 85% lower than China's, and the domestic supplier base is still developing.[32] These factors together make it hard for manufacturers to achieve the economies of scale needed to lower the costs of high-technology components like controllers, chargers, and electronic modules.

7. **Limited domestic ownership of core EV technologies:** Designs for EV powertrain and control system in India remain largely concentrated among global Tier 1 suppliers (such as Bosch, Continental, Valeo). Many local manufacturers still rely on licensed platforms or imported reference designs for components such as inverters, MCU, and VCU. As a result, localisation efforts are largely limited to assembly and integration. In the absence of domestic ownership of core Intellectual Property (IP), India continues to import complete

[28] McKinsey & Company. Europe's economic potential in the shift to electric vehicles. October 2024
[29] Press Information Bureau. Year End Review 2025: Ministry of Heavy Industries. 13 January 2026
[30] Press Information Bureau. Press Release on 332nd report pertaining to Ministry of Heavy Industries (MHI). 11 March 2026
[31] Press Information Bureau. Press Release on 332nd report pertaining to Ministry of Heavy Industries (MHI). 11 March 2026
[32] IEA. Global EV Outlook 2025. May 2025

subsystems/CKD kits rather than developing its own high-value engineering and design capabilities.

Way forward

The next phase of component localisation depends on mastering the production of automotive electronics and securing a domestic supply of critical materials. Addressing existing gaps through targeted policy measures, stronger supply chain integration, and continued technological development will be critical to achieving deeper localisation. Some recommendations to help achieve this are:

1. Broader participation of EV startups in PLI Auto scheme

Greater participation from EV startups could become increasingly important for the next phase of localisation, particularly in high-growth segments such as two- and three-wheelers, where many smaller players are already driving EV adoption and product development. However, the current PLI Auto structure remains inclined towards large OEMs, with eligibility criteria of INR10,000 crore (USD1.15 billion) revenue and INR3,000 crore (USD344.2 million) investment. As a result, most EV startups remain outside the incentive framework despite their growing role in domestic EV manufacturing.

Going forward, localisation may depend on whether the scheme moves beyond focusing on company size and starts considering growth potential, progress in manufacturing capability, and supplier partnerships. Wider participation from startups could improve utilisation of the PLI outlay, support faster local development of components, and better align policy incentives with the segments that currently drive EV growth in India.

2. Accelerating upstream ecosystem development

Localisation gaps remain most pronounced in upstream materials and electronics, which continue to have limited domestic capability.

- Domestic production of REPMs is likely to become increasingly important, particularly as India remains heavily dependent on Chinese magnets used in traction motors. Recent outreach to 14 countries by the Union Government also indicates a greater focus on attracting international partners to build domestic Neodymium iron boron (NdFeB) magnet manufacturing capability.[33]
- High-grade electrical steel (HGEL) used in some superior grade traction motors and certain power electronics applications is another area where domestic capability remains limited, with global production concentrated in China, Japan, South Korea, the US, and Europe.

[33] Financial Express. Centre reaches out to 14 nations, seeks participation in magnet scheme. 2 April 2026

- Greater local manufacturing of copper-intensive subcomponents and specialised electrical materials may also become important, given their growing contribution to motor and drivetrain costs.

Recent developments, such as the inauguration of Kaynes Semicon's Sanand plant, indicate early progress in building domestic capability in automotive chips and Intelligent Power Modules.[34] However, India still has limited local capability in automotive-grade power electronics. Without greater development of these core material segments, complete localisation of motors, inverters, and control systems will not be possible.

3. Improving cost competitiveness through scale and manufacturing transformation

Future localisation progress will also depend on whether local suppliers can become more cost competitive relative to imports from established manufacturing ecosystems such as China. At present, many Indian suppliers continue to face a 20–30% cost disadvantage due to lower production volumes, fragmented demand across OEMs, and limited vertical integration.[35]

- Greater component standardisation across OEM platforms could help aggregate demand and improve economies of scale for domestic suppliers.
- Wider adoption of common charging and component standards may become increasingly important, particularly in E2W and E3W segments, where fragmentation remains high.
- Brownfield conversion of existing ICE facilities into EV component manufacturing could improve capital efficiency and help suppliers scale up faster without requiring entirely new investment.

Recent initiatives such as Light Electric-Vehicle Acceleration Forum (LEAF) indicate growing industry recognition of the need for standardisation, especially in charging ecosystems for light EVs.[36] However, these efforts have not yet evolved into a broader policy framework covering other components. Faster progress in standardisation and manufacturing integration is likely to play an important role in reducing costs and improving supplier competitiveness over the long term.

Conclusion

Localising EVs follows a markedly different trajectory than localisation in the conventional automotive sector. For ICE vehicles, India's strengths in cost-effective labour, metalworking, and a robust supplier base enabled the country to localise mature mechanical systems with relative ease. In contrast, EVs depend far more on advanced technology, making localisation more about access to innovation and expertise. While lower-value EV components can be localised quickly, deeper

[34] Press Information Bureau. Prime Minister Shri Narendra Modi inaugurates the Kaynes Semicon Plant at Sanand, Gujarat. 31 March 2026.
[35] Vertical integration refers to the extent to which a company manufactures key materials, subcomponents and processes internally rather than sourcing them from external suppliers.
[36] ET Auto. LEAF Forum debuts to unify EV charging standards for light electric vehicles. 30 March 2026.

localisation in complex electronics will demand major investments in R&D, advanced manufacturing, critical materials, and international engineering collaborations.

Systems such as powertrain components, power electronics, and charging equipment could achieve over 90% of domestic content in the next five years, supported by recent investments and supplier expansion plans. However, complete localisation will remain challenging, as a large share of value in these systems continues to come from imported automotive chipsets, rare-earth magnets, and other specialised materials. This creates an important distinction between localisation and domestic value capture, since a component assembled in India may still depend heavily on imported parts. As a result, high localisation percentages may not necessarily mean that most of the value is being created within India.

Recent manufacturing investments are increasingly focused on components that account for a larger share of EV value instead of conventional fabrication and assembly. This suggests that supplier investments are gradually moving closer to core EV technologies. Moreover, the next phase of localisation would see more partnerships between OEMs and global suppliers, similar to collaborations such as Valeo and Mahindra, where components are manufactured locally instead of being imported directly. Such partnerships can support higher DVA, strengthen local supplier ecosystems, and improve the utilisation of policy incentives such as the PLI Auto scheme.

India's long-term competitiveness would depend on mastering the root-level technology that defines an EV. While component-level manufacturing is growing, the highest value is captured by countries with deep expertise in product design, power electronics, and advanced materials. For India to evolve into a globally competitive hub rather than only a local assembly base, it must shift focus towards indigenous R&D and intellectual property. By investing in fundamental research in semiconductors, magnets, and control systems, as established EV leaders have done globally, India can reduce its reliance on the global upstream ecosystem and secure its position as a self-reliant technology creator.

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