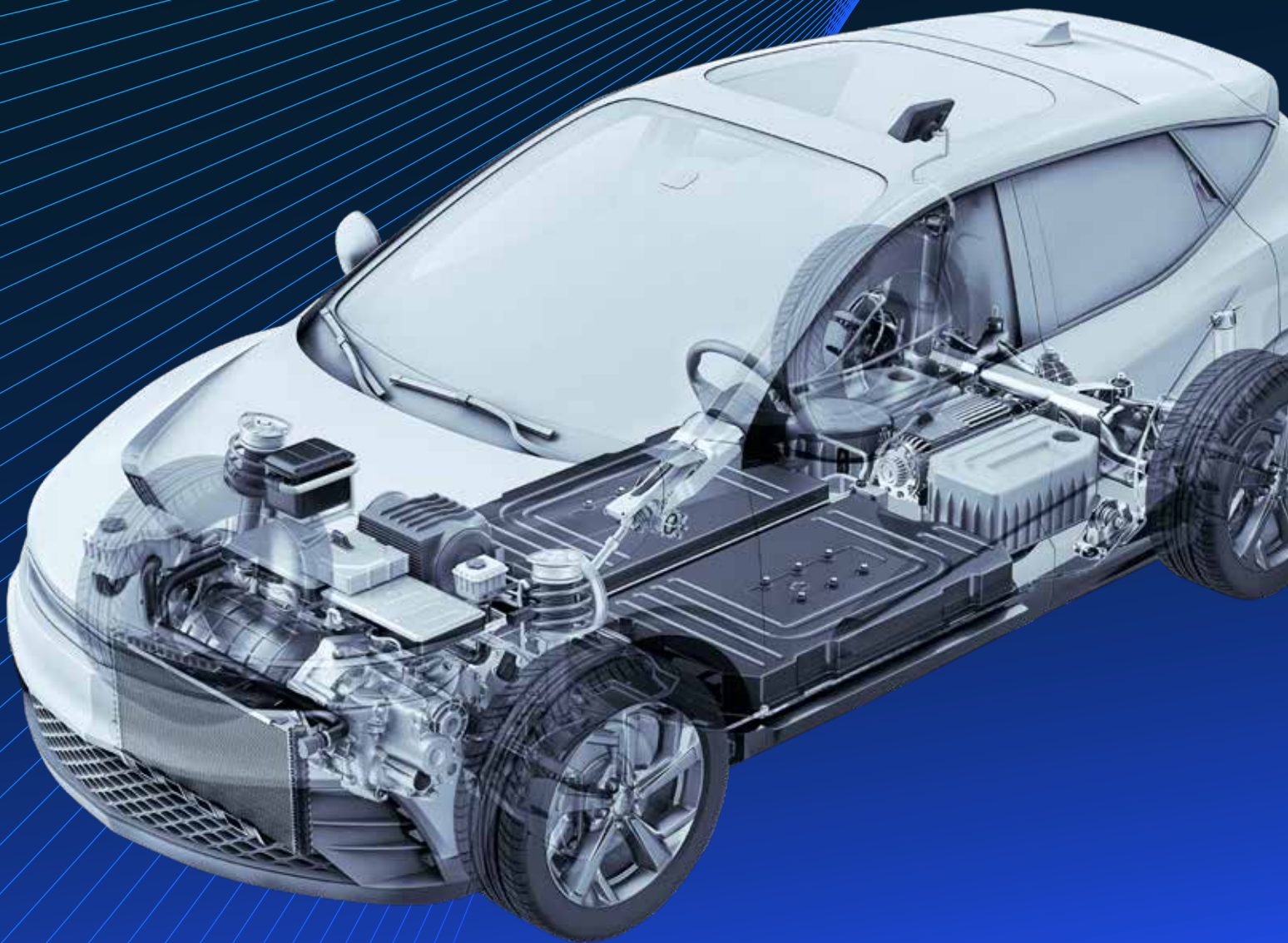


McKinsey
& Company

The future of mobility: Transforming to be ahead of the opportunity

September 2022



The future of mobility: Transforming to be ahead of the opportunity

September 2022

Authors

Jhankar Basu

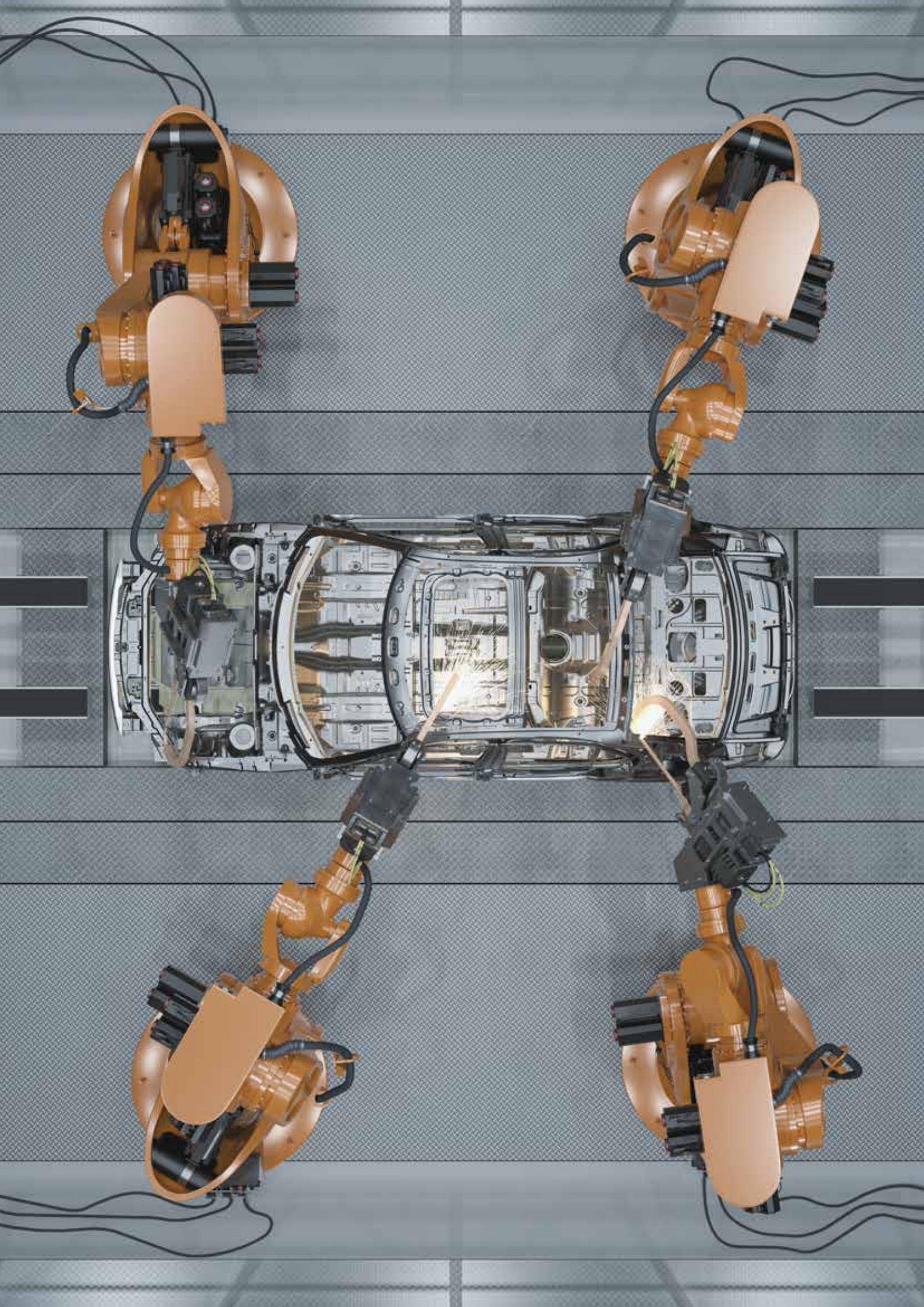
Brajesh Chhibber

Rajat Dhawan

Shivanshu Gupta

Srikant Inampudi

Ramesh Mangaleswaran



Acknowledgements

We thank the Automotive Component Manufacturers Association of India (ACMA) for inviting our perspective on the future of mobility in the context of the potential disruptions in this space, on the occasion of the 62nd annual conference organized by ACMA.

Our sincere thanks to the ACMA leadership, particularly Sunjay Kapur, Shradha Suri, Vinnie Mehta and the ACMA Secretariat for supporting us through this effort. Several industry leaders contributed valuable perspectives as we developed this report, and we are grateful for their guidance.

The report was made possible through the efforts of the McKinsey working team of Samarth Agarwal, Rohan Sahni and Gandharv Vig. Avneet Choudhary, Gourav Ganguly, Mohit Khatri and Chitradeep Sen also extended valuable support on much of the analysis shared in this report. We thank Anamika Mukharji from the Client Communications team and Rohan Moorthy, Fatema Nulwala and Raksha Shetty from the External Communications team for their editorial expertise and guidance. We also thank Anand Sundar Raman and Gurpreet Singh Bhatia from the Visual Aids team for the design of this report.

Authors

Jhankar Basu

Associate Partner

Brajesh Chhibber

Partner

Rajat Dhawan

Senior Partner

Shivanshu Gupta

Senior Partner

Srikant Inampudi

Senior Partner

Ramesh Mangaleswaran

Senior Partner



Contents

Executive summary	1
The bend in the road: Disruptions and new possibilities	5
The transformative choices ahead: Strategies to ride the EV disruption	13
Stakeholders as enablers in this transformation agenda	25



Executive summary

The global automotive industry has demonstrated great resilience over the last two years. The pandemic and, more recently, the war in Ukraine, exacerbated the slowdown in global sales that had set in before COVID. However, despite near-term supply disruptions, the long-term prospects for the industry remain strong. Global sales of passenger vehicles are expected to rebound to peak levels by the middle of this decade. Emerging markets such as India will lead the way, along with China.¹

While there is cause for optimism, the push for clean mobility and corresponding growth in the adoption of electric vehicles (EVs) could disrupt the automotive landscape over the course of this decade. Europe and China are expected to be frontrunners in this shift, with the rest of the world following suit eventually.

In India's case, the total cost of ownership is likely to be more attractive for electric two- and three-wheelers² (E2W, E3W), than for passenger or heavy commercial vehicles (PV and HCV). Sales of new E2Ws and E3Ws could grow to 50 percent and 70 percent respectively by 2030. Internal combustion engines (ICE) will continue to dominate the Indian PV and HCV landscape, with slower electrification. Electric PVs and HCVs are expected to account for 10 to 15 percent and 5 to 10 percent of new vehicle sales respectively by 2030.

According to early estimates, a transition to EVs could impact up to 50 percent of ICE bill of material (BOM) components. This could disrupt the portfolio of incumbents in traditional ICE component categories. This disruption could be an opportunity too – creating multiple whitespaces for companies to cater to the new EV BOM needs and generate avenues to serve markets outside India in both ICE and EV component categories. These will represent new or expanded value pools, which players can capture by pivoting and diversifying with agility.

For Indian automotive component manufacturers to adapt to these shifts, we have outlined three broad strategy frameworks which they could customize to their unique starting points, capabilities and challenges:

- Continuous improvement and expansion in traditional ICE play within India – a USD 35 to 45 bn opportunity by 2030
 - Broaden across opportunities within the automotive market, e.g., 2W/3W suppliers (facing early electrification) pivoting into segments that are going to gradually electrify (e.g., PV/HCV).
 - Capture opportunities in automotive-like adjacent sectors, e.g., construction and mining equipment, rolling stocks for railways/metros, defence sector, etc. – all of which are growing and have a sizable market.

¹ Unless otherwise indicated, all figures for the automotive industry and electrification are projections by the McKinsey Center for Future Mobility, detailed in Chapter 1.

² *Global Two-wheeler Outlook 2022*, Frost & Sullivan report, <https://store.frost.com/global-two-wheeler-outlook-2022.html>

- A global expansion within current ICE categories – a USD 35 to 50 bn opportunity by 2030
 - Expand exports on the strength of shifting supply chains, as companies seek greater resilience by diversifying beyond traditional geographies. Indian companies could capture opportunities in areas where India has traditional advantages and exports are growing faster than competing suppliers from other geographies. These include categories such as forgings, castings, gear box parts, suspension parts, axles, wheel rims, etc.³
 - Make the most of the global component manufacturing rebalancing opportunity due to electrification. With faster EV penetration, the US and EU markets will likely lose economies of scale to locally manufacture traditional component categories (forgings, castings, etc.) due to low demand volumes and high variety. India-based players could serve these markets, leveraging the lower-cost labour advantage.
- Innovation in newer opportunities and a global play – a USD 25 to 40 bn opportunity by 2030
 - Occupy emerging white spaces in EV categories, e.g., supply chain of battery cell, battery pack manufacturing, e-motor supply chain, e-axle/reducer, electricals and electronics for EVs and charging infrastructure.
 - Expand into downstream service use-cases and their delivery, especially connectivity, where India has advantages to make a global play – software capabilities, application engineering capabilities and lower cost base.

This transformation to stay ahead of upcoming disruptions could be a success for the Indian automotive industry with the concerted support of all stakeholders.

- The government could spur local manufacturing and exports through a few specific actions:
 - Provide incentives targeted at the respective stakeholder groups, e.g., purchase-linked export-incentives for International Purchase Offices (IPO), purchase-linked incentives for original equipment manufacturers, export incentives for component manufacturers, etc.
 - Support companies to access technology through enabling tie-ups and joint ventures, and further incentivizing investments in innovation.
 - Institute trade agreements (e.g., FTAs) and reforms.
- Specifically for tapping the exports opportunity, a dedicated multi-stakeholder task force (comprising ACMA, SIAM and the Government of India) could systematically enable and empower industry players, e.g., through OEM connects, cross-border M&A, shifting of manufacturing, policy support, trade agreements, etc.
- The supplier community could embrace and invest in new technologies, quickly upskill their managerial and labour force, and drive localization by forging strategic partnerships and taking advantage of government incentives.

Disruptions, especially through the electrification of mobility, are inevitable. While this disruption brings some headwinds, it also presents new possibilities for Indian suppliers to expand both domestically and in global markets, in traditional categories and in newer EV segments. Indian auto component manufacturers could benefit from dedicating management bandwidth and resources to proactively harness these opportunities in the future of mobility.

³ Based on analysis of 6-digit EXIM (HSN code) data



1

The bend in the road: Disruptions and new possibilities

Global automotive sales could regain their historic peak by the mid-2020s, led by China and emerging markets, including India. These figures had peaked in 2016, then slowed down due to a supply chain shift, and and subsequently been beaten down by the COVID-19 pandemic.⁴ As the sales figures start to climb again, it will be important for players to anticipate and prepare for disruptions caused by the gradual adoption of electric mobility – which could sweep different geographies at different speeds.⁵

A gradual resurgence to historic sales peak

Multiple case scenarios developed by the McKinsey Center for Future Mobility project that global automotive sales will return to their historic peaks by the mid-2020s (Exhibit 1). China, along with emerging markets (including India) is expected to lead this resurgence, whereas developed markets including the US and Europe are past their peaks already.

The projected growth of the global two-wheeler (4 to 5 percent CAGR) and three-wheeler (2 to 3 percent CAGR) markets over this decade will scale new heights in sales, largely in high-growth markets such as South Asia, ASEAN, Africa and Latin America.⁶

The rise of electric mobility – disruption and opportunities⁷

Even as global automotive sales see a resurgence, the industry could expect a disruption from the upswing in electric mobility, primarily due to four factors:

1. **A drop in battery costs** will make total cost of EV ownership more attractive, e.g., the production cost of the NMC (Nickel, Manganese and Cobalt) cell could fall at 4 percent YoY till 2025.
2. **The development of the battery cell manufacturing supply chain** will ensure more than sufficient production to meet demand, e.g., by 2030 demand could be for 4,500 GWhr whereas the potential supply could be at 5,600 GWhr. Lithium availability will not be a bottleneck in the mid-term. Supply challenged elements will be Cobalt and Nickel only, with potential mitigation from the use of iron-phosphate chemistries.
3. **The world will see growing consumer demand:** Consumers appreciate a broad palette of EV advantages and new EV segments are emerging to meet this demand – over 20 new E2W models are expected to launch before 2025.

⁴ McKinsey Center for Future Mobility (Jun 22), IHS Markit (actuals)

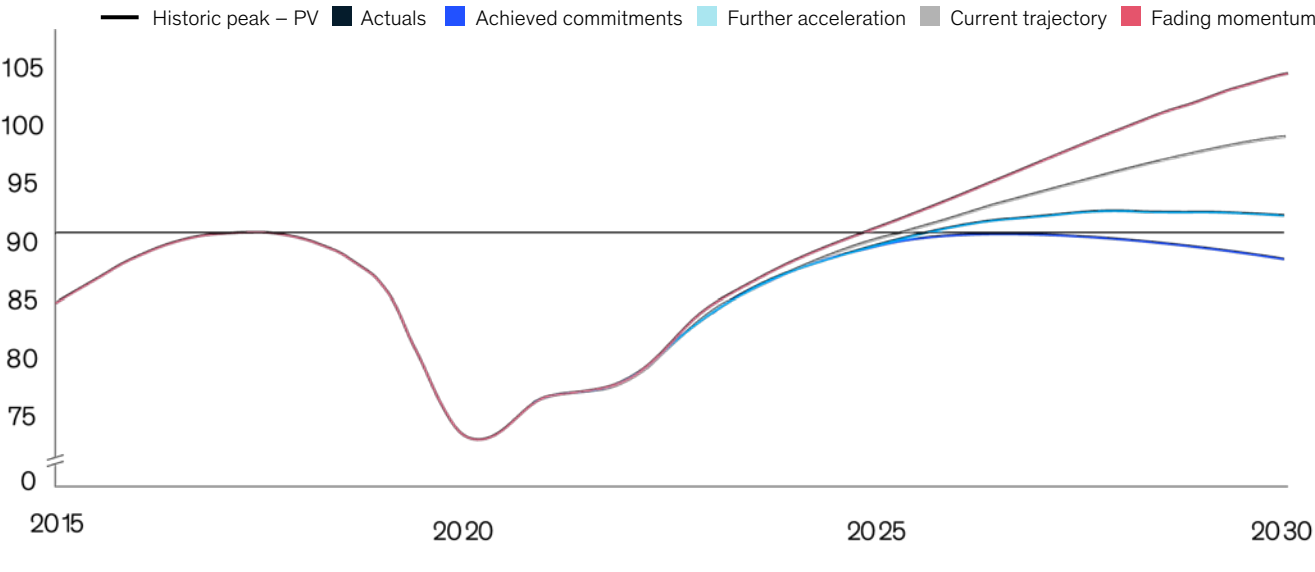
⁵ McKinsey Center for Future Mobility – McKinsey Electrification Model, IHS Markit

⁶ *Global Two-wheeler Outlook 2022*, Frost & Sullivan report, <https://store.frost.com/global-two-wheeler-outlook-2022.html>

⁷ Unless otherwise indicated, all numbers and projections in this chapter are insights from the McKinsey Center for Future Mobility

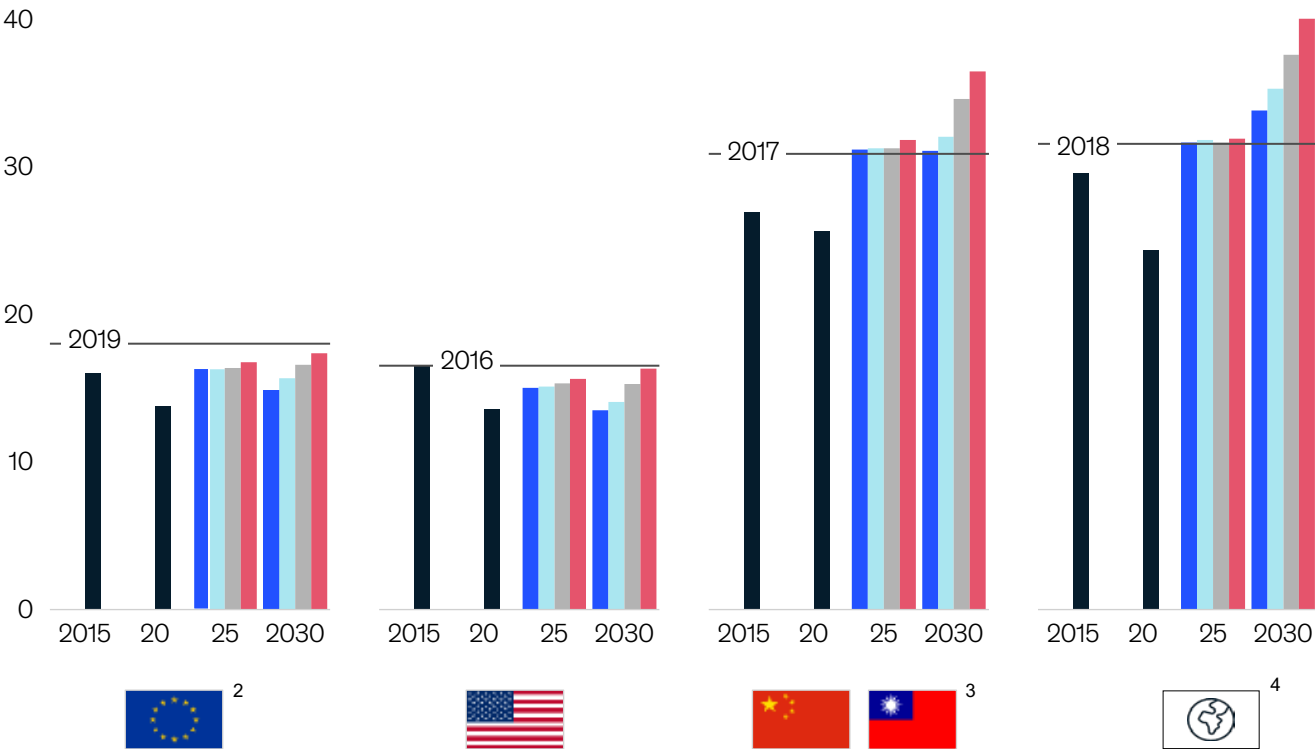
Global PV sales could see a resurgence, led by China and other emerging markets.

Light vehicle sales¹ globally, in million vehicles



Scenario description (based on net-zero commitments)

Fading Momentum	Current Trajectory	Further Acceleration	Achieved Commitments
Fading momentum in cost reductions, climate policies and public sentiment will lead to prolonged dominance of fossil private transport	Current trajectory of EV/AV cost decline continues, however currently active policies remain insufficient to close gap to net-zero	Further acceleration of transition driven by country-specific commitments and technology, though financial restraints remain	Net-zero commitments achieved by leading countries through purposeful policies, followers transition at slower pace



1. GVW <3.5 t.
2. EU incl. European Union, United Kingdom, Switzerland, Iceland, Norway.
3. Mainland China and Taiwan.
4. All other countries not incl. in EU, USA, China & Taiwan.

Source: McKinsey Center for Future Mobility (Jun 22), IHS Markit (actuals)

4. **A mix of government incentives (such as FAME and PLI) and regulations (such as CAFÉ norms)** could influence the mix of powertrain technologies by incentivizing EV vehicle production and sales. In large geographies like the US, EU and China, regulators are already setting steep targets for EV adoption based on the respective government's net zero targets. This is also likely to prompt greater electrification of mobility, with the near-total electrification of new car sales in the EU and China by 2035. The US could attain the same level possibly in the subsequent eight to 10 years (Exhibit 2).

Exhibit 2

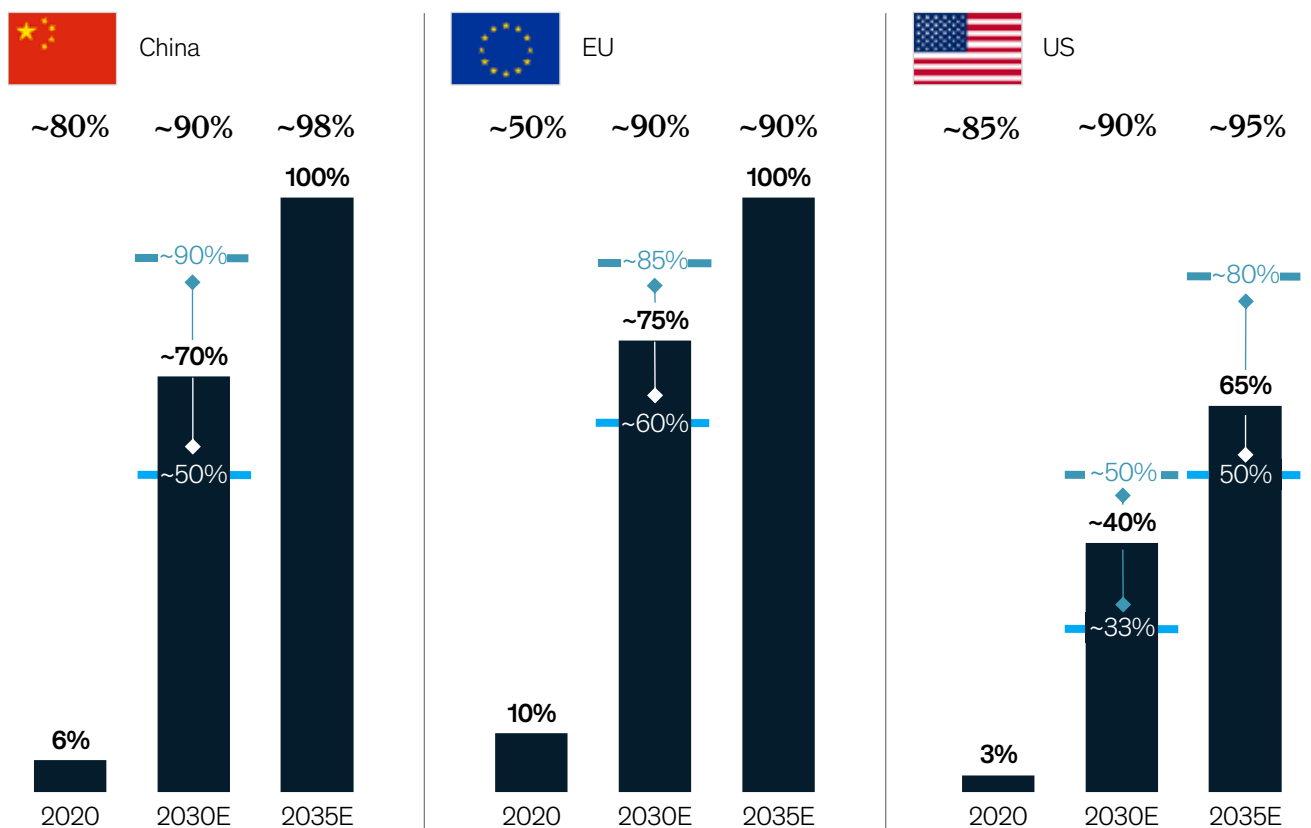
Steep regulatory targets for EV adoption could mean near-total electrification of new car sales in the EU and China by 2035.

EV (BEV, FCEV, PHEV) sales in percent of new passenger vehicle sales

2021 end update

Global EV adoption scenarios

~xx% BEV % in xEVs Net Zero Accelerated Reference



Scenario description

Net Zero

Net-zero commitments achieved by leading countries through purposeful policies, followers transition at slower pace

Accelerated

Most likely scenario in which consumer adoption will exceed country-specific regulatory targets, however insufficient for net-zero

Reference

Trajectory of EV penetration in which country-specific targets will be met, however insufficient to close gap to net-zero

Source: McKinsey Center for Future Mobility – McKinsey Electrification Model, IHS Markit

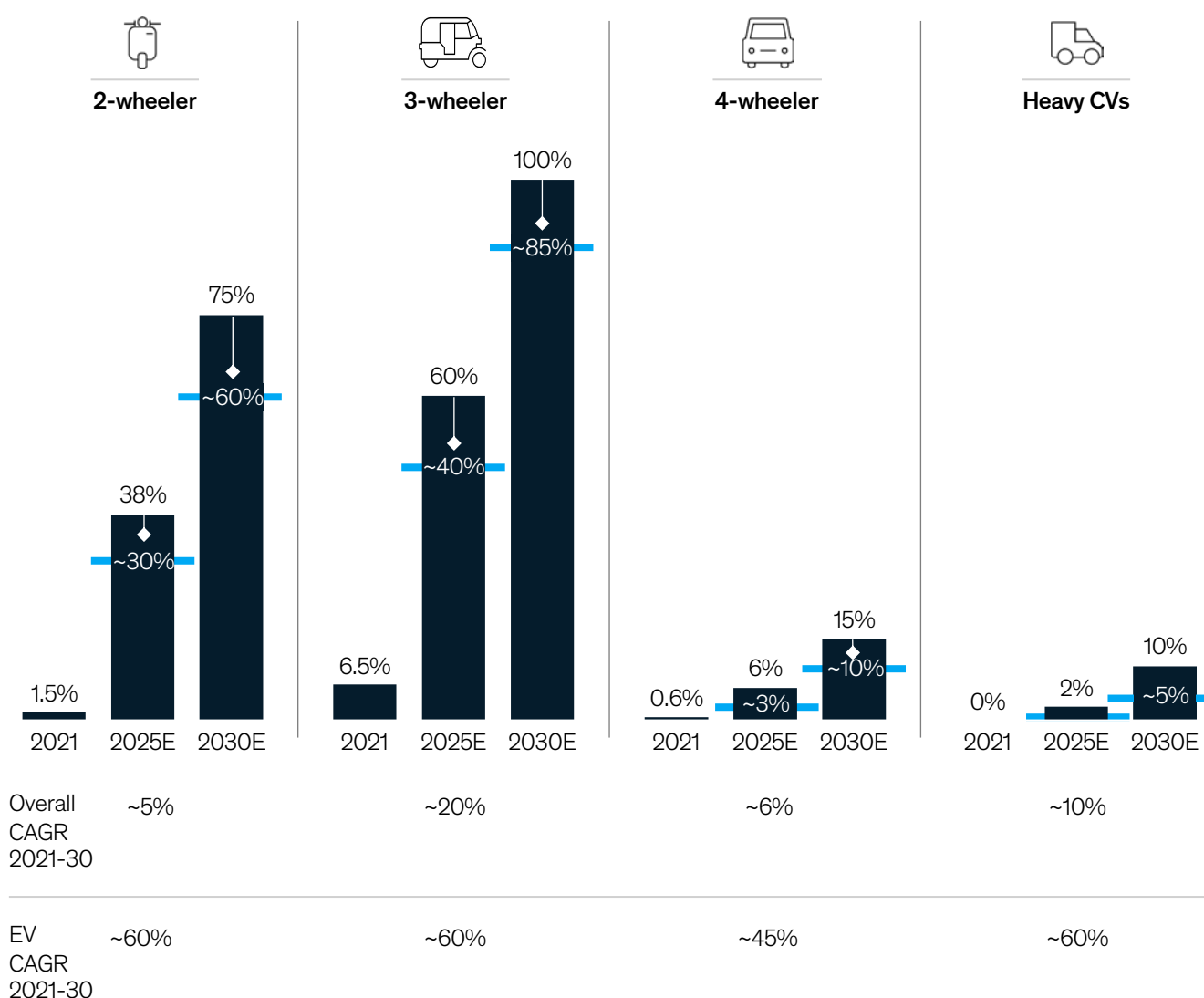
In India, smaller-sized vehicles will be on the fast lane to electrification (Exhibit 3), as electric two- and three-wheelers (E2Ws and E3Ws) are more effective on total cost of ownership. EV adoption in passenger vehicles (PVs) could lag behind these smaller vehicles since PVs require larger batteries, meaning a higher cost difference and longer pay-back periods.⁸ The widespread adoption of electric HCVs (heavy commercial vehicles) is expected to take the longest amount of time, given it is expected to take the route of hydrogen fuel cell EV technology - with higher fuel cell costs and hydrogen costs at the nozzle.

Exhibit 3

India is likely to see more electric 2W and 3W penetration than 4W and heavy CVs.

EV (BEV) sales in percent of new vehicle sales in India

■ Aggressive case adoption scenario ■ Base case adoption scenario 2022 update



Source: McKinsey Center for Future Mobility – EVOLVE EV forecast tool

⁸ Based on the BOM analysis of a leading Indian auto original equipment manufacturer in 2W/3W/4W.

New realities for automotive suppliers in an era of electrification

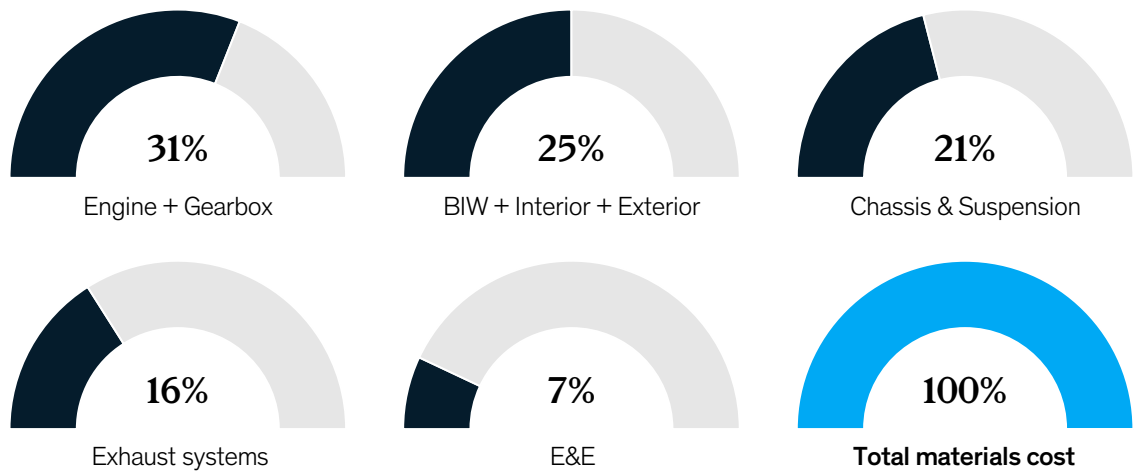
The rise of electrification across vehicle segments could directly impact the bill of materials (BOM) of vehicles. This could cause value to migrate across component categories, at different projected rates across vehicle segments, given that the uptake of E2Ws and E3Ws is expected to be higher than that of E4Ws or electric HCVs. Engines and associated powertrain components like fuel systems and exhaust systems will lead the transformation, and be replaced by battery, e-motor, e-axle/reducer and power electronics. Around 75 percent of the BOM in battery EVs consists of entirely new components (Exhibit 4),⁹

Exhibit 4

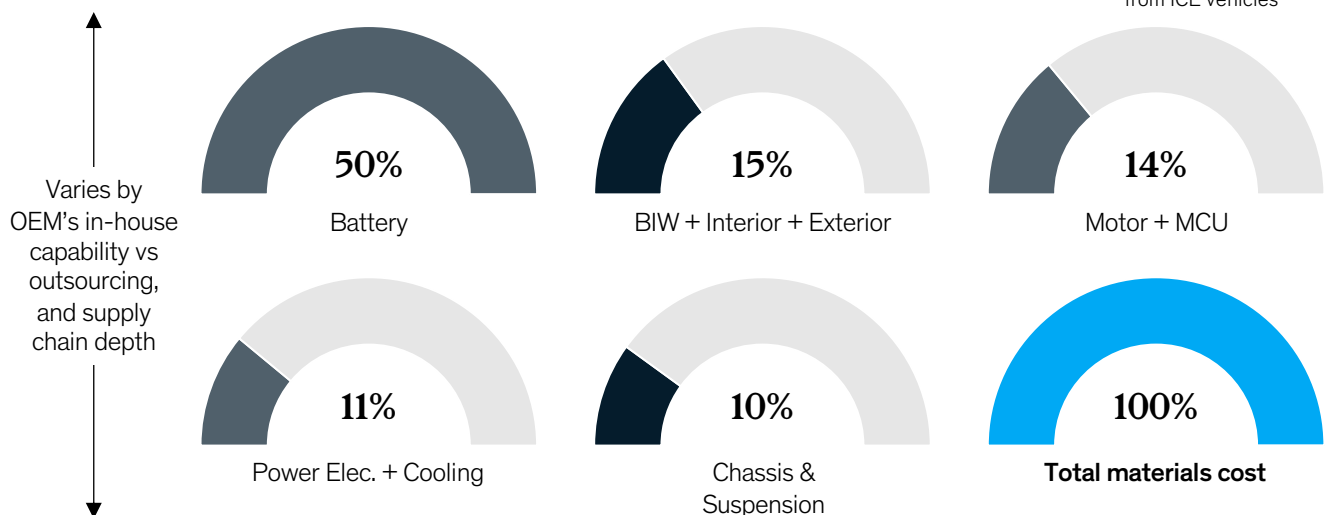
A rise in BEV adoption could disrupt the vehicle bill of materials.

% of costs (100% = Total materials cost), India estimates 2021 end

ICE Vehicles



BEV Vehicles



Note: Landed cost analysis restricted to ex OEM; Duties, subsidies, dealership markups, taxes excluded from analysis.

Source: BOM analysis of 4W from a leading Indian auto OEM

⁹ Based on the BOM analysis of a leading Indian auto original equipment manufacturer

EV adoption would affect the entire list of component categories – across plastics and rubber, pressing and fabrication, electronics and electricals, forging and machining, castings and proprietary components, and particularly component categories that are more focused on engine and powertrain (including engine auxiliaries), e.g., forgings, castings, etc. This impact could, however, also result in various additional opportunities for Indian auto component manufacturers, creating a larger value pool for them (Exhibit 5).

Exhibit 5

While electrification could disrupt traditional ICE categories, it also creates new opportunities and value pools.

Estimates Non-exhaustive xx Approx % of ICE BOM¹ ■ >85% of BOM value impact in EV² ■ <5% of BOM value impact in EV²

Component categories ⁴	2W		4W	
	Engine ³	Non-engine ³	Engine ³	Non-engine ³
Plastic & Rubber	■ 4%	■ 8%	■ 1%	■ 10%
Press & Fab	■ 4%	■ 23%	■ 6%	■ 13%
Electronics & Electricals	■ 9%	■ 5%	■ 5%	■ 17%
Forging & Machining	■ 7%	■ 5%	■ 5%	■ 5%
Proprietary ⁵	■ 10%	■ 5%	■ 14%	■ 8%
Castings	■ 13%	■ 7%	■ 10%	■ 5%
Total	■ 47%	■ 53%	■ 42%	■ 58%
	100%		100%	

New opportunities in EVs

Vehicle BOM opportunities:

- EV battery cells
- EV battery pack and BMS (excl. cell)
- E-motor
- Converter and on-board-charger
- E-axle/reducer (transmission)

Charging opportunities:

- Charging infrastructure (manufacturing & installation)
- Swapping infrastructure
- Charging services

1. Modelled on the analysis of a typical 2W (scooter) & 4W (diesel car) BOM – used to represent the broader 2W/4W market

2. % of BOM value impact in EV represents BOM % of traditional ICE components that would disappear in EVs (assumed in-wheel hub motor based E2W)

3. Engine represents powertrain related components including engine, engine control, exhaust, fuel systems, transmission; Non-Engine represents non-powertrain related components including BIW, brakes, suspension, steering, wheels, etc.

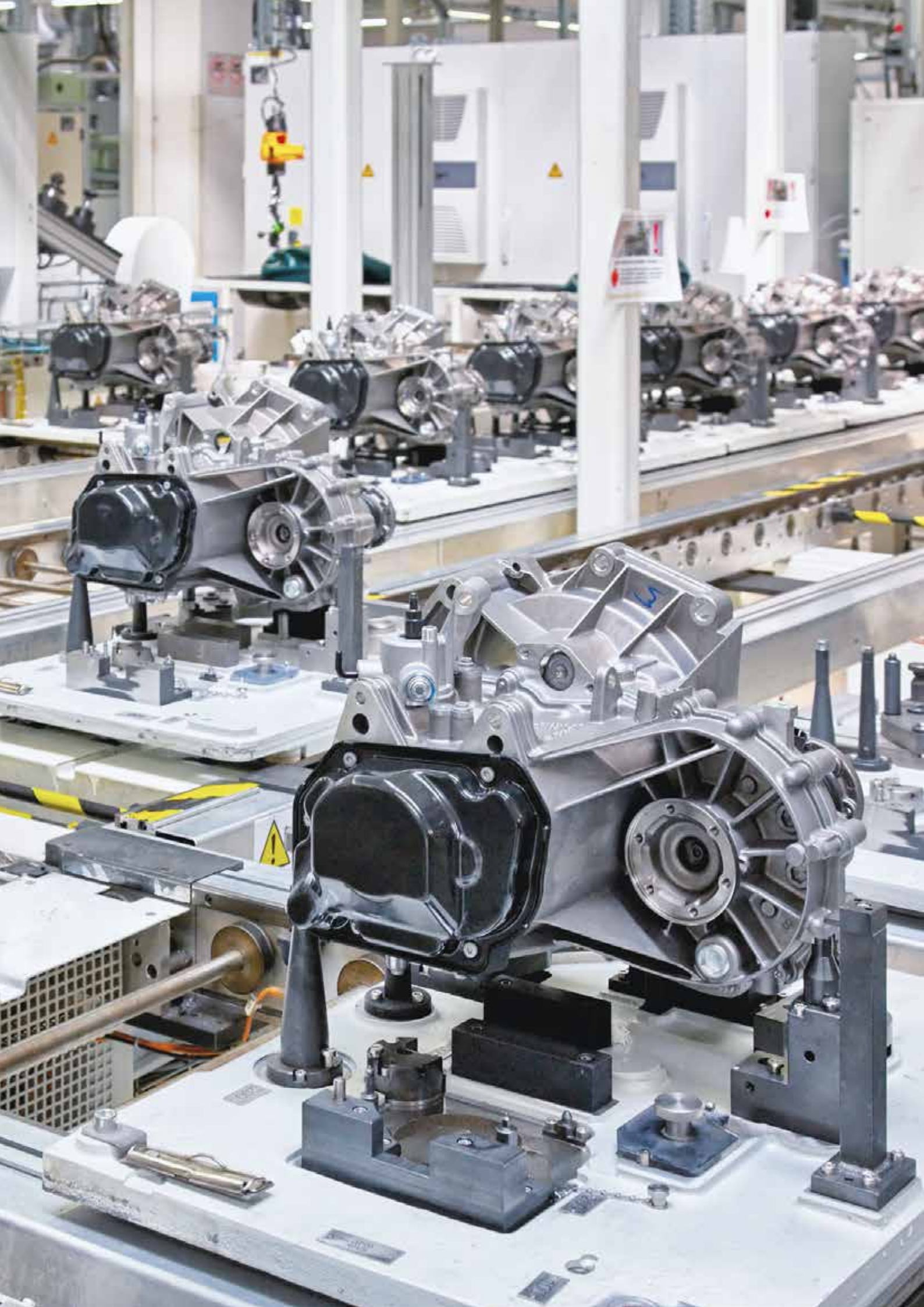
4. Component categories represented either by manufacturing process/capabilities or by material type used

5. Proprietary components require unique capabilities for suppliers including technical know-how, specialized materials, etc, having a high BOM contribution instead of the underlying manufacturing process itself

Source: BOM analysis of 2W & 4W from leading Indian auto OEMs

The proliferation of EVs could expand the overall BOM, creating a larger value pool for Indian automotive component manufacturers. New avenues could include EV battery cells, EV battery pack and BMS (excluding cell), e-motor, converter and on-board-charger, e-axle/reducer (transmission), and ecosystem opportunities, such as charging infrastructure (manufacturing and installation), battery swapping infrastructure, and charging services.

Automotive component manufacturers could see the rise of electrification as a disruption or as a new opportunity, making a strategic choice to benefit from a dynamic, evolving landscape.



2

The transformative choices ahead: Strategies to ride the EV disruption

Strategic choices could help Indian auto component manufacturers turn the disruption to their advantage. The six broad opportunities ahead translate to three strategic themes (Exhibit 6).

Exhibit 6

Three strategic choices for companies to tap new opportunities in a disrupted industry.

Early estimates

	Opportunity description	Incremental revenue pool creation till 2030, USD bn
'Continuous improvement and expansion' in the traditional ICE play in India	A Expand across opportunities within automotive market in India	15–20 ¹
	B Capture opportunities in adjacent, automotive-like sectors in India	20–25 ²
'Going global' within current categories	C Expand exports: Leverage tailwinds due to shifting supply chains	35–50 ^{3, 4}
	D Expand exports to OE/ Tier 1/ aftermarket: Tap the rebalancing of global manufacturing due to Electrification	
'Innovation' in newer opportunities and a global play	E Diversify into new EV categories	8–10 ⁵
	F Expand into downstream service use-cases and their delivery, esp. connectivity	20–30 ⁶

1. Opportunity size computed for ICE sales across India passenger vehicle (4W) & heavy commercial vehicle (HCV) markets, assuming representative BOMs & base case electrification scenarios.
2. Across 5 adjacent sectors - Construction & Mining Equipment, Power Generation – Diesel genset, Farm Equipment – tractors, Railway Equipment – rolling stock, Defence Equipment.
3. Computed for high and medium opportunity segments for India, wherein India – China CAGR > 2%, and assuming India would achieve half of China's 2021 market share by 2030 & category-wise export market size to remain constant.
4. Based on base case electrification scenario (current trajectory) for US & EU markets. Assuming E/G BOM (~47%: engine, transmission, gearbox, exhaust) to migrate to exports (50% of these components will be incrementally sourced through imports in US & 60% in EU); India to capture 25% - 40% of this incremental export's opportunity for the shrinking ICE markets in US and EU.
5. Assuming 20%-25% CAGR from 2025-2030 in the market size for the EV value pool beyond the INR 26.2k Cr (USD 3.28 bn) market size projections for 2025.
6. Assuming India can uptake 8-10% market share in the connectivity value pool by 2030, given the strength in IT / technology.

Continuous improvement and expansion in the traditional ICE play

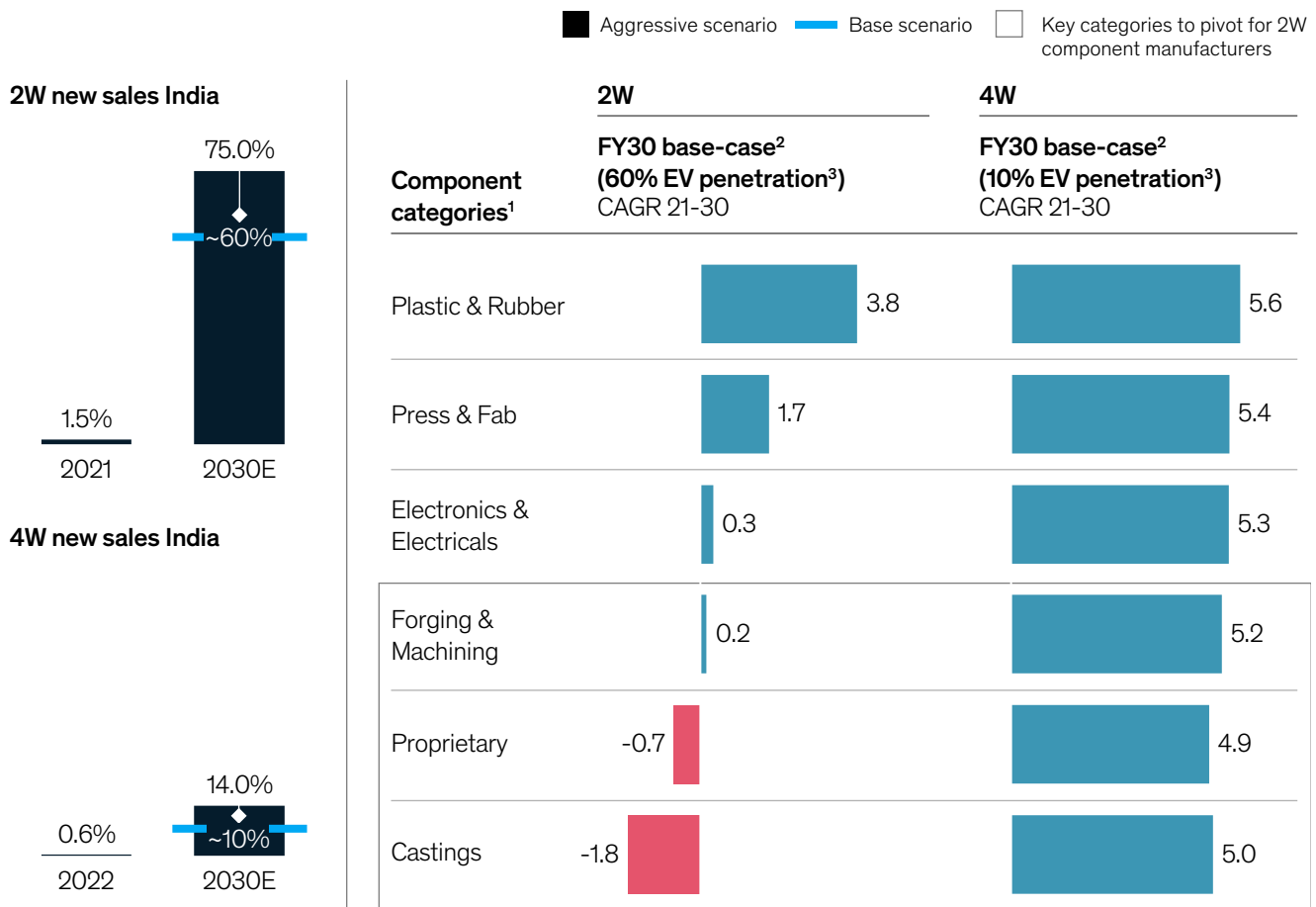
A. Expand across opportunities within the automotive market in India

E2Ws and E3Ws are projected to rapidly grow in India, which would affect suppliers serving these vehicle types. Suppliers could address this concern by pivoting their capabilities to expand into segments that are projected to continue growing, such as the traditional ICE passenger vehicle segment. For example, casting and forging – component categories projected to shrink/grow minimally in the 2-wheeler market with growing electrification – are expected to grow in the PV and CV market (Exhibit 7).¹⁰ Overall, while ICE for 2Ws is projected to de-grow at around 4.5 percent per annum till 2030, 4W ICE is expected to grow at around 4 percent per annum in that time.

Exhibit 7

Opportunity A

2W suppliers could pivot to growing 4W market in India to mitigate headwinds from electrification.



1. Component categories represented either by manufacturing process/capabilities or by material type used.
2. Modelled on the analysis of a typical 2W (scooter) & 4W BOM; 4W (diesel car) BOM estimated by scaling long tail of BOM (bottom ~14%) across categories in same proportion.
3. E2W & E4W penetration at 60% & 10% is as per the base case projections of the McKinsey electrification model for India.

Source: McKinsey Center for Future Mobility, BOM analysis of 2W & 4W from leading Indian auto OEMs

¹⁰ McKinsey Center for Future Mobility, BOM analysis of 2W & 4W from leading Indian auto OEMs

B. Capture opportunities in adjacent, automotive-like sectors in India












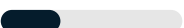



At least five automotive-type adjacent sectors – construction and mining equipment, power generation, farm equipment, railway/metro rolling stock, defence equipment – are in ascendancy due to their unique drivers for growth (Exhibit 8). These present opportunities for automotive suppliers as electrification disrupts the core automotive sector.

Exhibit 8

Opportunity B

Auto suppliers could deploy their capacities in multiple adjacent sectors with a significant market size in India.

Non-exhaustive

Adjacent sectors	CAGR for ICEs till FY30 Percent	Est. industry size in FY21 USD bn	Drivers of growth	
 Construction & mining equipment	 7-8	 ~5	Coal consumption to grow at ~4% p.a. to meet rising energy demand Push for 'Make-in-India' to drive manufacturing & mining at ~8-10% p.a.	INR 100Tn National Infrastructure Pipeline (NIP) Government measures to improve liquidity of NBFC sector
 Power generation – diesel genset	 5-6	 ~1	Construction sector expected to grow at 9-10% Healthcare to grow to 3X in 10 years; hospitals to grow 13-14% p.a.	Data center market expected to grow to 2X+ between 2021-27 Need to improve DISCOM health & infra to overcome continued power outages
 Farm equipment – tractors	 5-6	 ~11	Improved access to finance for farmers through NBFCs High-cost & poor availability of labour driving mechanization	High manufacturing costs in US/Europe Increasing MSP prices & higher demand of food
 Railway equipment – rolling stock	 7-10	 ~2.5	17,000 km of new tracks to be built by 2025 Rising passenger & freight traffic with increasing urbanization & rising incomes	Diamond Quadrilateral network of high-speed rail: connecting major metros Dedicated freight corridor: Six high-capacity, high-speed corridors
 Defence equipment	 7-10	 ~12	Defence Acquisition Procedure, 2020 (DAP 2020): minimum 50% indigenization Increase in FDI and encouraging technology transfer up to 100%	Opening defence R&D for industry, startups, and academia: ~25% defence R&D budget Innovations for Defence Excellence (iDEX) scheme involving MSMEs & start-ups

Source: Arizton Advisory (<https://www.arizton.com/market-reports/india-construction-equipment-market>), PS market research (<https://www.psmarketresearch.com/market-analysis/india-diesel-genset-market>), ICRA (<https://www.imarcgroup.com/farm-agricultural-equipments-industry-india>), Indian Railways Budget 2020-21, IBEF (<https://www.ibef.org/industry/defence-manufacturing>)

Adjacent to automotive manufacturing, these sectors have a similar (even higher) concentration of traditional component categories like forgings/castings (Exhibit 9). Disruptions in these sectors open doors for automotive suppliers to challenge incumbent companies:

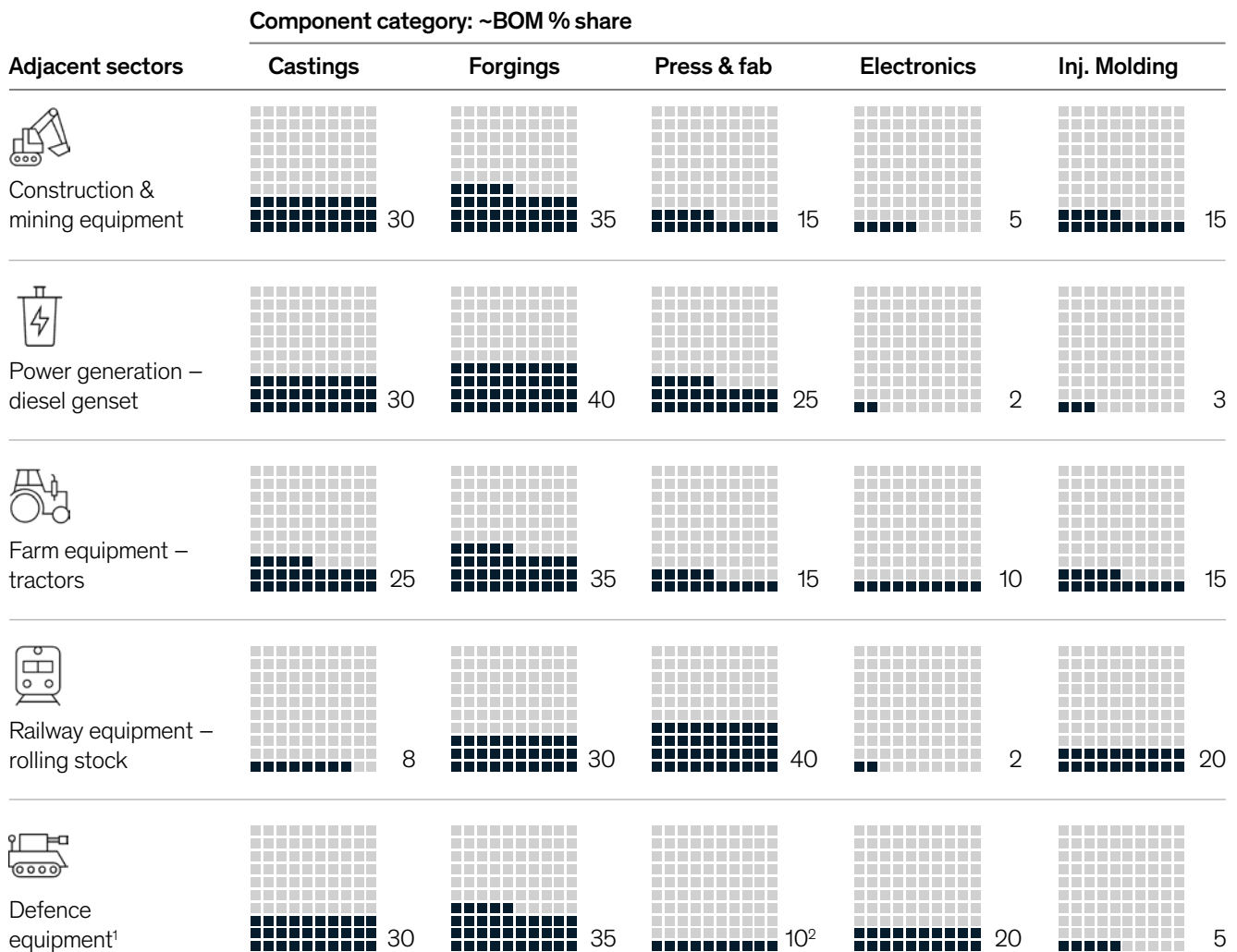
- Evolving regulatory measures, such as emission norms for construction vehicles and tractors (CEV, TREM), and other safety norms require companies to innovate. Automotive manufacturing companies entering these spaces could disrupt incumbents by bringing better innovation, faster.
- Changing architectures (e.g., fuel injection in smaller tractors, CNG migration in power generation) could require suppliers to develop new technologies, again creating avenues for new entrants to carve a niche for themselves.
- Automotive suppliers could benefit from the growing investments for ‘Make in India’ and new PLI incentives to boost the MSME sector.

Exhibit 9

Opportunity B

Automotive-adjacent sectors present a significant market size for component categories affected by growing electrification.

Estimates



1. Defence equipment represented by a land system example, i.e., battle tanks.

2. Proprietary processes (laser cutting, plasma, water jet etc.) are required for defence equipment manufacturing given special material usage such as Titanium alloys, etc. and a lower scale of manufacturing.

Source: Expert interviews

Going global within current categories

C. Expand exports on the back of shifting supply chains

Over the last few years, geopolitical forces have impacted global trade relations across key markets such as the US, EU and China. Most recently, the pandemic and the war in Ukraine also disrupted the global supply chain. As major companies seek greater resilience by diversifying beyond traditional geographies, Indian component manufacturers could step in as an alternative, growing their presence across categories and establishing a competitive advantage.

An analysis of non-nearshore auto-component imports into the US and Europe indicates that China, a leading supplier to the world, has more than five times the market share of India. A closer look indicates that Indian exports have begun to grow at a much faster rate in select categories, such as gearbox parts, wiring harness, brakes/clutches and bearings (Exhibit 10), especially over the last few years. With more supply chain shifts, a significant share of the migrating business could come to India, which constitutes a large opportunity.

Exhibit 10

Opportunity C

Indian suppliers could further expand exports in categories where India has been growing at a fast pace.

2021 EXIM data (vs 2016)

High opportunity components for India (China share >25% | India CAGR > China CAGR) Moderate opportunity components for India (China share <25% | India CAGR > China CAGR)

Category	Imports ¹ size, \$ bn	China share, percent	India share, percent
Engine - Fuel system & exhaust parts	42.6	31	4
Cabin & load body	25.0	31	3
Engine/Engine components	23.8	16	4
Gear box parts	20.5	16	6
Engine - Electricals	18.5	37	4
Heavy vehicle parts – Others ²	14.8	31	7
Cabin electricals	14.0	20	1
Other articles of iron or steel ³	10.1	52	5
Wiring harness	9.7	6	2
Brakes & clutches	9.3	41	7
Bearings	8.6	34	8
Rubber components	8.5	26	6
Wheel rims	6.2	40	2
Suspension	5.3	34	5
Axles	5.3	16	11
Glass & mirrors	4.0	50	2
Steering parts	3.2	24	5
Shafts	3.0	23	12
Non motorized vehicle parts – Others ⁴	2.9	34	1
Others ⁵	2.9	25	6
Light vehicle parts – Others ⁶	2.3	28	3
Grand total	240.6	28	4.6

1. Non-nearshore imports excludes imports from North America (Mexico/Canada) for US and imports from western Europe, eastern Europe & Scandinavia for Europe
2. Heavy vehicle parts – Others includes HSN codes 870899, 870990 & 871690: parts and accessories, for tractors, large motor vehicles, self-propelled works trucks, trailers and semi-trailers, etc.
3. Other articles of iron or steel includes HSN codes 732619 & 732690: articles of iron or steel, n.e.s. (excluding cast articles or articles of iron or steel wire)
4. Non motorized vehicle parts – Others includes HSN codes 871420 & 871499: parts and accessories for carriages for disabled persons & bicycles, n.e.s.
5. Others includes HSN codes 731822, 731823, 731824, 731829, 848410, 848420, 848490: washers / rivets / cotters & cotter pins / non-threaded articles/ gaskets / seals/etc. of iron or steel.
6. Light vehicle parts – Others includes HSN code 871410: parts and accessories of motorcycles, incl. mopeds, n.e.s.

Source: 6-digit EXIM (HSN code) analysis

D. Expand exports to global OE/Tier 1/aftermarket, as manufacturing rebalances due to electrification

Both the US and Europe are expected to see a significant increase in electrification over the course of this decade, and a corresponding drop in ICE volumes. Certain components could see significant de-growth as a result. For example, increased EV penetration is expected to impact forging component volumes (Exhibit 11).

As the market transforms to low volumes and high variety, local suppliers in the US and Europe could lose economies of scale. The supply for these components may then gradually move to new destinations that specialize in labour-intensive manufacturing.

Emerging economies such as India, with the advantage of low labour costs, could benefit from this shift. Indian SMEs could capture an incremental USD 20 bn to 30 bn by 2030.

Exhibit 11

Opportunity D

India could benefit from low labour costs and target high-variety, low-volume manufacturing.

Example of growth scenarios for forging components with electrification of a global 4W

Non-exhaustive

Components ¹	Scenario 1 (16% EV penetration) IHS current projections, CAGR 21-25	Scenario 2 (24% EV penetration) 2% incremental CAGR of EVs, CAGR 21-25
Differential gears – Large	4.33	5.2
Differential gears – Medium	3.79	3.9
CPM – Suspension ³	2.70	2.7
Transmission gears	1.71	0.5
Pinions	0.81	-1.7
Transmission shafts	0.71	-1.5
Annulus ring gears	0.57	-1.5
Hypoid ring gear	0.24	-2.2
CPM – Engine Products ³	-0.03	-2.6
Differential gears – Small	-0.17	-0.1
Balance shafts ²	-0.31	-2.9
Axle shafts	-0.49	-1.3
Connecting rods	-1.22	-3.7
Valve bodies/control	-1.66	-4.1
CVT pulleys	-2.39	-4.9

1. Includes forging, connecting rod, and machining balance shaft and valve bodies/control products

2. Balance shaft production concentrated in Bolingbrook

3. For CPM: Overall market volume growth assumed for suspension products and ICE vehicle growth assumed for engine products

4. Range of electrification across 3 EV penetration scenarios: reference, accelerated, net zero case

Source: IHS Light Vehicle Powertrain + Alternate Propulsion Forecast, Jan 2021; AAM 2025 strategy work; MF capacity utilization, data from Dec 2020

With significant export opportunities on the anvil, a concerted effort by stakeholders could make India a globally preferred manufacturer. Suppliers, industry bodies (ACMA, SIAM) and the government will need to work together to seed and grow specific initiatives supporting these export opportunities.

The industry could benefit from targeted incentives to help companies grow exports:

- **For International Procurement Offices (IPOs):** Purchase-linked export-incentivization schemes could encourage them to purchase more from India or grow the exports of components by an OEM.
- **For OEMs:** Production linked incentives (PLIs) could be instrumental in overcoming certain cost disabilities (e.g., logistics costs) targeting certain vehicle segments for global exports.
- **For component manufacturers:** Incentivizing an increase in sales of manufactured goods from India for domestic and global consumption, and PLIs to overcome cost disabilities could be empowering.

Innovation in new opportunities and a global play

E. Diversify into new EV categories

While the proliferation of EVs might shrink some of the traditional ICE categories, multiple new EV-specific component and service categories open up across the value chain (Exhibit 12).

Exhibit 12

Opportunity E

Automotive companies could tap opportunities in multiple component categories across their value chain.

Estimates

● High ● Low

Top opportunities	Feasibility		Key opportunities in the value chain, esp. for SMEs
	Manufacturing complexity	Technology know-how	
EV battery cells	●	●	Castings: battery pack casings, enclosures (if aluminium) Others: vibration pads, thermal sensor, PCM, signal wires, battery connectors, enclosures
EV battery pack and BMS (excl. cell)	●	●	
E-motor	●	●	Castings: motor casings; Forgings: shafts, bearings Extrusion: copper wire coils (drawing), electrical wires Others: steel laminations, connector plugs, rotors, magnets
Converter and on-board-charger	●	●	
E-axle/reducer (transmission)	●	●	Castings: gearbox casing Forgings: shafts Others: shifters
Charging infra (manuf. & installation)	●	●	Castings: casings Extrusion: wiring Others: switches, transformers

Source: McKinsey Center for Future Mobility – McKinsey Electrification Model

Most of these opportunity segments offer avenues for traditional component suppliers (including MSMEs) to play a role in an expanded value chain. For example, e-motor manufacturing requires multiple sub-components made through forging (e.g., shafts, bearings) and casting (e.g., casings) processes.

The biggest opportunity is in the battery cell value chain – a very specialized domain, with a high degree of manufacturing and technological complexity. By 2030, this value chain is expected to grow to USD 14 bn in India (Exhibit 13). This is a new white space where component suppliers could explore opportunities.

Exhibit 13






Opportunity E

Large opportunities emerging in global and India battery value pools, across the value chain.

Value pools along the battery value chain¹

Estimates

● 2025 ● 2030

	Key activities	Global value pool 2025 and 2030, in USD bn		India value pool 2025 and 2030, in USD bn	
 Raw material and refining	Mine and extract raw material Refine and process raw materials into usable products	~55	~123	~1	~4
 Active material and cell components	Chemically activate the raw materials Produce cathode, anode, electrolyte and separator materials	~23	~50	~0.4	~1.5
 Cell production	Manufacture battery cells Stack/roll cells in form factor (e.g., pouch, cylindrical, prismatic)	~64	~143	~1.3	~5.5
 Battery packaging and integration	Assemble cells into modules, and modules into packs Connect HW and SW into complete package	~50	~110	~0.8	~2.8
 Recycling and second-life	Reuse batteries for new purposes (second-life) or recycle components and materials in batteries	~7	~16	-	~0.4

1. Total value pool including import dependent inputs (e.g., Raw materials and semi-con).

Source: McKinsey Center for Future Mobility – Electric Vehicle Opportunity Landscape and Value Engineering; Advanced Cell Chemistry PLI, Ministry of Heavy Industries (GOI) (<https://heavyindustries.gov.in/UserView/index?mid=2487>)

F. Expand into downstream service use cases, especially connectivity

The increase in EV adoption is expected to be accompanied by big shifts in global value pools towards downstream services (Exhibit 14).

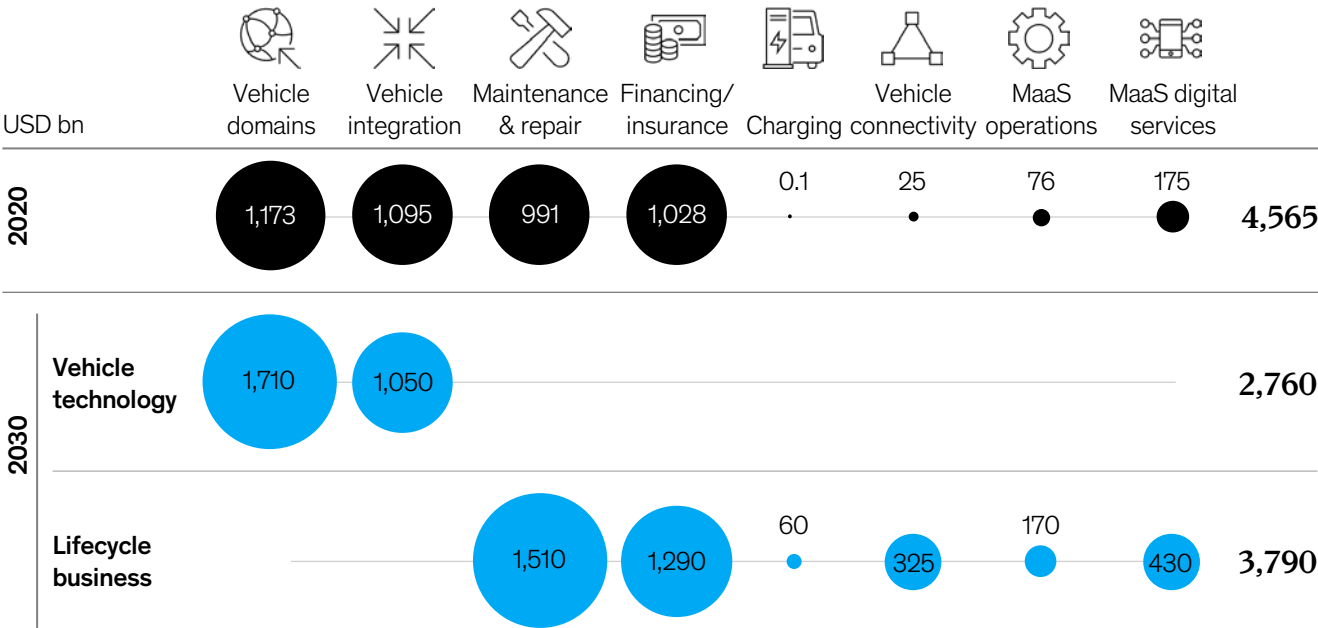
Some of these value pools, such as vehicle connectivity services, mesh very well with India's capabilities and starting position – deep software capabilities, application engineering capabilities, and lower cost base to serve the global markets.

Exhibit 14

Opportunity F

Value pools could shift globally, with a projected >10x growth in vehicle connectivity, from USD ~25 billion in FY20 to USD ~325 billion in 2030.

Reference scenario considering passenger transport and vehicles up to 3.5 tons



Source: McKinsey Center for Future Mobility

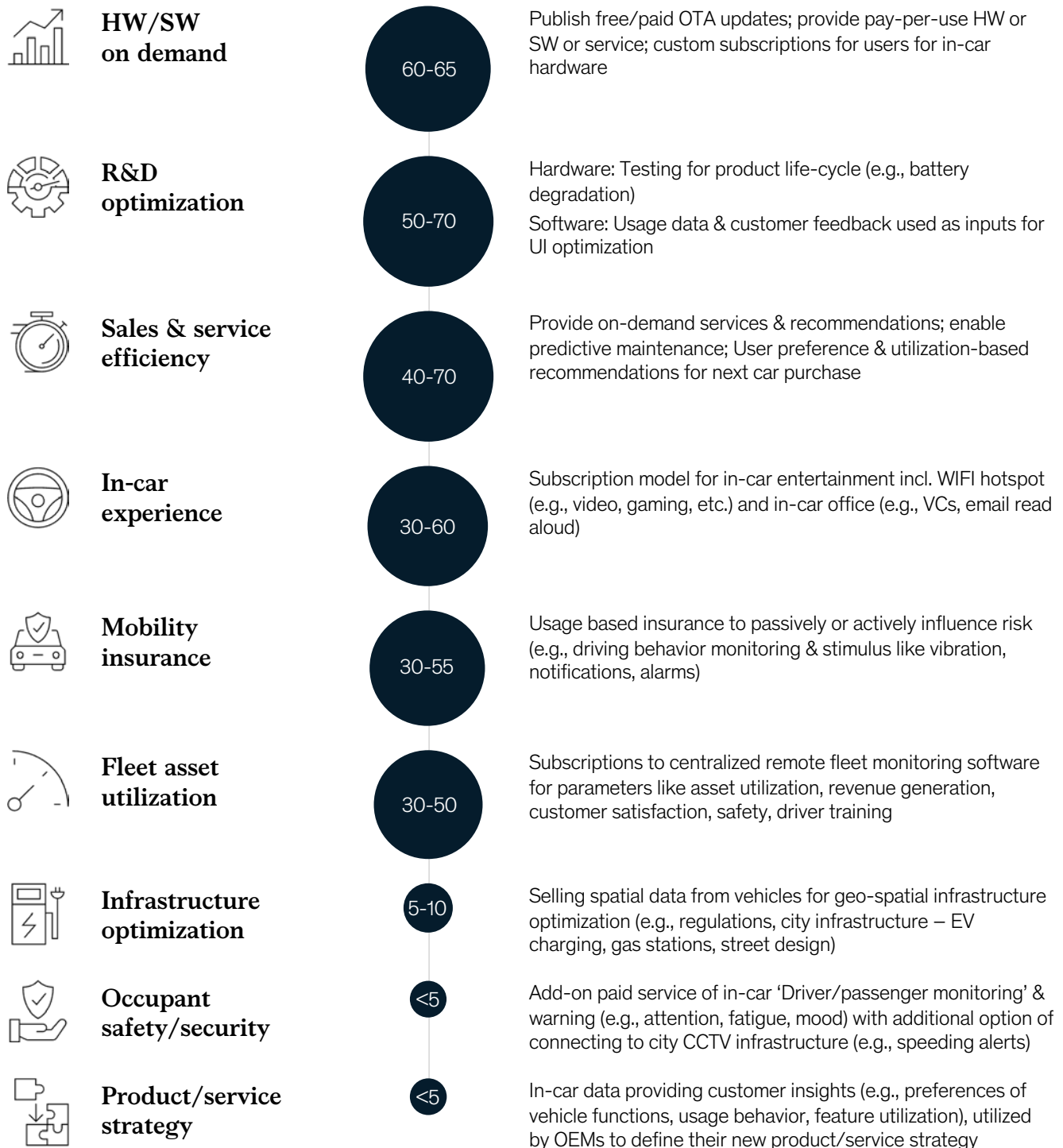


A double-click on this opportunity segment of vehicle connectivity shows scope for the global value pool to grow more than 10 times to be USD 250 to 400 bn by 2030. This could be a significant white space for new suppliers to enter and deliver value across nine use-case clusters (Exhibit 15).¹¹

Exhibit 15

Opportunity F

New suppliers could enter certain whitespaces and deliver value, potentially reaching USD 250 to 400 bn by 2030.



¹¹ McKinsey Center for Future Mobility.

MSME-focused possibilities for enduring growth








As EV adoption increases, MSME auto component players are expected to have a wide range of options to diversify their product portfolios towards de-risking and expanding their businesses. They can pro-actively identify their strategic play based on their unique starting points, context, and capabilities – exploring across automotives, adjacent auto-type sectors, global exports and new emerging opportunities such as EVs (Exhibit 16).

Exhibit 16

Opportunities for MSMEs to ensure enduring growth, through diversifying their product portfolios.

Illustrative example; each MSME player will require a specific answer basis its unique starting point and context

Non-exhaustive

		Potential opportunities to de-risk and expand			
MSME: 2-wheeler supplier with following play		Within broader automotive (4W/CV)	Adj. auto-type sectors (const, power gen, rail, etc.)	Global exports play	EV opportunities
Forging 	Shafts and rods 	Pinion shafts, rack bars, transmission shafts, cam shafts, piston rods, connecting rods	Differential gears, transmission gears, balance shafts, con-rods, PTO shafts	Piston rods for hydraulic application, cam shafts, forged racks,	E-motor shafts, reducer shafts, Drive gears, reducer gears
	Gears 	Pinions, suspension parts	Transmission gears, small differential gears, rolling-axle components	Transmission gears, pump gears, pinions	
	Engine small forgings 	Small-to-mid sized forgings for engine and transmissions, suspension components	Engine forgings, suspension components, small forgings for tracks	Transmission gears, pump gears, CVT pulleys, suspension parts	
Casting 	Engine small castings 	Small-to-mid sized engine & transmission castings, mounts	Engine & transmission castings, mounts, structural components	Levers, grab handles, mounts, small engine castings	Battery pack casing, enclosures, motor casings, gearbox castings, casings for charging infrastructure
	Housings and covers 	Suspension housings, caliper housings, mounting brackets, transmission housing	Valve bodies, pump covers, PTO Covers, NVH shields	Housings for hydraulic pumps, caliper housings, mounting brackets, transmission housing	

It will be important for all stakeholders to work together, enabling India's automotive component manufacturers to transform and capture the opportunities ahead.



3

Stakeholders as enablers in this transformation agenda

The success of auto component manufacturers in the face of EV-linked disruptions would not only enhance their growth and relevance, but also be a boost for India. It would consolidate India's position on the world map as a future-ready hub for manufacturing. This calls for a concerted effort by all stakeholders – across the government, industry bodies, OEMs and suppliers. Each of these could be a crucial enabler in helping the industry to prepare for its next phase of growth.

How the government could spur local manufacturing and exports

The government could undertake specific measures:

- **Introduce targeted incentives on both supply and demand side:** While existing incentive schemes are available to many, it will also be important to create targeted incentives for larger companies that have the scale, competitiveness, and capabilities to become global players. Such companies could also pave the way for a larger, thriving Indian ecosystem of component manufacturers. A mix of purchase-linked incentives for International Purchase Offices (IPOs), production-linked incentives for OEMs/suppliers and sales-value linked incentives for OEMs could be instrumental in providing local manufacturing a much-needed thrust.
- **Institute trade agreements and reforms:** The government could accelerate the growth of Indian automotive component exports through forging bilateral and multilateral Free Trade Agreements (FTAs) and enacting critical trade reforms.
- **Facilitate innovation:** As new-age technologies find applications in the automotive space, it is important to support them with an ecosystem that allows them to thrive and flourish. To foster innovation, the government may invest in deploying dedicated capability building programs focused on up-and-coming topics, such as a Centre of Excellence for Industry 4.0, Artificial Intelligence (AI)/Machine Learning (ML), analytics, cybersecurity and electronics. Establishing investment funds and incubation centres could go a long way to accelerate innovation for ACES (Autonomous vehicles, Connectivity, EVs and Shared Mobility).

How industry bodies could support automotive manufacturers

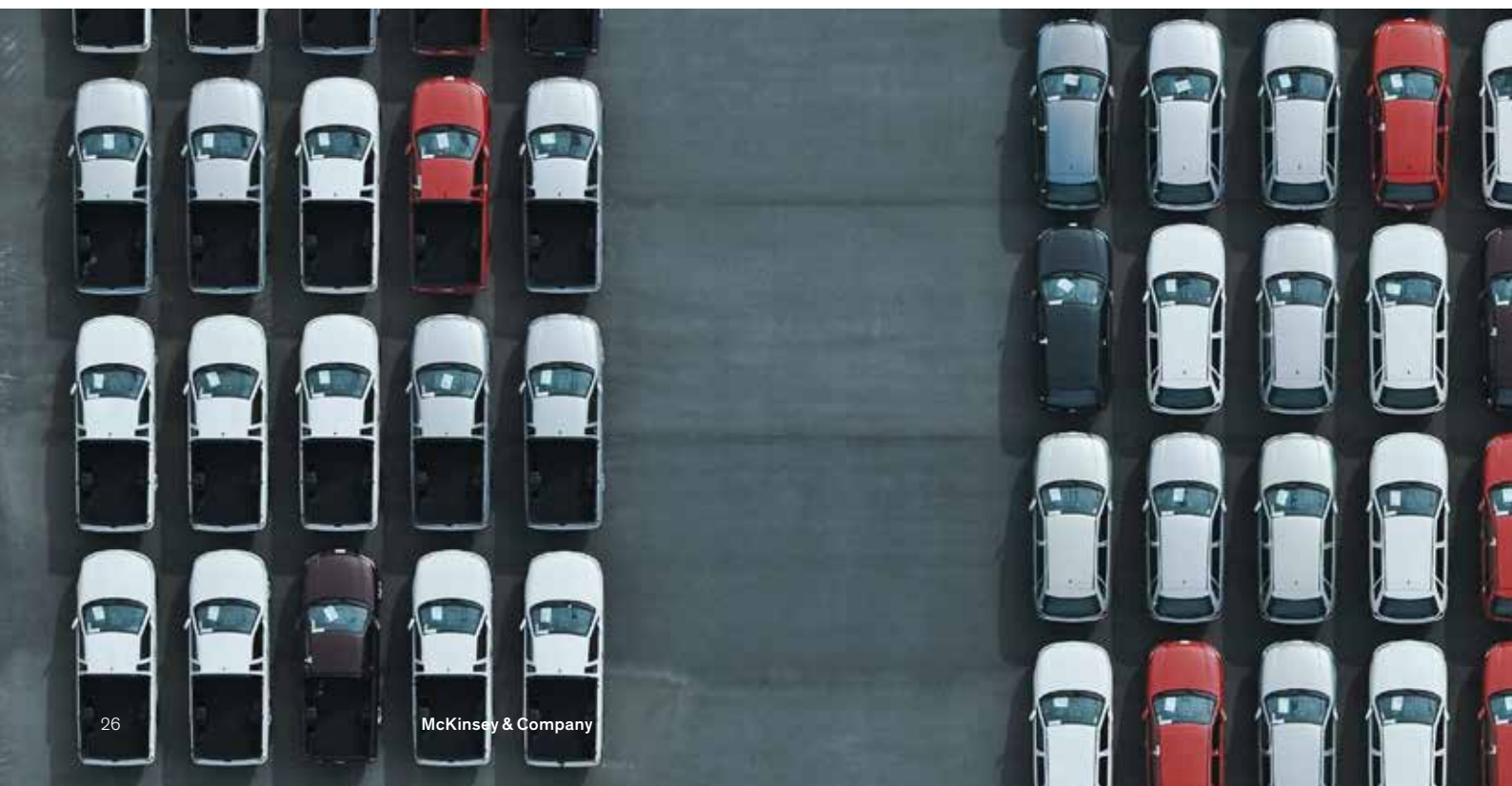
The industry bodies that govern the automotive component industry in India can support industry players to share their priorities and needs with the government. They could:

- **Foster stakeholder connectivity:** As mentioned previously, industry bodies could constitute a dedicated task force representing OEMs, auto-component suppliers and the Government of India to capture the opportunities ahead. The taskforce could spearhead initiatives such as OEM connects, cross border M&A, shifting of manufacturing, policy support, trade agreements, etc. It could help to establish and nurture institutional connects with global bodies and scale IPOs. By organizing trade fairs, exhibitions, and expos, it could also enable connectivity across key decision makers from various stakeholder groups.
- **Promote exports:** Industry bodies could work with the Export Promotion Councils and help to showcase the technologies, capabilities and potential of the Indian ecosystem to prospective target markets. They could also help multiple component manufacturers to work in a more integrated, collaborative manner to ease supply chain bottlenecks and bring their best to high-potential export markets.
- **Curate capability-building programs:** As India's automotive component manufacturers try to adopt new-age, cutting-edge technologies at the same pace as many other parts of the world, their management and labour force will need large-scale upskilling. Industry bodies could curate programs and establish guidelines on relevant topics to educate the community on latest industry trends and how to adapt to these.

How OEMs could support the local ecosystem

OEMs in India could support the auto-component industry in at least two ways:

- **Drive localization:** Auto-component suppliers could benefit from OEMs buying at scale from India to meet global demand. They can take advantage of any production-linked or sales-value linked incentive schemes to give localization its much needed boost.
- **Forge partnerships with suppliers:** OEMs could be instrumental in helping suppliers to access the newest technologies and adapt to changing requirements. For a seamless transition, OEMs could forge strategic collaborations with suppliers in joint R&D, risk-sharing, innovation and testing. They could also collaborate with suppliers to help them upskill and become export ready, with a special focus on quality control and process improvement.



How suppliers could navigate these shifts

This is an important moment in time for Indian auto component manufacturers, especially MSMEs. Suppliers who can anticipate the key shifts and match the needs of a transforming landscape with agility are more likely to succeed. Some proposed focus areas include:

- **Systematically look at export opportunities:** Auto component manufacturers could benefit from making the most of any available PLIs provided by the government. In addition, they could respond with agility to capture opportunities for strategic partnerships or acquisitions of suppliers in these geographies – where ICE component manufacturing is expected to decline.
- **Invest in research:** The BOM disruptions caused by EV proliferation are expected to open new vistas for component manufacturers. To be able to cater to these ever-evolving needs, component manufacturers may gain access to the latest innovations by embracing new technologies and startups.
- **Invest in training:** To meet stringent global quality standards and the evolving needs of the changing landscape, suppliers can invest in building capabilities and upskilling their managerial and labour force. They can be proactive in their engagements with OEMs and try to evolve from supplier relationships to partner-based collaborations.

Electrification could be the future of mobility. Indian automotive component manufacturers could see the upcoming disruption for the opportunities it presents, pivoting and diversifying in an agile manner to expand at home and abroad in traditional and new segments.




*The future of mobility: Transforming to be
ahead of the opportunity*


September 2022


Copyright © McKinsey & Company

Designed by INO VG & Design team

www.mckinsey.com

 @McKinseyIndia

 @McKinseyIndia

 @McKinsey India

 @McKinsey India