



Infomerics Ratings

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## INDUSTRY OUTLOOK

### HIGH GROWTH IN AUTOMOBILE INDUSTRY: HOW SUSTAINABLE?

31 December 2022

#### 1. INTRODUCTION

India is commemorating its 75<sup>th</sup> year of independence this year. During this period, India has increasingly acquired a significant place in the expanding global economy. India is already the fifth-largest economy in the world, behind the United States of America (USA), China, Japan, and Germany, with a nominal Gross Domestic Product (GDP) of USD 3.25 trillion. This rise was facilitated by the growth of the services sector and some sectors of the manufacturing industry, e.g., software, drugs and pharmaceuticals, automobiles, etc.

The Covid-19 pandemic caused widespread gloom and doom for the global as well as the Indian automotive industry, despite the industry being recognized as a 'sunrise industry.' Economists, planners, and policy makers have been greatly worried because of the coronavirus pandemic and the subsequent lockdowns that triggered major headwinds for the Indian economy. In this process of deceleration, there were also issues of the tech-led disruptions from cab aggregators, fluctuations in interest rates and reduced liquidity in NBFCs.



The Auto & Auto Component industry's impact on the Indian economy currently is significant as it contributes ~7% to the country's GDP and is expected to increase to 12% as per the Automotive Mission Plan 2016-26 (AMP 2026).<sup>1</sup> With an annual turnover of about ₹ 7.5 lakh crores and export of ₹ 3.5 lakh crores, the industry is the largest manufacturing industry in the country and accounts for 49% of the manufacturing GDP. Further, the industry is responsible for the creation of 37 million direct and indirect employment opportunities. The government of India has set a goal of increasing employment to 50 million people, while increasing the sector's contribution to GDP to 12%.<sup>2</sup> India's annual production of automobiles in FY22 was 22.93 million vehicles.<sup>3</sup> The production and sales for the past few years is given in Table 1.

Category	2016-17		2017-18		2018-19		2019-20		2020-21		2021-22	
	Prod.	Sales	Prod.	Sales	Prod.	Sales	Prod.	Sales	Prod.	Sales	Prod.	Sales
Passenger Vehicles	0.38	0.3	0.4	0.33	0.40	0.34	0.34	0.28	0.30	0.27	0.37	0.30
Commercial Vehicles	0.08	0.3	0.09	0.09	0.11	0.10	0.07	0.07	0.06	0.06	0.08	0.07
Three Wheelers	0.08	0.05	0.10	0.06	0.13	0.07	0.11	0.06	0.06	0.02	0.08	0.03
Two Wheelers	1.99	1.76	2.32	2.02	2.5	2.12	2.10	1.75	1.84	1.51	1.8	1.35

**Source:** Society of Indian Automobile Manufacturers (SIAM) Statistics. Available at: <https://www.siam.in/statistics.aspx?mpgid=8&pgidtrail=14>

The devastation caused by the pandemic in the automobile industry is seen in table (Table 1). Globally synchronized economic slowdown and its devastating impact on the international and the domestic sector led to plummeting numbers in FY21 for both production and sales vis-à-vis FY20. Although in FY22, it is quite visible that sales have gradually picked up. This can be seen from the table (Table 2) below, where it is seen that 2W, TRAC (Tractors) and PV sales fell in 2021 but picked its pace up in 2022. Sales for PV in FY23 (till September end was 19,36,740 as per SIAM report. But for CV and 3W situation went up for the past three years.

CATEGORY	NOV'22	NOV'21	NOV'20	YOY % (2021)	YOY % (2020)	NOV'19	YOY % (2019)
2W	18,47,708	14,94,797	15,27,551	23.61%	20.96%	18,63,731	-0.86%
3W	74,473	41,296	25,205	80.34%	195.47%	71,833	3.68%
<i>E-RICKSHAW(P)</i>	<i>33,971</i>	<i>15,958</i>	<i>7,476</i>	<i>112.88%</i>	<i>354.40%</i>	<i>14,505</i>	<i>134.00%</i>
<i>E-RICKSHAW WITH CART (G)</i>	<i>1,820</i>	<i>1,039</i>	<i>695</i>	<i>75.17%</i>	<i>161.87%</i>	<i>686</i>	<i>165.00%</i>
<i>THREE-WHEELER (GOODS)</i>	<i>8,021</i>	<i>6,693</i>	<i>6,084</i>	<i>19.84%</i>	<i>31.84%</i>	<i>9,954</i>	<i>-19.00%</i>
<i>THREE-WHEELER (PASSENGER)</i>	<i>30,617</i>	<i>17,559</i>	<i>10,913</i>	<i>74.37%</i>	<i>180.56%</i>	<i>46,573</i>	<i>-34.26%</i>
<i>THREE-WHEELER (PERSONAL)</i>	<i>44</i>	<i>47</i>	<i>37</i>	<i>-6.38%</i>	<i>18.92%</i>	<i>115</i>	<i>-61.74%</i>
PV	3,00,922	2,48,052	3,06,385	21.31%	-1.78%	2,86,263	5.12%
TRAC	77,993	49,737	55,062	56.81%	41.65%	48,342	61.34%
CV	79,369	59,765	52,261	32.80%	51.87%	74,614	6.37%
<i>LCV</i>	<i>46,836</i>	<i>38,198</i>	<i>33,185</i>	<i>22.61%</i>	<i>22.66%</i>	<i>49,923</i>	<i>-6.18%</i>
<i>MCV</i>	<i>4,776</i>	<i>4,280</i>	<i>3,169</i>	<i>11.59%</i>	<i>50.71%</i>	<i>4,531</i>	<i>5.41%</i>
<i>HCV</i>	<i>2,505</i>	<i>15,565</i>	<i>9,091</i>	<i>60.84%</i>	<i>175.38%</i>	<i>18,551</i>	<i>34.95%</i>
<i>Others</i>	<i>2,722</i>	<i>1,722</i>	<i>1,816</i>	<i>58.07%</i>	<i>49.89%</i>	<i>1,609</i>	<i>69.17%</i>
<b>Total</b>	<b>23,80,465</b>	<b>18,93,647</b>	<b>19,66,464</b>	<b>25.71%</b>	<b>21.05%</b>	<b>23,44,783</b>	<b>1.52%</b>

**Source:** FADA Research<sup>4</sup>

**Note:** CV is subdivided in the following manner: - **LCV** – Light Commercial Vehicle (incl. Passenger & Goods Vehicle), **MCV** – Medium Commercial Vehicle (incl. Passenger & Goods Vehicle), **HCV** – Heavy Commercial Vehicle (incl. Passenger & Goods Vehicle) and **Others** – Construction Equipment Vehicles and others. **3W** is sub-divided in the following manner: - E-Rickshaw – **Passenger**, E-Rickshaw – **Goods**, 3-Wheeler – **Goods**, 3-Wheeler – **Passenger** and 3-Wheeler – **Personal**.

<b>Table 3: OEM (Original Equipment Manufacturer) wise Market Share Data for the Month of November'22 with YoY comparison for the Major players of the country.</b>				
<b>Two-Wheeler OEM</b>	<b>NOV'22</b>	<b>Market Share (%), NOV'22</b>	<b>NOV'21</b>	<b>Market Share (%), NOV'21</b>
HERO MOTOCORP LTD	6,36,064	34.42%	5,49,443	36.76%
HONDA MOTORCYCLE AND SCOOTER INDIA (P) LTD	4,62,163	25.01%	3,66,486	24.52%
TVS MOTOR COMPANY LTD	2,70,551	14.64%	2,20,779	14.77%
BAJAJ AUTO LTD	2,10,251	11.38%	1,72,029	11.51%
SUZUKI MOTORCYCLE INDIA PVT LTD	72172	3.91%	48982	3.28%
ROYAL-ENFIELD (UNIT OF EICHER LTD)	69211	3.75%	37149	2.49%
INDIA YAMAHA MOTOR PVT LTD	53560	2.90%	47168	3.16%
OLA ELECTRIC TECHNOLOGIES PVT LTD	16306	0.88%	-	0.00%
AMPERE VEHICLES PRIVATE LIMITED	12257	0.66%	1990	0.13%
OKINAWA AUTOTECH PVT LTD	9059	0.49%	5372	0.36%
HERO ELECTRIC VEHICLES PVT. LTD	9014	0.49%	7023	0.47%
ATHER ENERGY PVT LTD	7765	0.42%	2203	0.15%
CLASSIC LEGENDS PVT LTD	3673	0.20%	2976	0.20%
PIAGGIO VEHICLES PVT LTD	3523	0.19%	4772	0.32%
OKAYA EV PVT LTD	1783	0.10%	-	0.00%
JITENDRA NEW EV-TECH PVT. LTD	1254	0.07%	256	0.02%
BEING INDIA ENERGY AND TECHNOLOGY PVT LTD	1215	0.07%	857	0.06%
PUR ENERGY PVT LTD	924	0.05%	1687	0.11%
TWENTY TWO MOTORS PVT LTD	854	0.05%	-	0.00%
KINETIC GREEN ENERGY & POWER SOLUTIONS LTD	838	0.05%	-	0.00%
Others Including EV	5271	0.29%	25625	1.71%
<b>Total</b>	<b>18,47,708</b>	<b>100.00%</b>	<b>14,94,797</b>	<b>100.00%</b>
<b>Three-Wheeler OEM</b>	<b>NOV'22</b>	<b>Market Share (%), NOV'22</b>	<b>NOV'21</b>	<b>Market Share (%), NOV'21</b>
BAJAJ AUTO LTD	26,652	36%	15,218	36.85%
PIAGGIO VEHICLES PVT LTD	5,364	7%	4,893	11.85%
YC ELECTRIC VEHICLE	3,067	4%	1,840	4.46%
MAHINDRA & MAHINDRA LIMITED	2,484	3%	1,608	3.89%
SAERA ELECTRIC AUTO PVT LTD	2,089	3%	898	2.17%
ATUL AUTO LTD	1,808	2%	1,400	3.39%
MAHINDRA REVA ELECTRIC VEHICLES PVT LTD	1,674	2%	837	2.03%
DILLI ELECTRIC AUTO PVT LTD	1,461	2%	604	1.46%

CHAMPION POLY PLAST	1,247	2%	782	1.89%
MINI METRO EV L.L.P	1,232	2%	409	0.99%
TVS MOTOR COMPANY LTD	1,223	2%	857	2.08%
UNIQUE INTERNATIONAL	1,057	1%	456	1.10%
J. S. AUTO (P) LTD	861	1%	513	1.24%
TERRA MOTORS INDIA PVT LTD	776	1%	422	1.02%
ENERGY ELECTRIC VEHICLES	712	1%	388	0.94%
VANI ELECTRIC VEHICLES PVT LTD	703	1%	411	1.00%
Others including EV	22,063	30%	9,760	23.63%
<b>Total</b>	<b>74,473</b>	<b>100%</b>	<b>41,296</b>	<b>100%</b>
<b>Commercial Vehicle OEM</b>	<b>NOV'22</b>	<b>Market Share (%), NOV'22</b>	<b>NOV'21</b>	<b>Market Share (%), NOV'21</b>
TATA MOTORS LTD	30,282	38.15%	26,469	44.29%
MAHINDRA & MAHINDRA LIMITED	20,081	25.30%	12,044	20.15%
ASHOK LEYLAND LTD	13,084	16.49%	7,879	13.18%
VE COMMERCIAL VEHICLES LTD	5,270	6.64%	3,786	6.33%
MARUTI SUZUKI INDIA LTD	3,828	4.82%	3,664	6.13%
DAIMLER INDIA COMMERCIAL VEHICLES PVT. LTD	1,555	1.96%	1,149	1.92%
FORCE MOTORS LIMITED, A FIRODIA ENTERPRISE	675	0.85%	650	1.09%
SML ISUZU LTD	586	0.74%	568	0.95%
Others	4,008	5.05%	3,556	5.95%
<b>Total</b>	<b>79,369</b>	<b>100.00%</b>	<b>59,765</b>	<b>100.00%</b>
<b>PV OEM</b>	<b>NOV'22</b>	<b>Market Share % NOV'22</b>	<b>NOV'21</b>	<b>Market Share % NOV'21</b>
MARUTI SUZUKI INDIA LTD	1,23,409	41.01%	1,02,158	41.18%
HYUNDAI MOTOR INDIA LTD	44,859	14.91%	38,582	15.55%
TATA MOTORS LTD	40,723	13.53%	29,754	12.00%
MAHINDRA & MAHINDRA LIMITED	28,849	9.59%	18,240	7.35%
KIA MOTORS INDIA PVT LTD	19,503	6.48%	12,937	5.22%
TOYOTA KIRLOSKAR MOTOR PVT LTD	12,318	4.09%	10,691	4.31%
RENAULT INDIA PVT LTD	6,356	2.11%	8,955	3.61%
HONDA CARS INDIA LTD	6,666	2.22%	7,965	3.21%
SKODA AUTO VOLKSWAGEN INDIA PI'T LTD	6,440	2.14%	4,927	1.99%
VOLKSWAGEN AG/WDIA PVT. LTD.	1	0.00%	89	0.04%
AUDI AG	44	0.01%	107	0.04%
SKODA AUTO INDIA/AS PVT LTD	1	0.00%	4	0.00%
<b>SKODA AUTO VOLKSWAGEN GROUP</b>	<b>6,486</b>	<b>2.16%</b>	<b>5,127</b>	<b>2.07%</b>
MG MOTOR INDIA PVT LTD	3,718	1.24%	2,660	1.07%
NISSAN MOTOR INDIA PVT LTD	2,649	0.88%	3,229	1.30%
MERCEDES-BENZ INDIA PVT LTD	1,089	0.36%	869	0.35%
MERCEDES -BENZ AG	39	0.01%	27	0.01%
DAIMLER AG	1	0.00%	5	0.00%

<b>MERCEDES-BENZ GROUP</b>	<b>1,129</b>	<b>0.38%</b>	<b>901</b>	<b>0.36%</b>
FIAT INDIA AUTOMOBILES PVT LTD	996	0.33%	1,062	0.43%
BMW INDIA PVT LTD	962	0.32%	753	0.30%
PCA AUTOMOBILES INDIA PVT LTD	639	0.21%	57	0.02%
FORCE MOTORS LIMITED, A FIRODIA ENTERPRISE	446	0.15%	163	0.07%
JAGUAR LAND ROVER INDIA LIMITED	158	0.05%	203	0.08%
VOLVO AUTO INDIA PVT LTD	156	0.05%	138	0.06%
ISUZU MOTORS INDIA PVT LTD	64	0.02%	64	0.03%
PORSCHE AG GERMANY	80	0.03%	32	0.01%
AUTOMOBILI LAMBORGHINI S.P.A	2	0.00%	0	0.00%
BENTLEY MOTORS LTD	1	0.00%	5	0.00%
ROLLS ROYCE	3	0.00%	1	0.00%
Others	750	0.25%	4375	1.76%
<b>Total</b>	<b>3,00,922</b>	<b>100%</b>	<b>2,48,052</b>	<b>100%</b>

Source: FADA Research (Refer to endnote 4)

The table above shows that the November 2022 had the highest retails in the existence of the Indian Automobile Industry, with March'20 being the outlier owing to the BSIV-to-BSVI transition. The focus of holiday sales moved to the wedding season, when 32 lakh marriages will be held. Total retail sales grew by 1.5% vis-à-vis the pre-covid month of 2019. While all other categories rose, 2W grew 24% y-o-y but decreased 0.9% from Nov'19 (a pre-covid year). Overall, November'22 auto retail grew by 26%. Due to the wedding season, this sector moved from negative to positive. And 3W, which was the only category with low demand during Covid, became the fastest rising in 2022 (refer to endnote 4).

## 2. SHIFTING PARADIGMS

Considered in a proper historical and comparative perspective, locational factors (availability of raw materials-steel, non-ferrous metals, window glass, plastic, rubber, wood, paint, textile, electronic cables, seat cushions, and other industrial raw materials; a steady supply of spare parts; proximity to iron and steel-producing centers; closeness to plants making tires, tubes, storage batteries, paints, and other ancillary products; connectivity to Port cities) played an important role in the salubrious growth of the automobile industry in India.

An analysis of the regional spread reveals that the major automobile manufacturing centers are Mumbai, Chennai, Jamshedpur, Jabalpur, and Kolkata. These facilities manufacture a wide range of vehicles, including trucks, buses, passenger cars, three-wheelers, and two-wheelers. While three distinct clusters have emerged in South India around Chennai, in West India- Ahmedabad to Pune and in North India- Haryana, Delhi-NCR in the automobile industry, the Chennai region is the largest automobile industry hub accounting for 40% of revenue and 60% of exports and is, therefore, known as “India's Detroit”.

In industries across the development spectrum, a clear divide can easily be discerned. The rising skew in distribution of income and wealth in the country increases the demand for high-end, top of the line models. Thanks to the pandemic, the new generation has stopped sharing cabs. They restrain from using public transport. The population has been demanding a lot more cars for personal use than ever before. They are splurging on expensive cars, viz., compact SUVs, sedans, and luxury vehicles and the festive season is fueling this trend. People like buying SUVs costing around Rs. 15 lakhs because of their hatch back and sedan like comfort qualities. They want a PV as it is safer. With ever-increasing road infrastructure, longer highways and better connectivity, sales of PV have increased. Together with this aspect, shifting demographics, rising urbanization

with India expected to house over 500 million people living in cities by 2030—1.5 times the current US population, and greater participation of women and youth in the job market provide tailwinds to this industry. The PV industry will end this year at an all-time high, but next year will bring a torrent of regulatory reforms, including on-board diagnostic (OBD-2) mandates, BS-VI Stage-II norms, and mandatory six air bags in all PVs.

In recent years, the used car industry in India grew at a fast clip<sup>5</sup> because of the shift in consumer demand and a growing societal acceptance of people buying a used car, the steep reduction in the ownership with the ownership period falling from 6-7 years for most cars a few years ago to around 4 years now, the advent and spread of online platforms and rapid spread of digitization. There are also factors like rapid rise in the presence of manufacturer owned used-car retail outlets and other revolutionary used car buying services like CARS24, much higher demand for used luxury cars than in the past and increased Reliability of cars together with extendable warranty periods of 7 years.

### 3. ELECTRIC VEHICLES (EVs)

India's clean car technology is a pre-requisite to the comprehensive strategy to slash its reliance on petroleum products and reduce air pollution in its cities, while meeting its national commitment to reduce global warming emissions from fossil fuel use by 2070 to zero. But the transition to EVs causes concern for Indian auto parts manufacturers because of the manifest need for new design components and manufacturing processes. The seriousness of this issue is reflected in the September 2022 study by McKinsey and Company, in conjunction with the Automotive Component Manufacturers Association (ACMA). This study highlighted that approximately 75 % of inventory for EVs will consist of components that require new design and manufacturing processes and a move to EVs could affect up to half of internal combustion engine (ICE) auto parts suppliers, from those producing plastic and rubber components or engine parts to electronics manufacturers. Clearly, this is a tall order and necessitates co-ordinated and concerted measures with a sense of urgency to facilitate a process and pattern of development, which is not oblivious to national and international concerns.

Despite such overarching concerns, it is manifestly clear that India is gradually transitioning to a green economy. EVs are the first full-fledged step in the direction of achieving sustainable development goals (SDG), specifically goal no 7 (i.e., affordable and Clean Energy) and paving the way for goal no 13 (i.e., Climate action for a low carbon emission in the future).<sup>6</sup> Understanding the characteristics of EVs is vital as they gain traction in the automotive industry both internationally and in India. The EV is an asset because of its low cost of ownership, ease of maintenance, and environmentally friendly qualities. In the current environment, when humanity is struggling with the issue of cataclysmic climate change, EVs represent one of the most practical alternatives to conventional internal combustion engines (ICEs), which have large carbon footprints.

The switch to EVs had the following impacts:

- Reduce the amount of fuel currently used for road transportation.
- Shift consumer demand from cars with ICEs to EVs.
- Necessitate more electricity and a network of recharging stations.<sup>7</sup>

Retail sales for the EV in the country witnessed a triple rise in FY22 with 2W offtake leading the segment, according to data compiled by Federation of Automobile Dealers Associations (FADA). The retail sale for EVs in FY22 is given below (Table 4):



**Table 4: All India Electric Vehicle Retail Data for FY22**

CATEGORY	FY'22	FY'21	FY'20	YoY % (2021)	YoY% (2020)
E - 2W	2,31,338	41,046	24,843	463.61%	831.20%
E - 3W	177,874	88,391	1,40,684	101.24%	26.44%
E - CV	2,203	400	493	450.75%	346.86%
E - PV	17,802	4,984	2,280	257.18%	680.79%
<b>Total</b>	<b>4,29,217</b>	<b>1,34,821</b>	<b>1,68,300</b>	<b>218.36%</b>	<b>155.03%</b>

Source: FADA Research.<sup>8</sup>

Note: 2W – Two-wheeler; 3W – Three-wheeler; CV – Commercial vehicle; PV – Passenger vehicle

According to a report by Future Market Insight, the global EV battery market is set to strengthen its market share in global market at a promising CAGR of 8.5%, while it is forecasted to generate revenue of USD 18.09 Billion in 2032. The market is valued at USD 8.68 Billion in 2022.<sup>9</sup> EV market in India is likely to increase at a CAGR of 36% until 2026. Moreover, EV battery market is estimated to expand at a CAGR of 30% during this period.<sup>10</sup>

One of the major concerns at the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP27), which took place in the Egyptian coastal city of Sharm el-Sheikh (Egypt) in November 2022 was to slash carbon emissions from source. Accordingly, EVs can help in mitigating Green House Gas (GHG) from the source by swapping daily fuel usage with consuming only renewable energy.

India's EV market is estimated to be ₹ 50,000 crore (USD 7.09 billion) sector by 2025, with 2W and 3W expected to attract higher electrification.<sup>11</sup> An analysis of India's move to EVs signifies that over the course of the next ten years, EVs, charging network, and batteries would need a total capital expenditure of USD 266 billion (₹ 19.7 lakh crore). The analysis estimates that the market for financing EV would be worth USD 50 billion (₹ 3.7 lakh crore) in 2030, which is around 80% of the present size of India's retail vehicle finance industry, which is currently valued at USD 60 billion (₹ 4.5 lakh crore).<sup>12</sup>

## PUBLIC CHARGING INFRASTRUCTURES

Tier 1 cities of India, such as, Delhi, Mumbai, Chennai, Bangalore, etc., were faced with private space crunch for EV charging stations as these cities usually have high rise residential blocks and high demands for the EVs. In the Union Budget 2022-23, as charging stations require more space, the government formulated the well-conceived initiative of battery-swapping, which will allow drained batteries to be swapped with charged ones at designated charging stations. It would thus make EV's more viable for potential customers.<sup>13</sup>

A memorandum of understanding (MoU) was signed between electric 2W company Ather Energy and Electric Supply Companies (ESCOs) of Karnataka for setting up 1,000 fast charging stations across the state.<sup>14</sup> Tata Power and Apollo Tyres Ltd announced a strategic partnership for the establishment of 150 public charging stations across India.<sup>15</sup> TVS Motor Company and BMW Motorrad, announced a partnership in the 2W - EV space, with plans to release their first electric 2W within the next two years.<sup>16</sup> Also, under the **Faster Adoption and Manufacturing of Hybrid and Electric vehicle (FAME)** India Scheme I & II, total of 532 EV charging stations have been installed by oil companies under the Ministry of Petroleum and Natural Gas (MoPNG).<sup>17</sup>

As many companies have expanded their EV segments from last year, existing high prices of EV and interest rates for easy financing for the same (since currently the interest rates vary from 12 to 18 %) might be reduced.

## 4. INSTITUTIONAL INITIATIVES

### PRODUCTION LINKED INCENTIVE (PLI)

The Automotive Mission Plan 2016-26 focused on a three-fold growth of the automotive industry. It brought into focus a slew of measures to promote India as a manufacturing base and an export hub. The Plan also sought to consolidate the auto-ancillary ecosystem in India.

The PLI to produce Advanced Chemistry Cells (ACC) batteries was granted permission by the Central Government in May 2021, and it was given a budget of ₹ 18,100 crores (USD 2.33 billion). In September 2021, the government approved the Production Linked Incentive (PLI) scheme for Automobile and Auto Component Industry in India for enhancing India's Manufacturing Capabilities for Advanced Automotive Products (AAT) with a budgetary outlay of ₹ 25,938 crores.<sup>18</sup> This year, the Union Budget extended this PLI scheme to include the rapidly growing e-bikes sector. The main objective was to reduce the goods and services tax (GST) and make the PLI more inclusive in nature for the upcoming startups for 2W. In March 2022, it was decided that four companies would be given the opportunity to benefit from this incentive. These companies were Reliance New Energy Solar Limited, Ola Electric Mobility Private Limited, Hyundai Global Motors Company Limited, and Rajesh Exports Limited.<sup>19</sup>

GST on EVs has been reduced from 12% to 5%; GST on chargers/charging stations has been reduced from 18% to 5%. The Ministry of Road Transport & Highways (MoRTH) announced that battery-operated vehicles will be given green license plates and be exempted from permit requirements and waive off tax on EVs, which in turn will help reduce their initial cost.<sup>20</sup>

The Ministry of Civil Aviation (MoCA) issued the list of 23 PLI beneficiaries for drones and drone components. Under the scheme, a total incentive of ₹ 120 crores was distributed over three financial years, roughly doubling all domestic drone manufacturers' turnover for FY21. The combined annual sales of drone and drone component manufacturers surged from ₹ 88 crores to ₹ 319 crores (unaudited) in FY22.<sup>21</sup> Under Phase-II of the FAME-India Scheme, ₹ 1000 crores have been allocated for the development of charging infrastructure. The Ministry of Heavy Industries has already sanctioned 520 Charging Stations/Infrastructure under Phase-I. Further, this Ministry has also sanctioned 2,877 EVs Charging Stations in 68 cities across 25 States/UTs and 1576 charging stations across 9 Expressways and 16 Highways.<sup>22</sup>

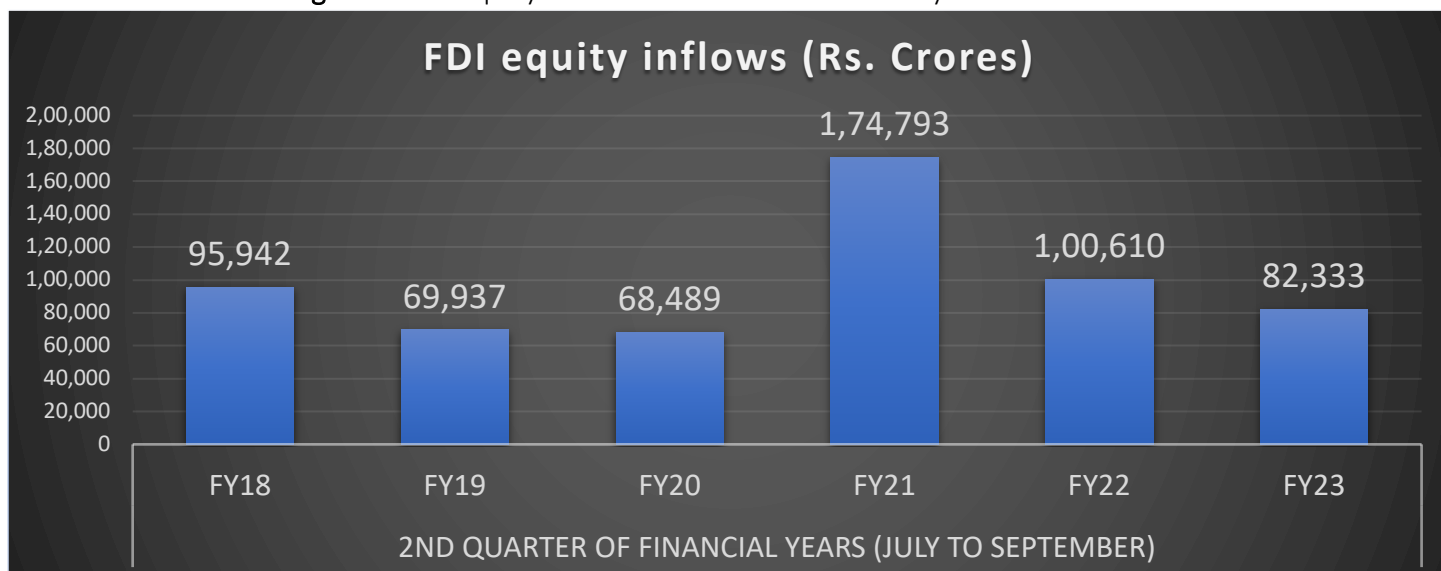
In September 2022, the Cabinet approved revisions in the PLI scheme, which was launched in December 2021, for semiconductor and display manufacturers, with 50 % financial aid for all technological nodes. Earlier, the cabinet approved ₹ 76,000 crores in a scheme to boost the sector, which would have helped incentivize semiconductor manufacturers amid shortages of crucial raw materials. Compound semiconductors, silicon photonics, sensors, and complex packaging are specialized sectors, thus the updated program will cover 50 % of capital expenditures for these industries.<sup>23</sup>

### FOREIGN DIRECT INVESTMENT (FDI)

The Government of India fosters foreign investment in the automobile sector and has allowed 100% FDI under the automatic route. Although equity inflow has fallen from FY21 levels, the automobile sector is still the second largest FDI attracting sector for it attracted 15.8 % of total FDI in the country. In the first two quarters of FY22, the automobile sector received FDI of USD 4.9 billion i.e., ten times higher than FY21.<sup>24</sup> FDI equity inflow for the 2<sup>nd</sup> quarters of the past few years is given below in Figure 1.



Figure 1: FDI equity inflows in India from financial year 2018 to 2023



Source: <https://dpiit.gov.in/publications/fdi-statistics>

In September 2022, the cumulative FDI equity inflows for automobile industry from April 2000 was ₹ 100,160.44 crores vis-à-vis ₹ 192,070.51 crores in the corresponding period in the past year.<sup>25</sup> The main causes for this decline in FY22 are higher trade deficits, financial wrangles, and disruptive inflation scenarios. India is expected to attract USD 100 billion foreign direct investment (FDI) in FY23 on the back of economic reforms and greater ease of doing business in recent years.<sup>26</sup>

In 2016, the insolvency and bankruptcy landscape in India was radically revamped by the launch of the new Insolvency and Bankruptcy Code (IBC), which will pave the way for FDI in the future year. PLI for Automobile and Auto Component Industry in India has attracted projected investment of ₹ 74,850 crores over five years. The proposed investments are ₹ 45,016 crore and ₹ 29,834 crores from approved applicants under Champion OEM Incentive Scheme and Component Champion Incentive Scheme, respectively.<sup>27</sup> As per India Brand Equity Foundation (IBEF) annual report this PLI is expected to bring investments of over ₹ 42,500 (USD 5.74 billion) by 2026 and create 7.5 lakh jobs in India.<sup>28</sup>

## 5. INDUSTRY RISK

The issue of vehicular emission has acquired center-stage because of the concerns of pollution, environmental degradation and the need to promote sustainable development all along the line. While the development of the automobile industry is necessary in the modern world, pollution emission concerns must be factored in a holistic and comprehensive strategy of development. These apparently conflicting concerns have led to the emergence and the global acceptance of the concept of sustainable development all over the world. Sustainable development was defined in the World Commission on Environment and Development's 1987 Brundtland report *Our Common Future* as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs"<sup>29</sup>. It is now globally accepted that sustainable growth model is the way to go to judiciously harmonize the interest of various regions and groups.

In conformity with international standards to reduce vehicular pollution, the Government of India introduced standards titled "India 2000". Subsequently, these standards were upgraded as Bharat Stage emission standards-standards similar to the stringent European emission standards and were gradually implemented.

Bharat Stage IV (BS-IV) was implemented first, in April 2010, in 13 cities- Delhi (NCR), Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur, Lucknow, Solapur, and Agra- and subsequently to all over the country in April 2017. Further, to reduce vehicular pollution on par with international standards, the Government of India announced the introduction of BS-VI norms to control air pollution, with effect from 1 April 2020.<sup>30</sup> In other words, the Indian Government leapfrogged from Bharat Stage Emission Standards of BSIV to BSVI of pollution norms instead of a gradual and calibrated move of the BSV to address the growing concern in respect of the increasing levels of pollutions and global warming.<sup>31</sup> In an attempt to raise the bar, the Indian auto-mobile sector is now looking at the phase 2 of emission norms that is set to come into effect in FY23.

The Indian emissions standards are based on the lines of European norms commonly known as EURO 2, EURO 3, and so on. Table below (Table no: 5) shows the comparative timelines of the origins for Indian and European emission norms. In this new normal, adoption and even more importantly, adaptation is required to overcome the travails of transition.

Table 5: Comparative timelines of the Indian and European emission norms		
Indian Emission Standard	European Standard	Year
India 2000	Euro 1	2000
Bharat Stage II (BS 2)	Euro 2	2005
Bharat Stage III (BS 3)	Euro 3	2010
Bharat Stage IV (BS 4)	Euro 4	2017
Bharat Stage V (BS 5)	Euro 5	To be skipped
Bharat Stage VI (BS 6)	Euro 6	2020

As per the BSVI phase 2 regulations, the OEMs might face these challenges:

- Petrol vehicles must have a 25 % reduction in Nitrogen Oxide (NO<sub>2</sub>) emission.
- Diesel-powered vehicles will have to reduce the hydrocarbon + NO<sub>2</sub> emission by 43 %.
- New emission standards, good fuel efficiency, and low costs are usually incongruous.
- PGM (programmed fuel injection), which is related to hardware, and (upgraded) semiconductors, electrification of any kind would increase the overall cost of the vehicles.
- Hybrids and EVs crucial to meeting Corporate Average Fuel Economy (CAFÉ) norms.

## GLOBAL SEMICONDUCTOR SHORTAGE

There was a significant decline in car demand during the initial phase of the Covid-19 crisis. However, for over a year, the focus has turned to the supply side. Most of the manufacturing is being carried out by two companies, i.e., East Asia – Taiwan’s TSMC and South Korea’s Samsung. These giants’ manufacturers capture 70% of the world’s semiconductors’ market. Large upfront investments (US\$10-\$12 billion) and long learning curve constitute the key barriers for the new entrants.<sup>32</sup>

The short-run prognosis for the Indian Auto Industry remains challenging due to Russia-Ukraine crisis and the China lockdown. For instance, Ukraine supplies 25 to 35 % of the world’s purified neon gas, and Russia supplies 25 to 30 % of palladium (a rare metal used for semiconductors).<sup>33</sup> Also, fuel prices have risen by ₹ 10 due to rising crude prices. This will keep rising and lead to budgetary cuts. OEMs raised prices because of increasing raw material costs. PV demand has not been affected much and faced strong demand with poor supply owing to semiconductor scarcity<sup>34</sup>. The price-sensitive 2W market shows, however, great prospects. The OEMs are facing

prolonged waiting after booking because of shortages of raw materials. The sales figures would have been much higher if this supply chain constraint would have been effectively addressed post Covid-19.

The high taxation<sup>35</sup> of the auto sector continues to be an area of concern and needs to be rationalized.

## **ELECTRIC VEHICLES (EVs) AT A TIPPING POINT**

As per recently released industry statistics, India's EV market is projected to reach USD 7.09 billion by 2025. The Indian EV market is likely to witness a robust CAGR growth of 42.38%. In addition, the Indian government is developing new strategies to attain 100% electric car mobility by 2030.<sup>36</sup> However, EVs face manifold challenges. Such challenges include:

- High cost of batteries like Nickel-metal hydride (NiMH) and Lithium-Ion (LiON)
- Supply chain constraints - Huge Demand supply gaps
- High cost of a personal charging station
- Low Mileage of the Vehicles

The absence of any tax breaks, rebates, or other forms of financial assistance for hybrids and imported automobiles is a significant factor that hampers the development of this industry. Despite this, the government, as part of the Paris Accord, has managed to establish timelines for "Only Electric Vehicle (Manufacturing)" by the year 2030.<sup>37</sup> The EV industry has immense latent potential. However, upgrades are still necessary in the areas of EV infrastructure and PLI schemes. Even though this project appears to have had ambitious ambitions, there is a growing recognition of the need to incentivize the EV manufacturing sector within the "Make in India" framework, along with a new policy and scheme for the same by the policy makers under the Government. Towards this end, Bain & Company<sup>38</sup> have isolated and identified five crucial factors. These factors relate to a decline in global battery prices; building of new and sustainable EV-specific business models for the Indian market; sustained focus on safety (through greater localization, quality control and audits, and standardization); government support to EV adoption via consumer and producer incentives and regulatory support; and a significant expansion of charging infrastructure.

## **HIGH RATES OF ACCIDENTS**

India has been benefitting from the "demographic dividend" from 2005-06 and this advantage is likely to persist till 2055-56. This is the period when the working age ratio is equal to or more than 150% and the dependency ratio, which is equal to or lower than 66.7 % (generally taken as the cut-off for the demographic dividend window).<sup>39</sup>

The ascendant middle class together with the seemingly mad scramble for speed and mobility has significantly increased the demand for cars with an attendant increase in the demand for parking space. This development has exacerbated the issue of the parking in the Tier-1 cities of India. A UK-based study, which took into consideration the top 50 countries with the highest GDP, revealed that India had the highest number of registered vehicles in the world. On an average, Indians spend almost 2 days per year in the traffic jams.<sup>40</sup>

The higher number of cars on the roads together with inadequate sensitization of the norms of road safety led to a large number of accidents.<sup>41</sup> According to the National Crime Record Bureau (NCRB) data, over 1.55 lakh lives were lost in road crashes across India in 2021 - an average of 426 daily or 18 every single hour - which was the highest death figures recorded in any calendar year so far. Although there is a rule for compulsory seat belt, defaulters do not always observe the law in letter and spirit. According to the World Health Organization (WHO), the use of rear seat belts can prevent fatality by 25% and prevent excess injury or death for the front seat passenger. This is why there has to be a heightened consciousness of the need to promote education of drivers, use of rear seat belts invariably to reduce the impact of collisions/accidents and the use of telematics technology

that will enable insurers to provide insurance based on the socioeconomic factors of drivers and their driving habits.

Year	Number of Accidents Total	Fatal	Number of Persons Killed	Injured	Accident Severity*
2011	497,686	121618 (24.4)	142,485	511,394	28.6
2012	490,383	123093 (25.1)	138,258	509,667	28.2
2013	486,476	122589 (25.2)	137,572	494,893	28.3
2014	489,400	125828 (25.7)	139,671	493,474	28.5
2015	501,423	131726 (26.3)	146,133	500,279	29.1
2016	480,652	136071 (28.3)	150,785	494,624	31.4
2017	464,910	134796 (29.0)	147,913	470,975	31.8
2018	467,044	137726 (29.5)	151,417	469,418	32.4
2019	449,002	137689 (30.7)	151,113	451,361	33.7

**Note:** Figures in parentheses indicate share of fatal accidents in total accidents.

\*Number of persons killed per 100 accidents.

**Source:** Information supplied by States/UTs (Police Department).<sup>42</sup>

According to Delhi Police Data, in the first six months of 2022, 2300 accidents took place in National Capital Territory of India (NCT) of Delhi, out of which, 495 were fatal, 1762 were not fatal and 43 were non-injury accidents.<sup>43</sup>

## HIGH INFLATION RATES

When international crude oil prices increase, so do prices in India. Increasing fuel costs will have a severe effect on the automobile sector, lowering vehicle demand and contributing to the overall inflationary strain. Included in the price of petrol are excise tax, value-added tax (VAT), and dealer's commission. The VAT varies by state. Subsequent to adding excise tax, dealer commission, and value-added tax, the retail price of fuel practically quadruples. Several factors influence the price of fuel. These include the rupee-to-dollar exchange rate, the price of crude oil, geopolitical cues, fuel demand, etc.

In terms of crude oil prices, the situation has become favorable for the past two quarters. But the real problem is not the crude oil, but the taxes imposed by the Centre and states. Data demonstrates that the Central government is taking in more fuel tax than the states. Even if the basic price of crude oil gets reduced in the market, the ever-increasing and ever-changing state taxes keep the price of petrol high and volatile. This volatility is also present at the city level petrol stations. For example, the computation of the price of petrol for the NCT of Delhi is given in the table below:

**Table 7: Price Buildup of Petrol at Delhi as on 23-Dec-22<sup>44</sup>**

Elements	Delhi
Base price	57.16 Rs. /ltr
Freight	0.20 Rs. /ltr
Price charged to dealers (excluding excise duty and VAT)	57.36 Rs. /ltr
Add: Excise duty	19.90 Rs. /ltr
Add: Dealer's commission (Average)	3.75 Rs. /ltr
Add: VAT (including VAT on Dealer Commission)	15.71 Rs. /ltr
<b>Retail Selling Price at Delhi- (Rounded)</b>	<b>96.72 Rs. /ltr</b>

With the emergence of the new variant of Omicron infecting thousands in China, Brazil, Japan, and USA, a post covid environment is as risky as it is uncertain. The unpredictable nature of this disease, geo-political dynamics, vaccination drives, religious riots, etc. makes the crude oil prices volatile.

## 6. EMERGING CONTOURS

Where do we go from here? An excellent piece <sup>45</sup> succinctly sums up the developments in the Indian automobile industry in the year 2022 and highlights the roadmap ahead. Some major events include the development of metaverse (an immersive virtual world that is facilitated by the use of virtual reality and augmented reality headsets) as the new automotive destination; non-fungible token (NFT) (unique and non-interchangeable unit of data stored on a digital ledger, and can be associated with reproducible digital files such as photos, videos, and audio) becoming the new currency, achievement of target of 10% ethanol blending in petrol; highly modern Expressways; and the thrust on innovative electric vehicles.

CNG vehicles have become a popular alternative to petrol-driven vehicles in the country. It is less expensive compared to- petrol and diesel, and is also said to have higher fuel efficiency. Some of the popular CNG cars launched in the Indian market in 2022 were Maruti Suzuki Alto K10, Toyota Glanza, Maruti Suzuki Baleno.

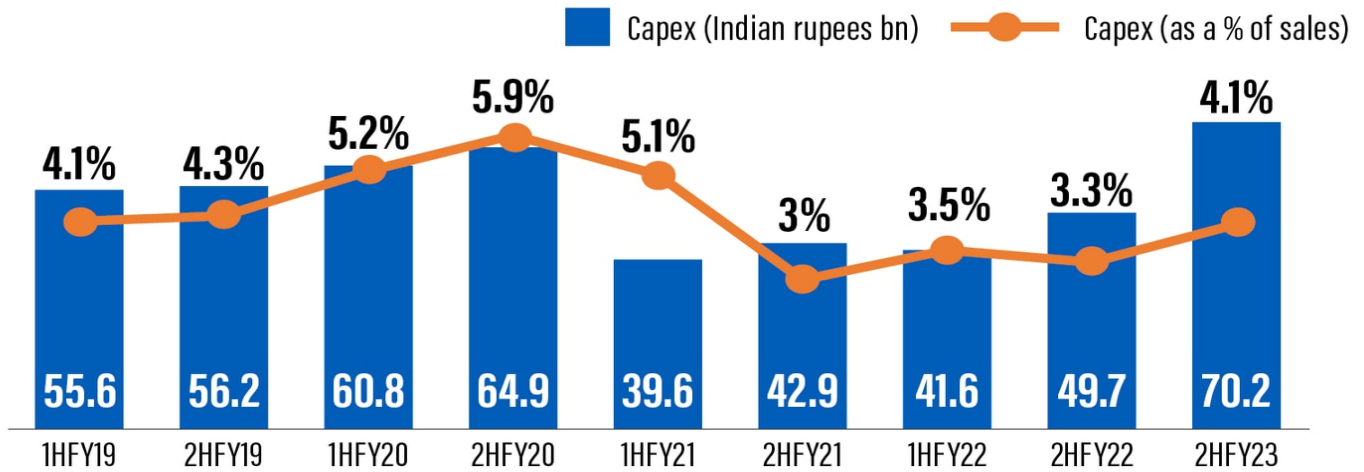
## 7. WAY FORWARD

There is a steadily burgeoning body of evidence-both theoretical studies and empirical evidences- that a complete reform of the nation's transportation network is necessary to achieve the avowed goals of development. This thesis can be substantiated by the concerns emanating from COP27 or the Policy initiatives in the wake of the Paris agreement. The government is working towards the objective of developing an electric mobility infrastructure with a reduced carbon footprint, high passenger density, and a focus on the restructuring of urban transportation. The sector also received an impetus from the government's series of incentives both at the production and the consumption levels. Moreover, in the light of the semi-conductor shortage and infrastructure challenges on the EV front, the government has brought about the much-needed revisions in the PLI schemes also.

While capex rose significantly from ₹ 55.6 billion in the first half year of FY 19 to ₹ 70.2.6 billion in the second half year of FY 23, capex as a proportion to sales, despite some occasional variations remained stuck at 4.1%. To bring about disruptive and game-changing transformation at this defining moment of history, capex has to rise significantly in both absolute and relative terms (as shown in Fig. 2).

Figure 2: CAPITAL EXPENDITURE

# Indian automobile manufacturers' capital expenditure



Source: Motilal Oswal

In its January 2023 Report, Goldman Sachs highlighted that some players may benefit from the energy transitions envisaged under the PLI schemes. These players are Reliance Industries, Dixon Technologies Ltd., Blue Dart Express, Amber Enterprises Ltd, Adani Ports and Special Economic Zones Ltd., and TVS Motors Ltd. Electronic manufacturing services, Components and its transportation services may be the direct beneficiaries of these PLI schemes. Along with that Banks will indirectly reap benefits from the credit needs of these companies.<sup>46</sup>

In terms of sales, the Indian Automobile industry grew rapidly this year. Due to Covid-19, the demand for PVs grew significantly. Supply chain constraints caused by the pandemic dented the capacity building of the car manufacturers both in developing and developed nations. Since the semiconductor shortage scenario is not transparent, it is difficult to suggest the precise course of action in the coming quarters. It is important that the report has not only emphasized the comparison of the current sales figures with the FY20 and FY21 figures, but also with the pre pandemic levels (as shown in Table 1 and 2). These figures show growth but it is still below the levels of FY18 and FY19. It is, therefore, suggested that the Government may not roll back the existing scheme and should rather extend it to other segments. It might be prudent to roll back the subsidies for the four-wheeler only after the market has become more competitive with reduced prices in the past years. Also, the stakeholders were not enthused by the fact that the automobile sector did not get any direct benefit in the Union Budget 2022-2023.

The government has announced a substantial hike in the Capex expenditure in the Budget this year. The data suggests that an increase in the capital outlays usually has multiplier effects in several the sector of the economy. This will provide a vital impetus for the sector. The Master plan for the expansion of national highways of completing 25000 kms in FY23 under PM GATISHAKTI program is consistent with the increasing demands for the vehicles.

In the past three years, there has been a considerable increase in the number of start-ups in the automobile sector. Indian start-ups provide a wide variety of services, from accessing new business prospects to fixing economic problems using technology. The eagerness and excitement of Indian entrepreneurs has led to growing firms and faster development in technology-based solutions for diverse human needs. The government has



provided tax incentive for such businesses; and especially for these start-ups, it is recommended that surcharges on capital gains may be further reduced. The policy renewal should focus on the tax rebates/incentives or increase in the subsidy for replacing ICEs with EVs, self-driving cars and high-performance hybrid cars.

The government may promote localization to produce auto as well as auto component, as there is a need to reduce India's dependency rates on imports in the pursuit of self-reliant development. Companies may engage management consultancies to maintain localization objectives and modify supply chain.

EVs charging stations infrastructure is a work in progress in India, if compared to other nations. India does have charging stations network, but they are either non-functional or they are far away from each other. Both the government and private charging stations are accessible in the tier-1 cities. Most of these stations are for four wheelers only. In sum, the infrastructure is not that advanced or up to the mark. The consumers need a universal form of charging ports that can be used for all types of EVs. Therefore, if the Government wants the consumers to choose EVs as a practical choice of transportation, they need to give a big push to the existing e-infrastructure to meet the surging needs.

Essentially, in its attempt to withstand the winds of change sweeping the world and bring about a sustained growth of the sector, the automobile sector is hampered by structural obstacles because of the inflationary spiral, new emissions norms, higher borrowing costs for consumers and more strikingly, the global shortage of semiconductors/ chip shortage during the Covid 19 pandemic. The medium-term growth story of the automobile sector in India is intact and robust. For, the sustained growth of the Indian economy is here to stay and there are justifiable expectations of a rise in productive employment and household income.

Further, there is immense latent potential for steady growth of the sector as the National Family Health Survey revealed only 8 per cent of households in India own cars. Over the years, India has emerged as a global sourcing hub with 90 of the top 100 auto-component suppliers present in India, India's reduced dependence on imports with high levels of localisation and an enabling trade policy. There is significant cost advantage with cost in India being 10-25 per cent lower than that of Europe and Latin America, Geographic proximity of key automotive manufacturing countries, including ASEAN countries and South Korea, and Asia emerging as a growing market because of its cost competitiveness, rising incomes, rapid urbanisation, improved infrastructure, and scope for greater vehicle penetration. But in view of the ambitious plans to significantly enhance the proportion of green cars, the automobile manufacturers need to focus on Research and Development (R&D) to bring about a paradigm shift to electric vehicles. This major shift has been driven by the initiatives from the car manufacturers because the rate of GST on EVs is 12% and a high-end SUV is charged 50%, the push to the Make in India campaign through the Energy Efficiency Services Limited (EESL) tender of procuring 10,000 cars and incentives to domestic component manufacturing for EVs and the development of an elaborate country-wide network of charging stations.

In a paradigm shift from resilience to resurgence, there must be an unwavering attention on domestic, international, and downstream growth for sustained growth of the industry over the long haul by synchronized measures<sup>47</sup>. This is a tall order and necessitates, *inter-alia*, measures such as, greater resilience in operations, especially the product, manufacturing, and supply-chain dimensions, promoting disruptive trends, especially within emerging markets, reimagining the partnership ecosystem, building the organization of the future and digitization and advanced analytics.

## REFERENCES

- <sup>1</sup> [https://www.sesei.eu/wp-content/uploads/2018/12/Automotive-Sector-Presentation\\_Final.pdf](https://www.sesei.eu/wp-content/uploads/2018/12/Automotive-Sector-Presentation_Final.pdf)
- <sup>2</sup> <https://timesofindia.indiatimes.com/blogs/voices/why-success-at-automobile-manufacturing-typifies-multi-regional-progress-in-india/?source=app&frmapp=yes>
- <sup>3</sup> <https://www.ibef.org/industry/india-automobiles>
- <sup>4</sup> <https://fada.in/images/press-release/16392ab5f7da10FADA%20Releases%20November'22%20Vehicle%20Retail%20Data.pdf>
- <sup>5</sup> [www.cars24.com/blog/6-factors-fueled-growth-used-car-industry-india/](http://www.cars24.com/blog/6-factors-fueled-growth-used-car-industry-india/)
- <sup>6</sup> <https://sdgs.un.org/goals>
- <sup>7</sup> Chaturvedi, B. K., Nautiyal, A., Kandpal, T. C., & Yaqoot, M. (2022). Projected transition to electric vehicles in India and its impact on stakeholders. *Energy for Sustainable Development*, 66, 189-200.
- <sup>8</sup> <https://fada.in/images/press-release/1624be480319abFADA%20Releases%20March%E2%80%9922%20and%20FY%E2%80%9922%20Vehicle%20Retail%20Data.pdf>
- <sup>9</sup> Future market insight report. Available at: <https://www.futuremarketinsights.com/reports/electric-vehicle-battery-market>
- <sup>10</sup> [https://indiaesa.info/images/pdf/press\\_release/Press\\_release-\\_India\\_EV\\_report\\_2019.\\_758346379.pdf](https://indiaesa.info/images/pdf/press_release/Press_release-_India_EV_report_2019._758346379.pdf)
- <sup>11</sup> [https://apedb.gov.in/automobile-industry.html#:~:text=India's%20electric%20vehicle%20\(EV\)%20market,higher%20electrification%20of%20the%20vehicle](https://apedb.gov.in/automobile-industry.html#:~:text=India's%20electric%20vehicle%20(EV)%20market,higher%20electrification%20of%20the%20vehicle)
- <sup>12</sup> MOBILISING FINANCE FOR EVs IN INDIA, 2021. Available at: [https://e-amrit.niti.gov.in/assets/admin/dist/img/new-frontend-img/report-pdf/mobilising\\_finance\\_for\\_evs\\_in\\_india\\_compressed-1-10.pdf](https://e-amrit.niti.gov.in/assets/admin/dist/img/new-frontend-img/report-pdf/mobilising_finance_for_evs_in_india_compressed-1-10.pdf)
- <sup>13</sup> Battery Swapping Policy, 2022. Available at: [https://www.niti.gov.in/sites/default/files/2022-04/20220420\\_Battery\\_Swapping\\_Policy\\_Draft.pdf](https://www.niti.gov.in/sites/default/files/2022-04/20220420_Battery_Swapping_Policy_Draft.pdf)
- <sup>14</sup> <https://m.economictimes.com/industry/renewables/mou-signed-with-ather-energy-to-set-up-1000-fast-charging-stations-for-electric-two-wheelers-in-karnataka/articleshow/89324571.cms>
- <sup>15</sup> <https://www.tatapower.com/media/PressReleaseDetails/1915/tata-power-partners-with-apollo-tyres-to-deploy-ev-charging-stations-at-its-commercial-passenger-vehicle-zones-across-india>
- <sup>16</sup> [https://www.business-standard.com/article/companies/tvs-motor-bmw-motorrad-join-hands-for-evs-first-product-in-24-months-121121501052\\_1.html](https://www.business-standard.com/article/companies/tvs-motor-bmw-motorrad-join-hands-for-evs-first-product-in-24-months-121121501052_1.html)
- <sup>17</sup> PIB August 2022. Available at: [https://pib.gov.in/Pressreleaseshare.aspx?PRID=1848751#:~:text=Under%20FAME%20India%20Scheme%20I,\(OMCs\)%20as%20on%2001.07.](https://pib.gov.in/Pressreleaseshare.aspx?PRID=1848751#:~:text=Under%20FAME%20India%20Scheme%20I,(OMCs)%20as%20on%2001.07.)
- <sup>18</sup> PIB press release 2022. Available at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1806077#:~:text=The%20Government%20approved%20the%20Production,outlay%20of%20%E2%82%B925%2C938%20crore.>
- <sup>19</sup> IBEF annual report, 2022. Available at: <https://www.ibef.org/industry/india-automobiles>
- <sup>20</sup> PIB press release 2022. Available at: [https://pib.gov.in/Pressreleaseshare.aspx?PRID=1848751#:~:text=Under%20FAME%20India%20Scheme%20I,\(OMCs\)%20as%20on%2001.07.](https://pib.gov.in/Pressreleaseshare.aspx?PRID=1848751#:~:text=Under%20FAME%20India%20Scheme%20I,(OMCs)%20as%20on%2001.07.)
- <sup>21</sup> PIB press release 2022. Available at: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1839628#:~:text=The%20eligibility%20criteria%20for%20the,over%2040%25%20of%20sales%20turnover.>
- <sup>22</sup> PIB press release 2022. Available at: [https://pib.gov.in/Pressreleaseshare.aspx?PRID=1848751#:~:text=Under%20FAME%20India%20Scheme%20I,\(OMCs\)%20as%20on%2001.07.](https://pib.gov.in/Pressreleaseshare.aspx?PRID=1848751#:~:text=Under%20FAME%20India%20Scheme%20I,(OMCs)%20as%20on%2001.07.)
- <sup>23</sup> <https://www.ibef.org/news/cabinet-approves-changes-in-pli-scheme-for-semiconductor-manufacturing>
- <sup>24</sup> <https://auto.economictimes.indiatimes.com/news/industry/sharp-uptick-in-fdi-in-auto-sector-in-2021-22-economic-survey/89252576>
- <sup>25</sup> <https://dpiit.gov.in/publications/fdi-statistics>

- 
- <sup>26</sup> [https://www.business-standard.com/article/economy-policy/fdi-likely-to-touch-100-billion-in-2022-23-industry-chamber-phdcci-122041400754\\_1.html](https://www.business-standard.com/article/economy-policy/fdi-likely-to-touch-100-billion-in-2022-23-industry-chamber-phdcci-122041400754_1.html)
- <sup>27</sup> PIB press release 2022. Available at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1806077#:~:text=The%20Government%20approved%20the%20Production,outlay%20of%20%E2%82%B925%2C938%20crore.>
- <sup>28</sup> IBEF annual report, 2022. Available at: <https://www.ibef.org/industry/india-automobiles>
- <sup>29</sup> Brundtland Report also called Our Common Future, publication released in 1987 by the World Commission on Environment and Development (WCED).
- <sup>30</sup> "Amid lockdown, India switches to BS-VI emission norms". The Hindu. 2 April 2020.
- <sup>31</sup> <https://pib.gov.in/PressReleasePage.aspx?PRID=1844628>
- <sup>32</sup> "Here's What the 2021 Global Chip Shortage is all About", Techwire Asia (3rd November 2021). Available at <https://techwireasia.com/2021/11/heres-what-the-2021-global-chip-shortage-is-all-about/>
- <sup>33</sup> Peter Hobson, "London market greenlights Russia's palladium while blocking its gold," Mining.com, March 8, 2022; Karvi Rana, "The Russian invasion of Ukraine to further cripple the semiconductor industry," Logistics Insider, February 16, 2022.
- <sup>34</sup> FADA research. available at: <https://fada.in/images/press-release/1624be480319abFADA%20Releases%20March%E2%80%9922%20and%20FY%E2%80%9922%20Vehicle%20Retail%20Data.pdf>
- <sup>35</sup> Times of India (2021). "Can't Grow An Automobile Industry With 50% Taxation": Maruti Chairman RC Bhargava. December 20.
- <sup>36</sup> <https://www.tecnovaglobal.com/blog/prominent-challenges-in-the-indian-automotive-sector-2022/>
- <sup>37</sup> <https://www.moneycontrol.com/news/automobile/budget-2022-what-the-automotive-sector-needs-8005531.html>
- <sup>38</sup> Bain & Company (2022). Electric Vehicles are Poised to Create a \$100B+ Opportunity in India by 2030.
- <sup>39</sup> <https://thewire.in/rights/world-population-day-withering-demographic-dividend#:~:text=India%20entered%20the%20demographic%20dividend,for%20the%20demographic%20dividend%20window.>
- <sup>40</sup> <https://www.selectcarleasing.co.uk/news/article/most-least-traffic-jammed-countries>
- <sup>41</sup> <https://www.wionews.com/india-news/india-426-die-each-day-in-road-accidents-18-per-hour-513143>
- <sup>42</sup> MoRTH Annual report 2021-2022. Available at: [https://morth.nic.in/sites/default/files/Annual%20Report\\_21-22-1.pdf](https://morth.nic.in/sites/default/files/Annual%20Report_21-22-1.pdf)
- <sup>43</sup> <https://www.newindianexpress.com/cities/delhi/2022/jun/06/2300-accidents-500-lives-lost-in-2022-so-far-data-2462338.html>
- <sup>44</sup> Price buildup for petrol in NCT of Delhi. Available at: <https://iocl.com/petrol-diesel-price>
- <sup>45</sup> Deepika Agarwal (2022). "Goodbye 2022: Five key developments in Indian automobile industry". Hindustan Times. 22 December.
- <sup>46</sup> [https://www.bqprime.com/business/goldman-picks-12-stocks-that-stand-to-benefit-from-production-linked-incentives?utm\\_source=whatsapp&utm\\_medium=referral&utm\\_campaign=socialshare](https://www.bqprime.com/business/goldman-picks-12-stocks-that-stand-to-benefit-from-production-linked-incentives?utm_source=whatsapp&utm_medium=referral&utm_campaign=socialshare)
- <sup>46</sup> McKinsey (2021). The Indian automotive industry: from resilience to resurgence. March 3