SESEI | Seconded European Standardisation Expert in India

Enabling Europe-India Cooperation on Standards

CEN - European Committee for Standardization
CENELEC - European Committee for Electrotechnical Standardization
ETSI - European Telecommunications Standards Institute
EC - European Commission
EFTA - European Free Trade Association

INDIAN AUTOMOBILE INDUSTRY

MAY 1, 2021

EU PROJECT SESEI

SESEI C/o European Business Technology Centre, Gate No. 3, DLTA Complex, South Block, 1st Floor, 1, Africa Avenue, New Delhi 110029
Tel: +91 11 3352 1500, **Fax:** +91 11 3352 1501 **Website:** http://www.sesei.eu

SESEI | Seconded European Standardisation Expert in India

Enabling Europe-India Cooperation on Standards

Table of Contents

1. Executive Summary

The year 2020 will go down the history hopefully soon, novel Corona Virus outbreak has had severe economic consequences across the globe, and it does not look like any country will be unaffected. This not only has consequences for the economy, but all our society is affected, which has led to dramatic changes in how businesses are conducted and the consumers behaviour.

Economies across the world plunged into deep contractions in the April-June quarter of 2020 and for India, the fall in real GDP during this quarter was the record lowest at 23.9 percent, with the Reserve Bank of India (RBI) calling it "historic technical recession". In 2020, the world economy shrank by 4.3 per cent, over two and half times more than during the global financial crisis of 2009. The modest recovery of 4.7 per cent expected in 2021, which would barely offset the losses of 2020, as per the UN Report. [1]

India's economy is estimated to contract by 9.6 per cent in 2020, as lockdowns and other containment efforts to control COVID-19 slashed the domestic consumption, and the growth is expected to recover and grow at 7.3 per cent in 2021, according to a UN report. The reform measures announced in the budget 2021-22 are aimed at taking India out of the COVID-19-induced downturn and making the country a better destination for private investment, both for domestic and foreign investors.

To overcome the unprecedented challenges created by the spread of novel coronavirus and related nationwide lockdown, government of India announced the economic package of Rs. 20 lakh crores (225B Euros) for uplifting the economy and making the country self-reliant. This special economic and comprehensive package was equivalent to 10% of India's GDP based on five pillars - Economy, Infrastructure, System, Vibrant Demography and Demand.

Before the lockdown enforced in the country, the Indian automotive sector had already undergone considerable slowdown due to structural changes beginning with the goods & services tax (GST), shift to e-mobility, the switch from BS-4 to BS-6 transition, liquidity crunch, etc. The COVID-19 lockdown has had a multiplier effect – the industry has almost been at a complete standstill since nationwide lockdown began in Mach 2020. A prolonged truncation of consumer demand due to the lockdown has significantly affected auto manufacturers' revenues and cash flows.

According to a parliamentary panel report submitted to Rajya Sabha, mainly due to Covid-19 pandemic and related lockdowns, the Indian automotive industry suffered loss of Rs 2,300 crore (250M Euro) per day and an estimated job loss in the sector was about 345,000.

In February 2018, The Department of Heavy Industry (DHI), Ministry of Heavy Industries & Public Enterprises (MoHI&PE) released the draft National Auto Policy (NAP)[2] to provide a long-term, stable, and consistent policy regime and to have a clear roadmap for the automotive industry, making India a globally competitive auto R&D and manufacturing hub and achieving the targeted objectives of green mobility". The AMP 2016-26[3] sets out clear targets for propelling Automotive industry amongst the top three nations in the world by 2026 where the focus will be on developing value-added components and not just conduct plain vanilla manufacturing.

[1] https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2021_FullReport.pdf
[2] https://www.dhi.nic.in/writereaddata/UploadFile/National%20Automotive%20Policy%20Draft%20v2.pdf
[3] http://www.siamindia.com/uploads/filemanager/47AUTOMOTIVEMISSIONPLAN.pdf

In November 2020, the government announced an outlay of INR 75,000 crore (8.3B Euro) for automobiles and components (including batteries) under the newly announced Production-Linked Incentive (PLI) scheme[4] with aims to accelerate domestic manufacturing.

In March 2021, Transport Ministry has announced the details for the country's much awaited "Vehicle Scrapping Policy"[5]. The objectives of the policy are to reduce population of old and defective vehicles, achieve reduction in vehicular air pollutants to fulfil India's climate commitments, improve road and vehicular safety, achieve better fuel efficiency, formalize the currently informal vehicle scrapping industry and boost availability of low-cost raw materials for automotive, steel and electronics industry.

Just like many other countries, The Indian auto industry is also set to witness major changes in the form of electric vehicles (EVs) and Intelligent Transport System (ITS) with aims to alleviate existing concerns including traffic congestion, fuel dependency, air & noise pollution etc.

In order to promote adoption of EVs in the country, Government of India has taken a slew of measures like demand incentives under FAME-II[6], reduction of GST on EVs from 12% to 5%, reduction of GST on chargers/charging stations for EVs from 18% to 5% and allowing the sale and registration of EVs without batteries. Ministry of Power has allowed sale of electricity as 'service' for charging of electric vehicles. This would provide a huge incentive to attract investments into charging infrastructure.

The Ministry of Road Transport & Highways (MoRTH) is allowing the grant of licence to age group of 16-18 years to drive gearless E scooters/Bikes upto 4.0 KW[7] and Ministry of Housing and Urban Affairs has made amendment in the Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines[8] to provide for electric vehicle charging stations in private and commercial buildings.

Subsequently, multiple state governments have been providing incentives to attract electric vehicle (EV) manufacturing in their states, and to fast-track adoption of EVs.

Despite many announcements to promote adoption of EVs in the country, EV market continues to be at a very nascent stage and barely contribute 0.1% in private vehicles, about 0.2% in two-wheelers and nearly zero for commercial vehicles due to various challenges such as High price of EVs, Lack of adequate charging points, long charging time and less awareness among consumers. According to Society of Manufacturers of Electric Vehicle (SMEV)[9], sales of EVs in India fell 20% in the financial year 2020-21 to 2,36,802 units as compared to 2,95,683 units In FY20.

MoRTH acts as a nodal agency for formulation and implementation of various provisions of the Motor Vehicles Act (MVA), 1988[10], and Central Motor Vehicle Rules (CMVR), 1989[11]. MoRTH has constituted three committees namely, CMVR - Technical Standing Committee (CMVR-TSC), Standing Committee on Implementation of Emission Legislation (SCOE) and Automotive Industry Standards Committee (AISC) to deliberate and advise the ministry on issues relating to safety and emission regulations.

[4] https://pib.gov.in/PressReleasePage.aspx?PRID=1703785
[5] https://www.hindustantimes.com/india-news/govt-to-provide-tax-incentives-against-vehicle-scrappage-gadkari-101616057294684.html
[6] https://fame2.heavyindustry.gov.in/
[7] https://www.thehindu.com/news/national/kerala/now-a-16-year-old-can-drive-e-scooter/article25813038.ece
[8] https://archive.pib.gov.in/documents/rlink/2019/feb/p201921503.pdf
[9] https://evreporter.com/ev-sales-report-for-fy-2020-21-by-smev/#:~:text=In%20FY20%2D21%2C%20the%20Indian,and%20low%20speed%20EVs%20%E2%80%93%20103%2C000.
[10] https://legislative.gov.in/sites/default/files/A1988-59.pdf
[11] https://morth.nic.in/central-motor-vehicles-rules-1989-1

In the Indian Automotive sector, the main bodies to engage in the standards formulation are Bureau of Indian Standards (BIS) and Automotive Research Association of India (ARAI). BIS is developing standards through its two technical committees i.e., Transport Engineering Division Council (TED) & Electrotechnical Division Council (ETD). ETD is preparing Indian Standards for electrotechnical aspects of totally or partly electrically propelled road vehicles. Ministry of Heavy Industry (MHI) has also come out with recommendations in the form of specifications for AC and DC chargers namely Bharat EV Charger AC-001 and Bharat EV Charger DC-001.

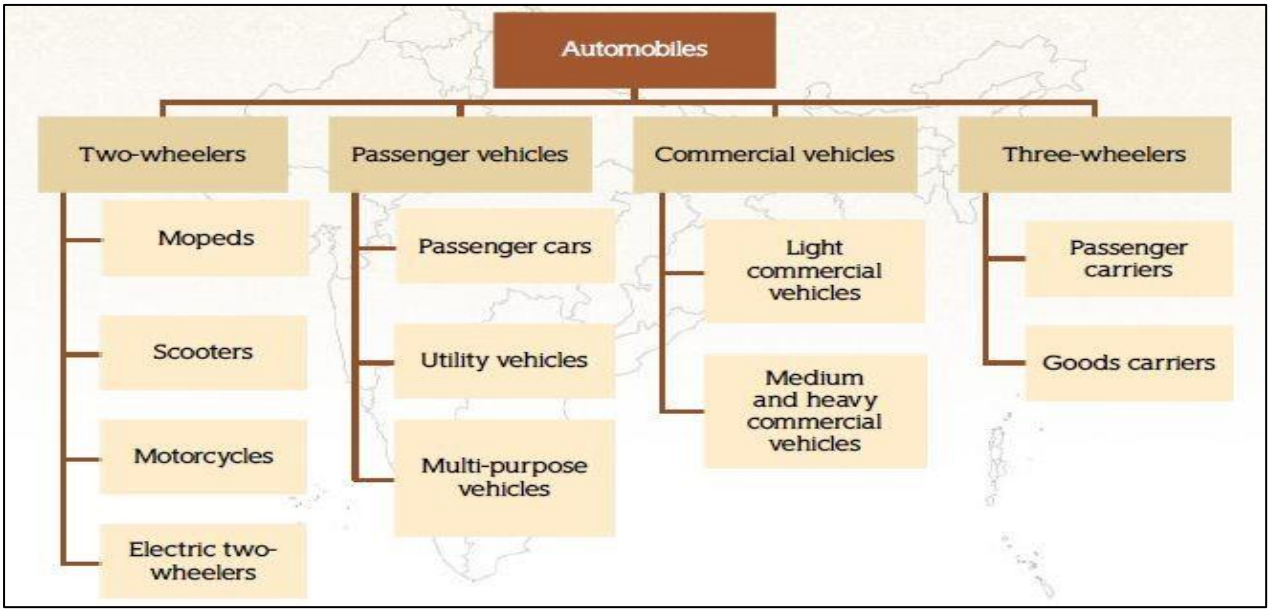
In this report, we have also provided details of Key players in Indian Automotive Industry, Automobile manufacturing hubs in India, Growth drivers of the Industry.

2. Introduction

Indian Automobile sector is the 4th largest vehicle market in the world. As per the current statistics, the auto industry's turnover is estimated to be equivalent to:

- 7.1% of overall GDP
- About 26% of Industry GDP
- About 49% of manufacturing GDP
- Employs 29 million people (directly and indirectly), and
- Contributes to 13% of excise revenue for the Government.

The industry manufactured over 26 million vehicles including Passenger Vehicles, Commercial Vehicles, Three Wheelers, Two Wheelers and Quadricycles in FY20, of which over 4.7 mn are exported. India holds a strong position in the international heavy vehicles arena as it is the largest tractor manufacturer, second-largest bus manufacturer and third largest heavy trucks manufacturer in the world.



COVID-19 has also changed the preferred mode of travel among passengers due to hygiene and health issues, with 56% of people choosing to use a personal vehicle over a public or shared transport as per

a recent survey done by PGA Labs[12]. This increased preference for personal mobility vehicles is expected to drive vehicle demand in the post-COVID world. Other key growth drivers are **Low car penetration and rise in income, Greater Availability of cheaper and easier finance, among others.**

The INR 8.7 trillion (US$ 118 billion) Indian automobile industry is expected to reach INR 16- 18 trillion (US$ 251- 282 billion) by 2026 with strong policy support from the government**.** Initiatives like Make in India[13], Automotive Mission Plan 2026[14], Production Linked Incentives (PLI)[15], Phased Manufacturing Programme for EVs[16] and Vehicle Scrapping Policy[17] by the government are expected to give a huge boost in revenue to the sector.

Two-wheelers and passenger vehicles dominate the domestic Indian automobile market and account for 81% and 13% of total unit sales, respectively. Passenger car sales are dominated by small and mid-sized cars.

The top companies like Maruti Suzuki, Hyundai Motors, M&M, Tata Motors, Ashok Leyland, Hero MotoCorp, HMSI, TVS, Bajaj Auto and Piaggio etc. with their ever-expensive dealing networks, promotional, convenient customer services have played a key role in the growth and development of the automobile industry in India.

3. Current status

3.1. Performance of Auto Industry in 2019-20

Production:

The industry produced a total 26,362,282 vehicles including Passenger Vehicles, Commercial Vehicles, Three Wheelers, Two Wheelers and Quadricycles in April-March 2020 as against 30,914,874 in April-March 2019, registered a negative growth of 14.73% over the same period last year.

Automobile Production Trends

Category	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Passenger Vehicles	3,221,419	3,465,045	3,801,670	4,020,267	4,028,471	3,434,013
Commercial Vehicles	698,298	786,692	810,253	895,448	1,112,405	752,022
Three Wheelers	949,019	934,104	783,721	1022,181	1,268,833	1,133,858

[12] https://auto.economictimes.indiatimes.com/news/industry/opinion-top-10-disruptive-trends-in-the-indian-automobile-industry/79609205
[13] https://www.makeinindia.com/
[14] https://www.siam.in/uploads/filemanager/47AUTOMOTIVEMISSIONPLAN.pdf
[15] https://www.autocarpro.in/news-national/centre-announces-rs-75-000-crore-manufacturing-incentive-scheme-for-india-auto-inc-77715
[16] https://dhi.nic.in/writereaddata/fame/famedepository/1-pmp.pdf
[17] https://www.businesstoday.in/current/economy-politics/modi-govt-vehicle-scrappage-policy-all-you-need-to-know/story/434413.html

Two Wheelers	18,489,311	18,830,227	19,933,739	23,154,838	24,499,777	21,036,294
Quadricycle*	--	531	1,584	1,713	5,388	6,095
Grand Total	**23,358,047**	**24,016,599**	**25,330,967**	**29,094,447**	**30,914,874**	**26,362,282**

*Only Oct-March 2016 data is available for 2015-16

The latest data from SIAM showed that the total production of Passenger Vehicles, Commercial Vehicles, Three-wheelers, Two-wheelers and Quadricycle in FY-21 was 22,652,108 units, as against 26,362,282 units in FY-20, witnessing a de-growth of 16.37%.

Sales:

The sale of Passenger Vehicles declined by (-) 17.88% in April-March 2020 over the same period last year. Within the Passenger Vehicles, the sales of Passenger Cars and Vans declined by (-) 23.58, percent and (-) 39.23 percent respectively while sales of Utility Vehicles marginally increased by 0.48 percent in April-March 2020 over the same period last year.

The overall Commercial Vehicles segment registered a de-growth of (-) 28.75 percent in April- March 2020 as compared to the same period last year. Within the Commercial Vehicles, Medium & Heavy Commercial Vehicles (M&HCVs) and Light Commercial Vehicles declined by (-) 42.47 percent and (-) 20.06 percent respectively in April-March 2020 over the same period last year.

Sale of Three Wheelers declined by (-) 9.19 percent in April-March 2020 over the same period last year. Within the Three Wheelers, Passenger Carrier and Goods Carrier declined by (-).8.28 percent and (-)13.27 percent respectively in April-March 2020 over April-March 2019.

Two Wheelers sales registered a de-growth of (-) 17.76 percent in April-March 2020 over April-March 2019. Within the Two Wheelers segment, Scooters, Motorcycles and Mopeds declined by (-) 16.94 percent, (-) 17.53 percent and (-) 27.64 percent respectively in April-March 2020 over April-March 2019.

Automobile Domestic Sales Trends

Category	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Passenger Vehicles	2,601,236	2,789,208	3,047,582	3,288,581	3,377,389	2,773,575
Commercial Vehicles	614,948	685,704	714,082	856,916	10,07,311	717,688
Three Wheelers	532,626	538,208	511,879	635,698	7,01,005	636,569

Two Wheelers	15,975,561	16,455,851	17,589,738	20,200,117	21,179,847	17,417,616
Quadricycle#		0	0	0	627	942
Grand Total	**19,724,371**	**20,468,971**	**21,863,281**	**24,981,312**	**26,266,179**	**21,546,390**

#Only Aug 18 -March 2019 data is available for 2018-19

Exports:

In April-March 2020, overall automobile exports registered a growth of 2.95%. While Commercial Vehicles and Three Wheelers exports declined by (-) 39.25% and (-) 11.54%, respectively. However, Passenger Vehicles exports marginally increased by 0.17% and Two wheelers' exports registered a growth of 7.30% in April-March 2020 over the same period last year.

Automobile Exports Trends

Category	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Passenger Vehicles	6,21,341	6,53,053	7,58,727	7,48,366	6,76,192	6,77,311
Commercial Vehicles	86,939	1,03,124	1,08,271	96,865	99,933	60,713
Three Wheelers	4,07,600	4,04,441	2,71,894	3,81,002	5,67,683	5,02,169
Two Wheelers	24,57,466	24,82,876	23,40,277	28,15,003	32,80,841	35,20,376
Quadricycle*		334	1,556	1,605	4,400	5,185
Grand Total	**35,73,346**	**36,43,828**	**34,80,725**	**40,42,841**	**46,29,049**	**47,65,754**

*Only Oct-March 2016 data is available for 2015-16

At present, Maruti Suzuki India Ltd, Hyundai Motor India, and Ford Motor India are the top three passenger vehicle exporters in the country. On the other hand, Bajaj Auto Ltd and TVS Motor are the leading exporters of two-wheelers.

3.2. Status of EVs in India

Electric vehicle (EV) ecosystem in India continues to be at a very nascent stage. Presently, pure electric vehicle penetration in India is barely 0.1% in private vehicles, about 0.2% in two-wheelers and nearly zero for commercial vehicles. However, the demand for electric vehicles has grown over two times in the last three years.

According to Society of Manufacturers of Electric Vehicle (SMEV), sales of EVs in India fell 20% in the financial year 2020-21 to 2,36,802 units as compared to 2,95,683 units In FY20.

- **E2W segment**: sales declined by 6% to 1,43,837 units, as compared to 1,52,000 units in FY20. E2W sales included 40,836 high-speed and 1,03,000 low-speed E2W.
- **E3W segment**: Registered sales of 88,378 units as against 140,683 units sold in FY20. The data doesn't include E3Ws that are not registered with the transport authority.
- **E4W segment**: the industry witnessed registration of 4,588 units, compared to 3,000 units in FY20, a jump of 53%.

According to a report by India Energy Storage Alliance (IESA), the electric vehicle (EV) market in India is expected to hit over 63 lakh unit mark per annum by 2027.

Challenges for EVs adoption in India:

India is gradually moving towards Electric vehicles (EVs) but It is not to say that it will be a smooth ride. There are many challenges that India may face, to successfully meet its goal of having 100% electric vehicle fleet on road by 2030. These include the following:

- **High price of EVs**: Electric Vehicles are too expensive in India due to the high cost of battery. Since batteries involve mined elements and raw materials, the cost of procuring these is high, plus the manufacturing process is expensive as well, requiring specialised facilities such as dry rooms. Given all this, the battery accounts for 40% – 50% of the total cost of manufacturing an electric vehicle. In India, most manufacturers rely on batteries imported from China, South Korea, Japan, and Europe. Government of India has proposed to offer $4.6 Bn incentives to companies setting up advanced battery manufacturing facilities as it seeks to promote the use of electric vehicles in the country.

- **Lack of adequate charging Infrastructure:** The lack of proper electric vehicle charging infrastructure poses one of the greatest obstacles in the rapid adoption of electric vehicles in India. In order to establish an adequate EV charging infrastructure to encourage users to consider EVs, Government has allocated INR 1000 crore (€115 million) for a period of 3 years for establishment of EV charging infrastructure under FAME-II, which will be established as per "Charging Infrastructure for Electrical Vehicles- Guidelines and Standards" released by Ministry of Power. List of Charging Station on 19-9-2020 are available here.

- **Long charging time:** Just like conventional vehicles rely on petrol pumps or gas stations for refuelling, the mass adoption of electric vehicles mandates a robust charging infrastructure. the charging process of EVs can take anywhere from 30 minutes (in case of fast charging) up to 24 hours, depending on the capacity of the battery and motors. Most, however, take around four to six hours to be fully charged, which is several times longer than the time it takes to refuel a petrol/diesel car.

- **Lack of Consumer awareness and price sensitivity:** One of the key challenges faced by the EV globally is the lack of consumer awareness about EVs. Traditionally, the Indian consumer is extremely price sensitive and would be hesitant to invest in environmentally friendly products that are too expensive. Unless the battery and other electro-mobility parts are economically at par with the established ICE engine market, it is difficult for EVs to make a dent in the Indian market. EVs are expensive primarily due to their costly batteries which are mostly imported. The government also plans to set up a lithium-ion battery-making facility under Bharat Heavy Electricals. In parallel, gradual improvements in the other technologies including motors would bring a decline in the overall costs of EVs and help set the base for market establishment.

Top 10 Electric Vehicle manufacturers in India & their innovations:

Here is a list of top 10 EV manufacturers in the country:

1. **Hero Electric:** Hero Electric, a part of Hero Group, has already rolled out more than a dozen electric vehicles in the country. The company has been among the front runners in the EV segment and has e-2Ws as well as e-3Ws. Across its ER series, E2 series and E5 series, Hero electric rolls out a range of Optima, Nyx, Flash and Photon electric scooters.

2. **Tata Motors:** Tata Motors has lately unveiled the Nexon in electric version as well that has been introduced with ZIPTRON technology. The company will launch the Nexon EV in a price bracket of Rs 15-17 lakhs and will target range of 300 km to address range anxiety issues often related to EVs in the country. It has also supplied Tata Tigor in electric version to Energy Efficiency Services Limited (EESL).

3. **Ather Energy:** Ather Energy launched its Ather 450 & Ather 340 electric scooter Models in India last year that have been primarily designed for city usage. The company claims that both the electric scooters have been designed to address various problems in EV two-wheeler segment such as slow charging, low powered motors as well as shorter battery life. Ather Energy is also offering Ather One plan that includes free access to public and home charging, breakdown assistance as well as unlimited data service among others.

4. **Mahindra Electric**: Mahindra spearheaded the electric vehicle revolution in the country with its very first and much famous Reva electric car. Over the years the company has diversified into various segments and offers a range of electric vans, electric autos and e-three wheelers like Mahindra E2o, Mahindra eAlfa Mini, Mahindra eSupro, Mahindra Treo and Mahindra eVerito.

5. **Lohia Auto**: Lohia Auto offers a range of electric scooters, electric three wheelers as well as e-autos in the country. Comfort E-Auto HS by Lohia Auto was launched at Delhi Auto Expo in 2018 that offers a load capacity of 40 kg and offers a seating for five people including the driver.

6. **TwentyTwo Motors**: Rolling out electric scooters in India, TwentyTwo Motors tied up with Taiwanese electric two-wheeler manufacturer Kwang Yang Motor Company (KYMCO) to expand its horizons in the country. Both companies will be developing various charging solutions across fast charging, standard charging as well as battery swapping.

7. **BYD Olectra**: Among the leaders in electric buses segment, Olectra BYD claims to sell over 100 electric vehicles in the country across various state transport undertakings. Nearly 40 e-buses

spanning 12m in length have been deployed by Telegana Stated Road Transport Corporation have been supplied by Olectra BYD.

8. **Hyundai Kona electric:** Charging up the Indian electric vehicle ecosystem, Hyundai launched its Kona EV in India with ARAI-certified range of 452 km. The Kona is equipped with lithium-ion polymer battery, against the conventional nickel-metal hybrid batteries for excellent charging and discharging efficiency. The company claims the EV has been designed to make it more suitable for Indian operating conditions.

9. **Ashok Leyland:** Ashok Leyland, the fourth largest bus maker in the world, unveiled its first electric bus Circuit in 2016 and Circuit S at the 2018 Delhi Auto Expo. The company claims its electric buses are designed for Indian conditions and has tied up with Sun Mobility to enhance its expertise in electric vehicle domain and introduce battery swapping in electric buses to address e-mobility needs in the country.

10. **MG Motor**: MG Motor has created a lot of buzz with its Hector SUV and has also lately introduced its MG ZS electric car. Strategically placed against Hyundai Kona electric, The MG ZS offers ARAI certified range of 340 kms and can be charged via two options- using normal 15 A AC charger in about 6-8 hours and 50 kW DC charger that can charge the vehicle up to 80 % in less than an hour.

The EV segment offers a huge business potential for Indian manufacturers across the value chain which includes manufacturers, traders as well as service providers. Electric vehicle range anxiety as well as charging infrastructure uncertainty continues to pose hurdles for electric vehicle adoption in the country. Despite a low volume segment, the electric vehicles and its manufacturers are growing in the country at a rapid clip. However, EV adoption will depend largely on stakeholders such as OEMs, start-ups, charging infrastructure developers along with battery manufacturers to come together and aim at a collaborative participation.

3.3. Status of ITS in India

Intelligent Transport Systems (ITS) add information and communications technology (ICT) to transport infrastructures and vehicles to improve their safety, reliability, efficiency and quality. In India, ITS is at its nascent stages. Most uses of ICT technologies that have so far been restricted application of Electronic Toll Collection (ETC) technologies on national and state highways, use of technologies for tracking, surveillance and information systems on public transport, and parking management systems in cities. Systems like electronic ticketing and automated fare collection systems have been mostly limited to metro systems.

At present, ITS has been partially implemented in very few cities in India including Mumbai, Bangalore, Surat, and Bhopal etc.

Key ITS developments in India:

- One of the successful ITS development that the Automotive Research Association of India (ARAI) came up with was AIS-140[18]. Along with that, optimizing toll collection booths to go cashless, with the help of RFID tags, also falls in the bracket of ITS, and has been a well-performing initiative.

[18] https://hmr.araiindia.com/Control/AIS/14201910518PMAIS-140.pdf

- Telecom Engineering Centre (TEC) of Department of Telecommunications (DoT) under Ministry of Communication has also come out with following two technical reports on related to ITS, detailing sector specific requirements/use cases to carry out gap analysis and future action plans with possible models of service delivery.
    i. M2M Enablement in Intelligent Transport Systems
    ii. V2V/ V2I Radio communication and Embedded SIM

- Telecommunication Standards Development Society, India (TSDSI) has also released a technical report "TSDSI RPT TR-1011 V1.0.0: Study on M2M Use Cases in Transportation Vertical from Indian Context" in February 2016. The objective of this report is to lay emphasis on a national ITS roadmap and create a sustainable model for deployment. This report is available here[19] for downloading.

- In 2017, NITI Aayog and International Road Federation (IRF) signed a Statement of Intent to cooperate in the field of ITS in India[20]. NITI Aayog has also set up a national level committee with members from various ministries and states for developing and implementing ITS to drive smarter mobility in the country[21].

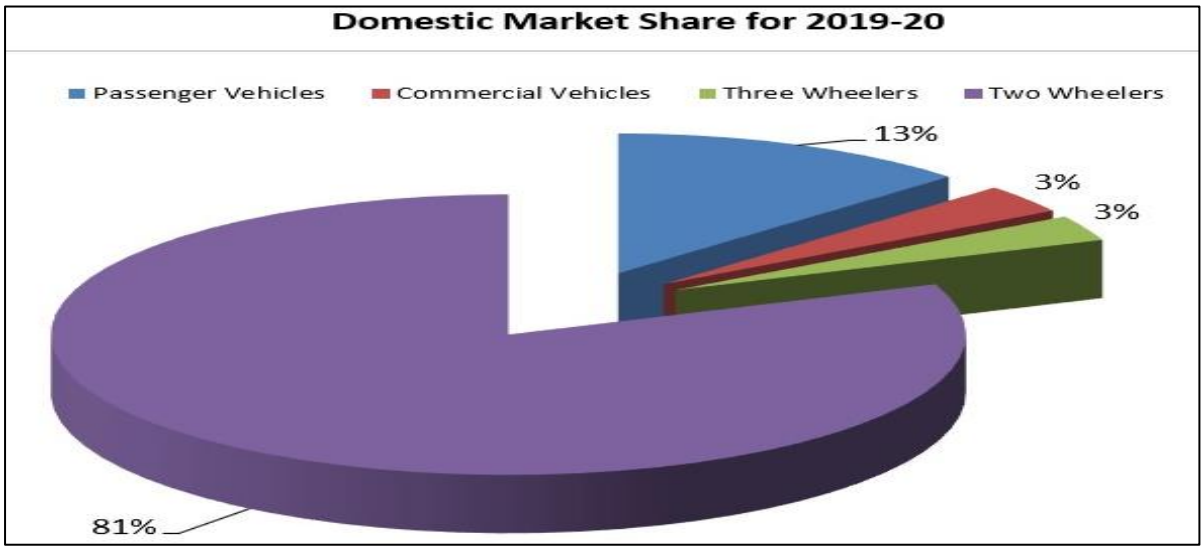
4. Market Segment

The Two Wheelers segment with 81% market share is the leader of the Indian Automobile market owing to a growing middle class and a young population. Moreover, the growing interest of the companies in exploring the rural markets further aided the growth of the sector. This is followed by passenger vehicles having a share of 13%. Commercial vehicles and three-wheelers have about 3% share each in the automobile industry.

Domestic Market Share for 2019-20	
Passenger Vehicles	13%
Commercial Vehicles	3%
Three Wheelers	3%
Two Wheelers	81%
Grand Total	**100%**

Source: SIAM

[19] https://members.tsdsi.in/index.php/s/kAkwppmQBVvwf7Q
[20] https://www.maritimegateway.com/niti-aayog-irf-geneva-cooperate-intelligent-transportation-systems/#:~:text=The%20National%20Institution%20for%20Transforming,Intelligent%20Transportation%20Systems%20(ITS).
[21] https://www.autocarpro.in/news-national/niti-aayog-plans-intelligent-transportation-systems-policy-india-26517



5. Key players/Manufacturers in India

India Automotive industry has emerged as a leading centre for big manufacture of two wheelers, small cars, passenger vehicles and commercial vehicles. Aautomobile industry in India is clearly dominated by 3 to 4 players in every vehicle category. The market share is mainly for top players in each segment based on vehicle sale for the period FY20.

Passenger vehicles FY21 sales Performance:

Maruti Suzuki, Hyundai Motor India, Tata Motors, Mahindra & Mahindra and Toyota Motor stand in top 5 In terms of market share followed by Honda Cars, Renault, Kia, Ford, Volkswagen, General Motors, Nissan etc.

Manufacturer-wise sales (PVs)				
Manufacturer	**FY21 sales**	**FY20 sales**	**Growth**	**Share FY21 (%)**
Maruti Suzuki	14,57,861	15,63,297	-6.7%	53.8
Hyundai	4,71,535	4,85,309	-2.8%	17.4
Tata Motors	2,22,025	1,31,197	69.2%	8.2
Mahindra	1,57,216	1,86,977	-15.9%	5.8
Toyota	93,134	1,14,081	-18.4%	3.4
Honda	82,074	1,02,016	-19.5%	3
Others	2,27,612	1,90,698	19.4%	8.4
Total	**27,11,457**	**27,73,575**	**-2.2%**	**100**

Maruti Suzuki

The Market share of Maruti Suzuki stood at 53.8% at the end of FY21. Maruti Suzuki reported total sales of 14,57,861 units in FY 2020-21, down 6.7% from 15,63,297 units in 2019-20. The domestic sales

in the 2019-20 financial year had fallen by 18% due to reasons that are well known, and in the 2020-21 fiscal the dispatches have been impacted due to COVID related factors.

Hyundai India

Korean rival Hyundai Motor India holds 2nd position in passenger vehicles segment with sale of 4,71,535 units in FY 21.

Tata Motors

Homegrown auto major Tata Motors has claimed the third position in passenger vehicle sales for the financial year 2020-21. The company sold 222,025 passenger vehicles in FY 21. Compared to 131,196 units from the previous fiscal, Tata saw a growth of 69% despite the downturn of the auto sector. This is even more of a milestone achievement as due to the coronavirus pandemic lockdown, the entire auto industry, like others, was not operational for around two months.

M&M

The company stood at the fourth position with the sale of 157,216 units of passenger vehicles in FY 21. The company's total Passenger Vehicles sales declined 16% to 157,216 units from 186,977 units in FY20. Within the segment, Utility Vehicles sales stood at 1,55,530 units, while sale of Cars and Vans stood at 1,686 units, registering a negative growth of 13% and 78% respectively.

Toyota Kirloskar Motor

In FY 2020-21, the company sold 93,134 units, which is 18.36% lower than FY 2019-20 when it sold 114,081 units.

Commercial Vehicle sale FY21:

Tata Motors, Mahindra & Mahindra, Ashok Leyland, VECVs – Eicher and Force Motors stands in top 5 in terms of market share based on sale of vehicle for the period FY21 followed by SML Isuzu, Maruti Suzuki India, VECVs – Volvo, Piaggio Vehicles, and Isuzu Motors India etc..

Commercial Vehicle				
Manufacturer	**FY21 sales**	**FY20 sales**	**Growth**	**Share FY21 (%)**
Tata Motors	2,42,490	3,10,855	-22.0%	42.64
Mahindra	1,57,216	1,86,977	-16%	27.65
Ashok Leyland	1,00,715	1,25,200	-20%	17.71
VE Commercial Vehicles (VECV)	41,268	48,721	-15.3%	7.25
Others	26,870	45,935	-41.5%	4.72
Total	**5,68,559**	**7,17,688**	**-20.8%**	**100**

Tata Motors:

In FY21, Tata Motors's commercial vehicle (CV) sales in the domestic market stood at 242,490 units, down 22% from 310,855 units in the last year.

Tata Motors (CVs)			
Category	**FY21**	**FY20**	**% change**
M&HCV	58,580	75,485	-22
I & LCV	38,058	41,949	-9
Passenger Carriers	8,599	37,698	-77
SCV cargo and pickup	1,37,253	1,55,723	-12
Total	**2,42,490**	**3,10,855**	**-22**

Source: Tata Motors

Within the segment, company sold 58,580 units of M&HCV, 38,058 units of I & LCV, 8,599 units of Passenger Carriers and 1,37,253 units of SCV cargo and pickup.

Export demands of CVs were also in the same boat recording de-growth of -32% with 20,283 units shipped, compared to 29,845 units from the previous fiscal.

M&M:

Mahindra & Mahindra sold 1,56,159 units in FY21, registered a negative growth of 21% when compared to 1,99,131 units sold in FY20.

M&M (CVs)			
Category	**FY21**	**FY20**	**% change**
LCV <2T	23,789	36,466	-35
LCV 2 T – 3.5 T	1,28,100	1,51,393	-15
LCV > 3.5T + MHCV	4,270	11,272	-62
Total	1,56,159	1,99,131	-21

Source: M&M website

Export for the FY21 stood at 18,381 units, down 32% as compared to 27,026 units in FY20.

Ashok Leyland:

Ashok Leyland commercial vehicle sales declined by 19.5% to 1,00,715 units in FY21 from 1,25,200 units in FY20.

Ashok Leyland (CVs)			
Category	**FY21**	**FY20**	**% change**
M&HCV Passenger	5,555	55,231	-89.9
M&HCV Goods	46,252	23,323	98.3
LCV	48,908	46,646	4.8
Total	1,00,715	1,25,200	-19.5

Export for the FY21 stood at 8,001units, down 10.3% as compared to 8,920 units in FY20.

VE Commercial Vehicles:

E Commercial Vehicles (VECV), a Volvo Group and Eicher Motors joint venture reported a negative growth of 15.3% in sales for FY21 at 41,268 units. The company had sold 48,721 units in FY20.

Two/Three Wheelers sale FY21

Hero MotoCorp (HMCL):

In the financial year 2020-2021, the company sold 5,790,979 units (domestic + export) as compared to 6,409,719 units in FY 2019-2020, down 9.64%. This includes domestic sales of 55,99,859 units and exports of 191,120 units.

2-Wheelers				
Companies	**FY2020-21**	**FY2019-20**	**% change YoY**	**Market share FY21**
HeroMotoCorp	55,99,859	62,31,458	-10.14%	37.04%
Honda	38,65,872	47,06,589	-17.86%	25.57%
TVS Motor Company	21,64,228	24,10,550	-10.22%	14.31%
Bajaj Auto	18,09,375	20,78,348	-12.94%	11.97%
Royal Enfield	5,73,438	6,56,651	-12.67%	3.79%
Others	11,06,615	13,34,020	-17.05%	7.32%
Total	**1,51,19,387**	**1,74,17,616**	**-13.19%**	**100.00%**

Source: ET Auto.com

3-Wheelers			
Company	**FY21**	**FY20**	**Change %**
Bajaj Auto (BAL)	3,67,021	6,67,644	-45.03%
TVS Motors	1,23,596	1,73,911	-28.93%
M&M	20,525	62,187	-66.99%

Honda Motorcycle & Scooter India Pvt Ltd (HMSI):

HMSI closed FY21 with a decline of 19.04% in total sales at 4,073,182 units. This includes domestic sales of 3,865,872 units and exports of 207,310 units. In 2019-20, the company's total sales stood at 50,31,297 units which included domestic sales of 47,06,572 units and exports of 324,725 units.

Bajaj Auto (BAL):

In FY 21, Bajaj Auto 2W sales declined by 8.7% to 36,05,893 units as compared to 39,47,568 units in FY20. 3W sales also registered a negative growth of 45% in FY21, stood at 3,67,021 units as compared to 6,67,644 units in FY20.

Total Exports of 2W and 3W stood at 20,54,247 units in FY21, down 5.4%, when compared to 21,71,105 units in FY20.

TVS Motors:

TVS Motors closed FY21 with an overall negative growth of 6.5%. the total sale of 2W & 3W stood at 30,51,863 units in FY21 as compared to 32,63,352 units in FY20.

Royal Enfield:

For the 2020-21 fiscal, the company reported total sales of 6,12,350 units, down 12% from 6,95,959 units in 2019-20.

6. Automobile & Components Manufacturing hubs in India.

As per Invest India report titled "Great Places for Manufacturing in India" released in May 2020, There are following established automobile/automobile components manufacturing hubs in India

- Pune-Aurangabad, Maharashtra
- Chennai-Sriperumbudur-Oragadam, TamilNadu and SriCity, Andhra Pradesh
- Manesar-Faridabad-Gurugram, Haryana

Following are the emerging automobile/automobile components manufacturing hubs in India.

- Sanand-Mandal-Bechraji, Gujarat
- Bengaluru-Bidadi, Karnataka and Hosur, Tamil Nadu

Automobile & Automobile Components Manufacturing hubs in India		
Region, State	**Major Occupier**	**Remarks**
Pune-Aurangabad, Maharashtra	Fiat, GM, Volkswagen, Mercedes-Benz, Tata Motors, Bajaj Auto, JLR, Mahindra & Mahindra, Skoda Auto, Goodyear Tyres, Balkrishna Tyres, Duro Valves, Force Motors, JCB, Sany, John Deere, Continental, Minda, Carraro	Maharashtra accounts for ~35% of India's output of automobiles by value.

Chennai-Sriperumbudur-Oragadam, TamilNadu and SriCity, Andhra Pradesh	Hyundai Motor, Schwing Stetter, Daimler Commercial Vehicles, RenaultNissan, Yamaha Motors, Bharat Benz, Eicher, Ashok Leyland, BMW, Royal Enfield, Isuzu, Komatsu, Ford, TAFE, CEAT Tyres	Part of Chennai and surrounding areas, which are popularly nicknamed "Detroit of India", due to the large presence of auto industry.
Manesar-Faridabad-Gurugram, Haryana	Maruti Suzuki, Honda Motorcycle and Scooter, Suzuki Powertrain, Suzuki Motorcycle, Hero Motors, Mitsubishi Electric Automotive, Harley Davidson, Yamaha Motors, JCB, Ecorts Tractors, Minda	Home to the first and largest plant of India's largest automobile manufacturer – Maruti Suzuki.
Sanand-Mandal-Bechraji, Gujarat	Tata Motors, Ford Motors, Suzuki Motors, Honda Motorcycle and Scooter	~102 sq. kms. of MBSIR (Mandal Bechraji Special Investment Region) being developed as an industrial hub, including a Japanese zone.
Bengaluru-Bidadi, Karnataka and Hosur, Tamil Nadu	Toyota Kirloskar, Mahindra Reva Electric, TVS Motors, Ashok Leyland, Continental	Karnataka is the R&D hub of India with 400+ R&D institutes.

Sources: https://www.mahindraworldcity.com/wp-content/uploads/2020/06/Great-Places-for-Manufacturing-in-India-Report-by-Invest-India-and-JLL.pdf

Pithampur, near Indore, Madhya Pradesh is an auto cluster with the presence of players such as VE (Volvo-Eicher) Commercial Vehicles, Man Trucks, Mahindra 2-wheelers, Force Motors, Bridgestone Tyres, Caparo India, Liugong, Pinnacle Auto, JBM etc.

India is fast on its way to becoming the primary global automobile manufacturer. The government of India is more than willing to lead this charge and assist this sector in every way to help it achieve its full potential".

7. Growth drivers

- **Rising adoption of personal mobility**: India is expected to become the youngest nation by 2025 with an average age of 25 years. A young population leads to higher personal vehicle ownership. In addition, COVID-19 has also changed the preferred mode of travel among passengers due to hygiene and health issues, with 56% of people choosing to use a personal vehicle over a public or shared transport as per a recent survey done by PGA Labs. This increased preference for personal mobility vehicles is expected to drive vehicle demand in the post-COVID world.

- **Low car penetration and rise in income:** Car ownership stood at 30 vehicles for every thousand Indians at the end of 2018 and is expected to reach 72 vehicles per 1000 people by 2025 due to rise in per capita income in India. As per the data released by Ministry of Statistics and Programme Implementation, the per-capita net national income during 2019-20 was estimated to be Rs 1,35,050 showing a rise of 6.8% as compared to Rs 1,26,406 during 2018-19.

- **Greater Availability of cheaper and easier finance**: All nationalized and scheduled banks offer loans for purchase of new vehicles at very low interest rates. In India nearly 70-75% of the new vehicle purchases are done by using bank loans. This indicates that Indian auto industry is unique in the way vehicles are purchased by consumers.

- **Strong policy support from the government**: The US$ 118 billion Indian automobile industry is expected to reach US$ 251- 282 billion by 2026 with strong policy support from the government. Initiatives like Make in India, Automotive Mission Plan 2026 and FAME India by the government are expected to give a huge boost in revenue to the sector. Government **has also brought scrapping policy** in March 2021, which is expected to be a growth driver for the Indian automotive industry by boosting new vehicle demand in the replacement market. This policy will also support India's "Green India" mission as it creates space for a cleaner fleet of vehicles.

8. Government Ministry/Department

8.1. Ministry of Road Transport and Highway

An apex organisation under the Central Government is entrusted with the task of formulating and administering, in consultation with other Central Ministries/Departments, State Governments/UT Administrations, organisations and individuals, policies for Road Transport, National Highways and Transport Research with a view to increasing the mobility and efficiency of the road transport system in the country. The Ministry has two wings: Road's wing and Transport wing.

Ministry's Transport Wing deals with matter relating to Road Transport and is responsible for such as:

- Central Motor Vehicle Rules
- Administration of the Motor Vehicles Act. 1988
- Notifications under Motor Vehicle Legislation
- Promotion of Transport co-operatives in the field of motor transport.
- Evolves road safety standards in the form of a National Policy on Road Safety and by preparing and implementing the Annual Road Safety Plan etc.

For more information, please click here[22]

8.2. Ministry of Heavy Industries & Public Enterprises

The "Ministry of Heavy Industries and Public Enterprises" is a Union Ministry under Government of India and comprises of the Department of Heavy Industry and the Department of Public Enterprise.

[22] https://morth.nic.in/about-us

The Ministry focuses on promoting the development and growth of capital goods, auto, power equipment, manufacturing, and engineering industry in the country, framing of policy guidelines for Central Public Sector Enterprise (CPSE). Under the Ministry, the Department of Heavy Industry is concerned with the development of the engineering industry viz. machine tools, heavy electrical, industrial machinery and auto industry and administers 29 operating CPSEs.

The Department also supports the development of a range of intermediate engineering products like castings, forgings, diesel engines, industrial gears, and gear boxes. The Department also administers:

- Automotive Research Association of India (ARAI) set up in 1966, and ARAI — Forging Industry Division, (ARM-HD) Pune, Maharashtra set up in 2006,
- NATRIP Implementation Society (NAT'S), set up in July 2005, for guiding the implementation of the National Automotive Testing and R & D Infrastructure Project (NATRIP),
- Central Manufacturing Technology Institute (CMTI)
- National Automotive Board (NAB) set up in 2012 to steer, coordinate and synergize all efforts of the government in the automotive sector.

Department of Heavy Industry is also the nodal Department for the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles in India (FAME-India) Scheme and is responsible for planning implementation and review of the scheme. For more information please click here[23]

9. Policy Initiatives

Some of the major initiatives taken by the Government of India are:

9.1. 100% FDI

The Government of India encourages foreign investment in the automobile sector and allows 100 per cent FDI under the automatic route. FDI inflow in this sector stood at 25.39 USD billion[24] b/w April 2000 – December 2020.

9.2. Draft National Auto Policy 2018

In February 2018, The Department of Heavy Industry (DHI), Ministry of Heavy Industries & Public Enterprises (MoHI&PE) released the draft National Auto Policy (NAP)[25].

Vision: "To provide a long-term, stable and consistent policy regime and to have a clear roadmap for the automotive industry, making India a globally competitive auto R&D and manufacturing hub and achieving the targeted objectives of green mobility"

Mission: The National Auto Policy is envisaged to achieve the following missions:

[23] https://dhi.nic.in/
[24] https://dipp.gov.in/sites/default/files/FDI Factsheet December 20.pdf
[25] https://dhi.nic.in/writereaddata/UploadFile/National Automotive Policy Draft v2.pdf

- To propel India as an automotive industry amongst the top 3 nations in the world in engineering, manufacturing and export of automotive vehicles and components.
- To scale-up exports to 35-40% of the overall output and become one of the major automotive export hubs in the world.
- To enable the automotive sector to become one of the largest employment creation engines.
- To enable the automotive sector in India to become a global hub for research & development.
- To drive the automotive sector in India to adopt safe, clean, and sustainable technologies.

Objectives: The objectives of the National Auto Policy are:

- Increase contribution to GDP to support the growth of the automotive industry in India and become one of the major contributors to the country's GDP and comprise a considerable proportion of the manufacturing sector GDP by 2026.
- Increase exports to scale-up exports to 30-40% of the overall output over the next decade and improve the brand recognition, competitiveness, and technological advancement of the Indian automotive industry across the world.
- Drive employment generation and skill development to become a solid foundation for job creation in the automotive sector, both direct and indirect, over the next decade and become a major driver of the 'Skill India' program
- Increase local R&D investments to drive the R&D efforts in the automotive sector towards indigenous research, design and engineering in both automotive vehicles and components.
- To promote clean, safe, efficient, and comfortable mobility for every person in the country, with a focus on environmental protection and affordability

9.3. Automotive Mission Plan 2016-26

The Automotive Mission Plan 2016-26 (AMP 2026)[26] is the collective vision of Government of India (Government) and the Indian Automotive Industry on where the Vehicles, Auto-components, and Tractor industries should reach over the next ten years in terms of size, contribution to India's development, global footprint, technological maturity, competitiveness, and institutional structure and capabilities. AMP 2026 also seeks to define the trajectory of evolution of the automotive ecosystem in India including the glide path of specific regulations and policies that govern research, design, technology, testing, manufacturing, import/ export, sale, use, repair, and recycling of automotive vehicles, components, and services. AMP 2026 is a document that is aimed at multiple stakeholders in India and overseas and seeks to communicate the Government and industry's intent and objectives pertaining to the Indian Automotive industry, comprising the automotive vehicle manufacturers, the auto-component manufacturers and tractor manufacturers who operate in India.

The objective of the Automotive Mission Plan 2026 includes:

- To propel the Indian Automotive industry to become the engine of the "Make in India" programme.
- To make the Indian Automotive Industry a significant contributor to the "Skill India" programme.
- Promote safe, efficient, and comfortable mobility for every person in the country with an eye on environmental protection and affordability through both public and personal transport options.
- To seek increase of net exports of the Indian Automotive industry several fold.
- Promote comprehensive and stable policy dispensation for all regulations impacting the industry.

[26] http://www.siam.in/uploads/filemanager/47AUTOMOTIVEMISSIONPLAN.pdf

The AMP 2026 is aimed at bringing the Indian Automotive Industry among the top three of the worlds in engineering, manufacture and exports of vehicles & components, growing in value to over 12% of India GDP and generating an additional 65 million jobs.

9.4. National Electric Mobility Mission Plan (NEMMP) 2020

The National Electric Mobility Mission Plan 2020[27] is one of the most important and ambitious initiatives undertaken by the Government of India that has the potential to bring about a transformational paradigm shift in the automotive and transportation industry in the country. This is a culmination of a comprehensive collaborative planning for promotion of hybrid and electric mobility in India through a combination of policies aimed at gradually ensuring a vehicle population of about 6-7 million electric/hybrid vehicles in India by the year 2020 along with a certain level of indigenization of technology ensuring India's global leadership in some vehicle segments. It is a composite scheme using different policy-levers such as:

1. Demand side incentives to facilitate acquisition of hybrid/electric vehicles.
2. Promoting R&D in technology including battery technology, power electronics, motors, systems integration, battery management system, testing infrastructure, and ensuring industry participation in the same
3. Promoting charging infrastructure
4. Supply side incentives
5. Encouraging retro-fitment of on-road vehicles with hybrid kit

The 2020 roadmap estimates a cumulative outlay of about Rs.14000 Cr. [1.86B Euro]. during the span of the scheme, including industry contribution.

National Electric Mobility Mission Plan (NEMMP) 2020 aims to achieve national fuel security by promoting hybrid and electric vehicles in the country. There is an ambitious target to achieve 6-7 million sales of hybrid and electric vehicles year on year from 2020 onwards. Government aims to provide fiscal and monetary incentives to kick start this nascent technology. With the support from the Government, the cumulative sale is expected to reach 15-16 Million by 2020. It is expected to save 9500 Million Liters of crude oil equivalent to Rs. 62000 Cr. [8.26B Euro] savings.

9.4.1. Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME-India) Scheme

Under NEMMP, Department of Heavy Industry (DHI) had launched FAME scheme for promotion of hybrid & electric vehicles with an outlay of INR 795 crore (€91 million) in 2015. The overall scheme is proposed to be implemented over a period of 6 years, till 2020. The scheme has 4 focus areas i.e.

I Technology development
II Demand Creation,
III Pilot Projects and
IV Charging Infrastructure.

[27] http://dhi.nic.in/UserView/index?mid=1347

The FAME India Scheme is aimed at incentivizing all vehicle segments i.e. 2 Wheeler, 3 Wheeler Auto, Passenger 4 Wheeler Vehicle, Light Commercial Vehicles and Buses. The scheme covers Hybrid & Electric technologies like Mild Hybrid, Strong Hybrid, Plug in Hybrid & Battery EVs. FAME is designed to implement in a phased manner. Phase I of the FAME-India Scheme was initially proposed for two years viz. FY15-16 and FY16-17 but was extended from time to time till March 31, 2019 and with an enhancement in outlay from INR 795 crore to INR 895 crore.

In the First Phase of the Scheme[28], about 2,80,987 hybrid and electric vehicles were supported by way of demand incentive, amounting to about Rs 359 crore. Further, Department of Heavy Industry (DHI) sanctioned 425 electric and hybrid buses to various cities in the country with total cost of about Rs. 280 Crores. The Department of Heavy Industry had also sanctioned 520 Charging Stations for Rs. 43 Crore (approx.) in cities like Bangalore, Chandigarh, Jaipur, and NCR of Delhi under Phase-I of FAME-India Scheme. The State-wise details of progress made under FAME-India Scheme Phase-I are annexed at ANNEXURE-I.

In Feb, 2019, Government has approved FAME-II[29], which came into effect on April 1, 2019. The total outlay of INR 10,000 crore has been made for three years till 2022 for FAME-II. The scheme is proposed to be implemented through the following verticals:

- Demand Incentives
- Establishment of network of Charging Stations
- Administration of Scheme including Publicity, IEC (Information, Education and Communication) activities.

Under Phase-II of FAME India Scheme, over 27,000 EVs have been supported till September 2020, by way of Demand Incentive amounting to about Rs. 95 Cr (€11 million). Further, 5595 electrical buses have been sanctioned to various State/ City Transport Undertakings under Phase-II of the Scheme. This involves Government incentive of around Rs. 2800 Cr (€322 million). Department of Heavy Industry has also sanctioned 2,636 Electric Vehicle Charging Stations amounting to Rs 500 Crore (Approx.) in 62 cities across 24 States/UTs under FAME-II scheme.

Under FAME-II, a budget provision of Rs. 1000 Crore (€115 million) for a period of 3 years has been earmarked for establishment of charging infrastructure, which will be established as per "Charging Infrastructure for Electrical Vehicles- Guidelines and Standards[30]" released by Ministry of Power.

9.4.2. Guidelines and Standards for Charging Infrastructure for EVs: Ministry of Power

In Dec 2018, Ministry of Power (MoP) had come up with guidelines and standards for charging infrastructure for electric vehicles in India. Following clarities regarding charging infra were made in this document:

- Private charging at residences/offices shall be permitted. DISCOMs may facilitate the same.
- Setting up public charging stations (PCS) shall be a de-licenced activity, as long as it meets the technical and performance standards and the protocols, as laid down by the Ministry of Power and Central Electricity Authority.

[28] https://fame2.heavyindustry.gov.in/content/english/15_1_FAMEI.aspx
[29] https://dhi.nic.in/writereaddata/UploadFile/publicationNotificationFAME II 8March2019.pdf
[30] https://powermin.nic.in/sites/default/files/webform/notices/Charging_Infrastructure_for_Electric_Vehicles _Revised_Guidelines_Standards.pdf

- For setting up a PCS, the power distribution company will provide proper connectivity on priority and charging infrastructure can obtain electricity from any electricity generation company through open access.
- Specification for fast charging includes CCS, CHAdeMO or any fast charger as approved by DST/BIS with Rated Voltage (V) being in the range of 200V-750V.
- The guidelines further propose setting up at least one charging station in a grid of 3km x 3km in the cities; and on both sides of highways/roads at every 25km.
- In case of "long-distance EVs and heavy duty EVs like trucks/buses etc. there should be at least one fast-charging station at every 100km – one on each side of the highway/road.

In October 2019, Ministry of Power MoP) has approved amendments in Electric Vehicle (EV) Charging Guidelines and Specifications. 'Revised guidelines will address the concerns of EV owners' says the Minister At least one Charging Station to be available in a grid of 3 Km x 3 Km in the cities and one Charging Station at every 25 Km on both sides of highways/roads All Mega Cities & expressways connected to these Mega Cities to be taken up for coverage in first phase, other big cities to be taken up in second phase For inter-city travel, Fast Charging Station to be installed at every 100 KMs. Bureau of Energy Efficiency (BEE) nominated as the Central Nodal Agency to facilitate installation of Charging Infrastructure.

9.4.3. Policy amendments for Electric Vehicle Charging Infrastructure

The Ministry of Housing and Urban Affairs (MoHUA) has made amendments to the Model Building Byelaws (MBBL) 2016[31] and Urban Regional Development Plans Formulation and Implementation (URDPFI) Guidelines 2014[32] making provisions for establishing Electric Vehicle Charging Infrastructure, in order to facilitate availability of Electric Vehicle Charging Infrastructure. Ministry of Power has issued guidelines and standards for charging infrastructure for electric vehicles, which have also been considered while making these amendments.

The Guidelines will act as a guiding document to the State Governments and Union Territories to incorporate the norms and standards of Electric Vehicle Charging Infrastructure in their respective Building Bye Laws. The guidelines on Electric Vehicle Charging Infrastructure have been circulated to all the State Governments and UT Administrations with the request to amend their Building Byelaws and Master Plan Regulations.

9.4.4. Phased Manufacturing Program for Electric Mobility

To encourage local manufacturing of electric vehicles (EVs), the Union Cabinet in March 2019 has approved setting up of a National Mission on Transformative Mobility and Battery Storage to create a Phased Manufacturing Program (PMP) and drive indigenous production of electric vehicles and development of batteries and cell-manufacturing projects in the country. The Phased Manufacturing Programme acts as a roadmap for the industry to make necessary investments to localise EV and component production and enable the country to manufacture batteries at large-scale with an initial focus on the battery pack assembly plants, followed by integrated cell manufacturing.

[31] https://archive.pib.gov.in/documents/rlink/2019/feb/p201921501.pdf
[32] https://archive.pib.gov.in/documents/rlink/2019/feb/p201921503.pdf

The scope of the mission covers electric two-wheelers, three-wheelers, four-wheelers, buses and trucks, Lithium-ion cells, battery packs, chargers, and parts used in manufacturing EVs like electric motors, motor controller, electric compressor, and braking system.

The Phased Manufacturing Program is valid for five years until 2024 and help in localization of production across the entire electric vehicle value chain. It is being monitored by an inter-ministerial steering committee chaired by NITI Aayog.

Subsequently, The Ministry of Heavy Industries and Public Enterprises (MHIPE) has issued a notification to all the testing agencies under FAME-II. The notification is regarding the eligibility under the revised Phased Manufacturing Program (PMP) for xEV parts.

- Phased Manufacturing Programme (PMP) to promote indigenous manufacturing of electric vehicle, its assemblies/sub-assemblies and part/sub-parts/inputs of sub-assemblies theron[33].
- Phase Manufacturing programme for xEV parts for eligibility under FAME India Scheme Phase-II[34].

9.5. National Automotive Testing and R&D Infrastructure Project (NATRiP)

National Automotive Testing and R&D Infrastructure Project (NATRiP)[35] is a fully Government of India funded project with a total project cost of Rs. 3727.30 crore (€428 million). This is the largest and one of the most significant initiatives in Automotive sector so far. The project aims at creating core global competencies in automotive sector in India by facilitating seamless integration of Indian Automotive industry with the world, through setting up state-of-the-art, four green field automotive testing, homologation and R&D infrastructure facilities and up-gradation of two existing facilities with new technology and equipment. The four new centers that have been setup are:

1) International Center For Automotive Technology (iCAT) at Manesar (Haryana) in northern India.
2) Global Automotive Research Center (GARC) at Oragadam near Chennai (Tamil Nadu) in southern India.
3) National Automotive Test Tracks (NATRAX) at Pithampur near Indore (Madhya Pradesh) in central India.
4) National Institute of Automotive Inspection, Maintenance & Training (NIAIMT) at Silchar (Assam) in northeast India.

The two existing facilities 'Automotive Research Association of India (ARAI-Pune) and Vehicle Research & Development Establishment (VRDE - Ahmednagar)' have been upgraded with new technologies.

NATRiP Testing Centres:

- GARC Chennai
- iCAT Manesar
- NATRAX Indore
- NIAIMT Silchar

[33] https://fame2.heavyindustry.gov.in/WriteReadData/userfiles/DHI OM on Phased Manufacturing Programme 6 March.pdf
[34] https://fame2.heavyindustry.gov.in/WriteReadData/userfiles/PMP 29Spet20.pdf
[35] http://www.natrip.in/

NATRiP's proposal for "Grant-In-Aid for test facility infrastructure for Electric Vehicle (EV) performance Certification from NATRIP Implementation Society" under FAME scheme was approved by Project Implementation and Sanctioning Committee (PISC) on January 03, 2019.

9.6. Production Linked Incentive (PLI) Scheme

In November 2020, the government announced an outlay of INR 75,000 crore (8.5B Euro) for automobiles and components (including batteries) under the newly announced Production-Linked Incentive (PLI) scheme[36]. Given that automobiles account for more than 40% of India's manufacturing GDP, the scheme aims to accelerate domestic manufacturing. The PLI scheme could be the catalyst required to boost OEM exports and help in the long term by safeguarding India's future:

- The automotive industry is a major economic contributor in India. The PLI scheme will make the Indian automotive Industry more competitive and will enhance globalization of the Indian automotive sector.
- Advance Chemistry Cell (ACC) Battery manufacturing represents one of the largest economic opportunities of the twenty-first century for several global growth sectors, such as consumer electronics, electric vehicles, and renewable energy. The PLI scheme for ACC battery will incentivize large domestic and international players in establishing a competitive ACC battery set-up in the country.

The government will soon come out with detailed scheme to offer production linked incentive (PLI) to automobile and auto components industry that will lay the roadmap and raise India's bar as a global manufacturing hub.

9.7. Vehicle scrapping policy

In March 2020, Transport ministry unveiled the much-awaited "Vehicle Scrapping Policy[37]" which is aimed at creating an eco-system for phasing out of unfit and polluting vehicles, in the Lok Sabha.

"The objectives of the policy are to reduce population of old and defective vehicles, achieve reduction in vehicular air pollutants to fulfil India's climate commitments, improve road and vehicular safety, achieve better fuel efficiency, formalize the currently informal vehicle scrapping industry and boost availability of low-cost raw materials for automotive, steel and electronics industry.

Consumers will get scrap value for the old vehicle given by the scrapping centre, which is approximately 4-6 % of ex-showroom price of a new vehicle. In addition, the registration fees may also be waived for purchase of a new vehicle against the scrapping certificate.

The rules for fitness tests and scrapping centres are to be applicable from October 1, 2021. But the scrapping of the government and PSU vehicles which are older than 15 years are to come into effect from April 1, 2022.

The mandatory fitness testing for heavy commercial vehicles is to be in force from April 1, 2023, and the same will be in place in a phased manner for other categories from June 1, 2024.

[36] https://pib.gov.in/PressReleasePage.aspx?PRID=1671912
[37] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1705811

9.8. EV Policy Initiatives by Indian States

The Government of India in its Automotive Mission Plan 2016 had laid down a vision of "Safe, Comfortable and Efficient mobility" with the aim on environmental protection and affordability. Electric vehicles are gaining popularity across the globe. Due to fast depletion of fossil fuels and increase fuel cost, vehicle population, environment pollution, the automotive industry is shifting from traditional fuel-based technology to eco-friendly technologies.

The EV30@30 campaign, launched in 2017 under Electric Vehicle Initiative (EVI), a multi-governmental policy forum, of which India is a member, sets a collective aspirational goal for all members to have EVs contribute up to 30% of all vehicle sales by 2030. To achieve this target, Government of India has launched the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME Scheme) in 2015, under National Electric Mobility Mission Plan (NEMMP) with an aim to promote eco-friendly vehicles in the country.

Several states in India have also announced their EV policy to complement the National scheme and to address state-specific requirements. The states with approved EV policies include Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, New Delhi, Tamil Nadu, Telangana, and Uttar Pradesh. The states with draft policies include Bihar, Gujarat, Himachal Pradesh, Punjab, and Uttarakhand.

Nearly all the state EV policies prioritize two and three-wheelers, public transportation, and job creation. However, the policies differ in terms of targets, supply side incentives (manufacturing), and demand side incentives (consumer and charging infrastructure investments).

S. No.	State	State EV Policy
1.	**Andhra Pradesh** (approved June 2018)	• Attract combined investments of over INR 30,000 Crore in the next 5 years across the electric mobility ecosystem with an employment potential for 60,000 people. • Aims to have 1,000,000 EVs on the road by 2024. • Complete reimbursement of road tax and registration fees on sale of EVs until 2024. • Replace public transport buses in four cities to e-buses by 2024 and across the state by 2030. • Establish one lakh (100,000) slow and fast charging stations by 2024. Download PDF[38]>>
2.	**Karnataka** (approved September 2017)	• Aims to achieve 100% e-mobility in auto-rickshaws, cab aggregators, corporate fleets, and school buses/vans by 2030. • Local public transport bus fleets will introduce 1,000 EV buses. • Providing incentives to encourage manufacture of modular design lithium-ion batteries with higher mileage per charge. • Government will identify potential land on a long lease basis for setting up of EV charging stations and battery swapping infrastructure.

[38] https://evreporter.com/wp-content/uploads/2019/09/AP-Policy_final.pdf

		• Also, will offer incentives for setting up of the first lot of 100 fast charging stations. • To provide opportunities for R&D in electric mobility Download PDF[39]>>
3.	**Kerala** (approved March 2019)	• Aims to put one million EV units on the road by 2022 and 6,000 e-buses in public transport by 2025. • Incentives, such as state tax breaks, road-tax exemptions, toll-charge exemption, free permits for fleet drivers and free parking. • Viability gap funding for e-buses and government fleets. • Prioritizes EV component manufacturing. • Create e-mobility demonstration hubs in a few potential areas such as tourist villages, technology hubs, and major cities' central business districts. Download PDF[40]>>
4.	**New Delhi** (approved August 2020)	• Aims to register at least 25% electric vehicles by 2024. • Aims to have at least 50% e-buses for all new stage carriage buses procured for the city fleet, starting with 1,000 e-buses by 2020. • A purchase incentive of INR 10,000 per kWh of battery capacity provided for electric 4W (cars) (subject to a maximum incentive of INR 1.5 lakh per vehicle) for the first 1,000 e-cars registered in New Delhi after issuance of the policy. • A purchase incentive of INR 5,000 per kWh of battery capacity provided for 2-wheelers and subject to a maximum incentive of INR 30,000 per vehicle. • Purchase incentive of INR 30,000 per vehicle to owners of e-autos, e-rickshaws, and e-carts. • Incentive for scrapping and de-registering old highly polluting two-wheelers. Download PDF[41]>>
5.	**Maharashtra** (approved February 2018)	• Increase number of EV registered in Maharashtra to 500,000. • Generate an investment of Rs.25,000 crores in EV, EV manufacturing • and component manufacturing, battery manufacturing/assembly • enterprises and charging infrastructure equipment manufacturing and create jobs for 1,00,000 persons. • Exempts EVs from road tax and registration fees over five-year policy period. • Enable fuel stations to set up charging points through governing regulations and support for charging infrastructure by planning authorities and electricity supply agencies.

[39] https://evreporter.com/wp-content/uploads/2020/07/Karnataka-EV-Policy.pdf
[40] https://evreporter.com/wp-content/uploads/2020/09/Kerala-EV-Policy-Doc.pdf
[41] https://evreporter.com/wp-content/uploads/2020/08/Delhi-EV-Policy-07-08-2020.pdf

		• Modifies building/property rules to help establish a robust public charging infrastructure in the state. Download PDF[42]>>
6	**Madhya Pradesh** (approved October 2019)	• Rapid EV adoption and contribution to 25% of all new public transport vehicle registrations by 2026. • Target to convert 100% of all commercial & logistics fleets to electric fleet by 2028. • Shared e-rickshaws and electric auto-rickshaws incentives: free cost of permits, exempt/reimbursement from road tax/vehicle registration fees for five years, 100% wavier on parking chargers at any municipal corporation run parking facility for five years. • Ensure a safe, reliable, and affordable charging infrastructure, and promote renewable energy usage in the charging infrastructure. • Create newer employment opportunities by promoting EV manufacturing, charging infrastructures and promoting the usage of EVs in public-private transport. Download PDF[43]>>
7	**Tamil Nadu** (approved September 2019)	• Aims to convert of 5% of the buses, shared mobility fleets, institutional vehicles, and e-commerce delivery and logistics vehicles to EVs by 2030. • Establish a venture capital and business incubation service to encourage EV start-ups. • 100% Road Tax exemption by 2022. • EV-related and charging infrastructure manufacturing units will receive 100% exemption on electricity tax through 2025. • Attract ₹50,000 crore (₹500 billion) of investment in EV manufacturing and create a comprehensive EV ecosystem in the State. Download PDF[44]>>
8	**Uttar Pradesh** (approved August 2019)	• To attract investments of over INR 40,000 crore in the next 5 years across the electric mobility ecosystem with an employment potential for 50,000 people • To launch 1000 electric buses (BEVs/FCEVs) and achieve 70% EV public transportation on identified green routes in identified 10 EV cities by 2030. • To phase out all conventional commercial fleets and logistics vehicles and achieve 50% EV mobility in Goods Transportation in identified 10 EV cities by 2024 and all cities by 2030. • To roll out nearly 10 lakh EVs, combined across all segments of vehicles, by 2024.

[42] https://evreporter.com/wp-content/uploads/2020/07/EV-policy_Maharashtra.pdf
[43] http://mpurban.gov.in/Uploaded Document/guidelines/1-MPEVP2019.pdf
[44] https://evreporter.com/wp-content/uploads/2019/09/TN-EV-Policy-2019.pdf

		• To bring in manufacturing units of high-density power storage of at least 5GWh capacity in the next 5 years for smooth electric mobility • To set up nearly 2 lakh slow and fast charging, swapping stations by 2024 Download PDF[45]>>
9	**Telangana** (approved October 2020)	• 100% exemption of road tax & registration fee for the first 2,00,000 Electric 2W, 20,000 Electric 3W, 5,000 Electric 4W commercial passenger Vehicles such as Taxi, Tourist Cabs, etc., 10,000 Electric 3W (goods), e-carriers as well as electric Light Goods carriers, 5,000 Electric 4-W private vehicles, 500 E-buses, electric tractors purchased & registered within Telangana. • Setting up initial batch of fast charging stations in Hyderabad and other towns in a phased manner, by state entities and private players. • Battery disposal infrastructure model to facilitate deployment of used EV batteries. • Encourage EV adoption in Shared Mobility, Public Transport, Institutional Transport, Logistics & Delivery Services. Download PDF[46]>>
10	**Uttarakhand** (Approved – Dec 2019)	• Aims for 100% electrification of public transport (e-buses), shared mobility including e-bike, e-taxis, and goods transport using electric 2-, 3-, and 4-wheelers, and other mini goods-transport vehicles in five priority cities by 2030. • Manufacturing-focused policy and incentivize the manufacturing of lithium batteries with high mileage. Download PDF[47]>>
11.	**Bihar** (drafted June 2019, awaiting approval)	• Prioritizes electrification of rickshaws and plans to convert all paddle rickshaws to e-rickshaws by 2022. • Create normal/fast charging/swapping stations at every 25 Km on state highways/national highways in the state and every 3 km in the city, • Promotes manufacturing of e-rickshaws. • Attract on- ground investments of Rs. 1500 crore (Rs. 300 cr p.a), and • Create direct empowerment opportunities for 50,000 persons (10,000 p.a.) in the state. Download PDF[48]>>
12.	**Gujarat** (drafted September 2019,	• Aims to have 80,000 E-2W, 14,000 E-3Ws, 4,500 E-4Ws including commercial taxis and cargo, 1500 e-bus and other transport vehicles in the state under policy period.

[45] https://evreporter.com/wp-content/uploads/2020/07/UP_Electrical-vehicle-policy_english_Aug7_2019-1.pdf
[46] https://evreporter.com/wp-content/uploads/2020/10/TS-EV-ESS-Policy.pdf
[47] https://evreporter.com/wp-content/uploads/2020/07/electric1576487934.pdf
[48] https://evreporter.com/wp-content/uploads/2020/07/EV-policy_Bihar.pdf

	awaiting approval)	• Identify locations for long-term leases to develop fast charging stations and subsidize the first 200 stations by whichever is less: 25% of charging equipment costs or 10 lakh INR. • Funds for charging locations on state and national highways that lack stations within a 75-km radius. • Install charging stations at multi-level parking lots and public places. Download PDF[49]>>
13.	**Punjab** (drafted November 2019, awaiting approval)	• Aim to have 25% of annual vehicle registrations as EVs in the last year of the five-year policy period. • Aims to increase the share of electric 2-wheelers to reach 25% of new sales over the policy period. • Replace 25% of the bus fleet of the transport department with e-buses (presently about 90% of bus fleet runs on diesel). • Aims to increase the share of e-taxis to reach 25% of new sales over the policy duration period (presently almost 80% of registered taxis are diesel based). • Private EVs will be given 100% waiver on motor vehicle tax for a period of five years, while commercial vehicles will be exempted from registration as well as permit fee for the same period. Download PDF[50]>>
14.	Haryana	• 100% exemption of road tax on transportation EVs purchased within State. • Target to convert 100% of bus fleet owned by State Transport Undertakings in the state into electric buses by 2029, with the first phase of 100% conversion of bus fleet in Gurugram and Faridabad by 2024. • Support Public/Private Sector to set up Charging infrastructure in the State. • All new EV manufacturing Units and Electric battery Units as defined under the policy will be exempted for paying electricity duty for first 10 years. Download PDF[51]>>
15	Chandigarh (Drafted, Oct 2019)	• Only EVs to be registered in the city after 2030. • Aims to have an all-electric fleet of public buses by 2027, government fleet by 2025, Auto Rickshaws, Corporate Fleets, Cabs and School buses by 2030. • 1,000 public chargers by 2030 Download PDF[52]>>

[49] https://evreporter.com/wp-content/uploads/2020/09/Gujarat-EV-policy.pdf
[50] http://punjabtransport.org/Punjab EV Policy_Final Draft 15112019_Upload.pdf
[51] https://haryanatransport.gov.in/sites/default/files/Electric Vehicle Policy_2.pdf
[52] https://evreporter.com/chandigarh-ev-policy-2019/

16	Meghalaya (Drafted, Feb 2021)	• To facilitate adoption of at least 15 % EVs in the State by 2025. • To provide support towards adoption of EVs by providing purchase incentives for early adoption of EVs based on the energy capacity in kWh of battery. • To support the setting up of robust infrastructure for EVs including adequate power supply, network of charging points with favourable power tariff and adequate service centres. • To promote innovation in EVs for automotive and shared mobility by providing the requisite ecosystem and infrastructure. • To mandate adoption of EVs in the Government and its Boards, Corporations, Government undertakings, Development Authorities, Municipalities in a phased manner. • To facilitate in creating an ecosystem for recycling and reuse batteries and disposal of rejected batteries in an environment friendly manner to avoid environmental pollution. Download PDF[53]>>

Source: https://energy.economictimes.indiatimes.com/news/power/opinion-review-of-state-ev-plans-across-india-amidst-covid-19/78201363

10. Technical Regulations

The Ministry of Road Transport and Highways (MoRTH) acts as a nodal agency for formulation and implementation of various provisions of the Motor Vehicles Act (MVA), 1988, and Central Motor Vehicle Rules (CMVR), 1989.

To involve all stakeholders in regulation formulation, MoRTH has constituted three committees to deliberate and advise the ministry on issues relating to safety and emission regulations, namely:

1. CMVR - Technical Standing Committee (CMVR-TSC)
2. Standing Committee on Implementation of Emission Legislation (SCOE)
3. Automotive Industry Standards Committee (AISC)

CMVR-TSC and AISC advise and deliberate with MoRTH on safety-related regulations, whereas SCOE caters to emission-related regulations. CMVR-TSC, AISC and SCOE advises MoRTH on various technical aspects related to CMVR.

These committees consist of representatives from various other ministries and industry bodies namely Ministry of Heavy Industries & Public Enterprises (MoHI&PE)), MoRT&H, Bureau Indian Standards (BIS), testing agencies such as Automotive Research Association of India (ARAI), Vehicle Research Development & Establishment (VRDE), Central Institute of Road Transport (CIRT), industry representatives from Society of Indian Automobile Manufacturers (SIAM), Automotive Component Manufacturers Association (ACMA), Tractor Manufacturers Association (TMA) and representatives from State Transport Departments.

Major functions of the committees are:

[53] https://evreporter.com/wp-content/uploads/2021/02/Meghalya-EV-policy.pdf

- Provide technical clarification and interpretation of the CMVR.
- Recommend international standards to the Government which can be used in lieu of standard notified under the CMVR. Permit use of components/parts/assemblies complying with such standards.
- Recommend technical issue(s) relevant to implementation of the CMVR.
- Recommend new safety standards of various components for notification and implementation under CMVR.
- Recommend lead time required for implementation of safety standards.
- Recommend amendment to the CMVR considering changes in automobile technologies.

Standing Committee on Implementation of Emission Legislation (SCOE) deliberates the issues related to the implementation of emission regulations. Major functions of this committee are:

- To discuss the future emission and noise norms
- To recommend norms for in-use vehicles to MoRT&H
- To finalise the test procedures and the implementation strategy for emission norms
- Advise MoRT&H on any issue relating to implementation of emission and noise regulations.

Based on the recommendations from CMVR-TSC and SCOE, MoRT&H issues notifications for necessary amendments / modifications in the Central Motor Vehicle Rules.

India signed the UN WP 29 1998 Agreement in February 2006: The 1958 UNECE agreement is a multilateral agreement between countries for the adoption of uniform technical prescriptions for four-wheeler vehicles, equipment and parts which can be fitted and/or used on wheeled vehicles. These prescriptions are mutually recognised by all signatories for the type-approval process. India is not a signatory to the 1958 Agreement and hence there is no compulsion for India to accept, adopt and apply the ECE Regulations. However, India is a signatory of 1998 WP.29 agreement and actively participates in formulations of Global Technical Regulations (GTRs) since 2006. The 1958 Agreement signatories mutually accept the type approvals of vehicles of the signatory countries. Some countries outside of Europe such as South Africa, Tunisia, Australia, New Zealand, Japan, the Republic of Korea, Malaysia, and Thailand are signatories to the 1958 Agreement and directly accept the vehicles having European type approvals, whereas countries like India, the USA, Canada, and China have signed the 1998 Agreement and have their own standards for compliance. This creates a setback for European vehicle manufacturers selling vehicles in India, which are primarily designed as per ECE Regulations. Such vehicles must specifically adhere to Indian standards even though the Indian standards are generally derived from UNECE standards.

India has currently more than 70% safety regulations which are either partially or fully technically aligned with GTRs and UN Regulations while retaining Indian specific driving and environmental conditions.

Regulations are reviewed periodically by AISC and amendments are recommended to the Technical standing Committee on CMVR for adoption and subsequent notification by MoRT&H under the CMVR.

For more information, please click here[54]>>

[54] https://www.siam.in/technical-regulation.aspx?mpgid=31&pgidtrail=32

For information about Emission norms, please click here[55] and for Safety Regulation, please click here[56]

11. Standardization

In the Indian Automotive sector, the main bodies to engage in the standards formulation are Bureau of Indian Standards (BIS) and Automotive Research Association of India (ARAI).

BIS is developing standards through its technical committees i.e., Transport Engineering Division Council (TED) & Electrotechnical Division Council (ETD) - ETD is preparing Indian Standards for electrotechnical aspects of totally or partly electrically propelled road vehicles.

11.1. Transport Engineering Division Council (TEDC)

This division council of BIS is responsible for standardization in the field of transport engineering including air, water, road, and rail transport; diesel engines for stationery application and ISO freight containers, transport packaging etc. falls under the purview of TEDC. Within TED, there are 19 technical committees which have so far developed more than 1160 standards, out of which around 290 standards are identical/modified to ISO standards.

- **TED 27: Electric and Hybrid Vehicles:** TED 27 is responsible for standardization of Electric and Hybrid vehicles and their components. It is a mirror committee of ISO/ TC 22/SC 37 and IEC/ TC 69. So far, TED 27 has published 4 standards which are available as part of Annexure 1 of this report.

- **TED 28: Intelligent Transport Systems**: TED 28 is responsible for standardization of information, communication, and control systems in the field of urban and rural surface transportation, including intermodal and multimodal aspects thereof, traveller information, traffic management, public transport, commercial transport, emergency services and commercial services in the intelligent transport systems. It is a mirror committee of ISO/TC 204 excluded in-vehicle transport information and control systems (ISO/TC 22) and ISO/TC 241. So far, TED 28 has published 20 standards which are available as part of Annexure 2 of this report.

- **TED 30: Railway Applications:** TED 30 is responsible for standardization of all systems, products and services specifically related to the railway sector, including design, manufacture, construction, operation and maintenance of parts and equipment, method and technology, interface between infrastructure and vehicles and the environment, excluding those electro-technical and electronic products and services for railways which are within the scope of IEC/TC 9. So far, TED 30 has not published any standard.

List of published standards and Underdeveloped Standards by TED are available here[57]

11.2. Electrotechnical Division Council (ETD)

[55] https://www.siam.in/technical-regulation.aspx?mpgid=31&pgidtrail=33
[56] https://www.siam.in/technical-regulation.aspx?mpgid=31&pgidtrail=34
[57] https://www.services.bis.gov.in:8071/php/BIS_2.0/dgdashboard/published/pub_stn_list?depid=Njc%3D&depname=VEVE&aspect=&from=&to=

This Division Council of BIS is responsible for standardization in the field of electrical power generation, transmission, distribution, and utilization equipment; and insulating materials, winding wires, measuring and process control instruments and primary and secondary batteries. Within ETDC, 45 Technical Committees have so far developed over 1750 Indian Standards.

- **ETD 51: Electrotechnology in Mobility**: ETD 51 is responsible for preparing Indian Standards for electrotechnical aspects of totally or partly electrically propelled road vehicles. ETD 51 has, so far, developed 12 standards which are available as part of annexure 3 of this report.

Complete list of standards published by ETD is available here[58]

11.3. Automotive Research Association of India (ARAI)

Automotive Research Association of India (ARAI), established in 1966, is the leading automotive R&D organization of the country set up by the Automotive Industry with the Government of India. ARAI provides technical expertise in R&D, testing, certification, homologation and framing of vehicle regulations.

Its Automotive Industry Standards Committee (AISC) is set up under Central Motor Vehicles Rules - Technical Standing Committee (CMVR - TSC) by MoRT&H in the year 1997 to review the safety in the design, construction, operation, and maintenance of motor vehicles. Technical Secretariat to WP.29 was entrusted to ARAI in the year 2003, and its National Standing Committee on WP.29 establishes national policy and guidelines about harmonization of automotive regulations.

As mentioned above, India is a signatory to 1998 agreement, under which, the country is committed to participate in formulation of Global Technical Regulations.

ARAI has 6 GR groups (subsidiary technical bodies of WP.29) are:

- GRPE (India): Working Party on Pollution and Energy
- GRSG (India): Working Party on General Safety Provisions
- GRRF (India): Working Party on Brakes and Running Gear
- GRE (India): Working Party on Lighting and Light - Signaling
- GRB (India): Working Party on Noise
- GRSP (India): Working Party on Passive Safety

The Indian working groups consist of experts from the industry, test agencies and other organizations and deliberate on various subjects / regulations falling within their purview and submit their recommendations to the national secretariat for further actions.

List of standards published by ARAI related to electrically propelled road vehicles and Intelligent Transport System (ITS) is available as part of annexure 4.

List of standards published by ARAI is available at https://araiindia.com/downloads
and Draft Standards are available at https://araiindia.com/downloads

[58] https://www.services.bis.gov.in:8071/php/BIS_2.0/dgdashboard/published/pub_stn_list?depid=NjU%3D&depname=RVRE&aspect=&from=&to=

For information of Indian Emissions Regulations please visit at:

- https://www.araiindia.com/pdf/Indian_Emission_Regulation_Booklet.pdf
- https://www.araiindia.com/services/department-and-laboratories/emission

11.4. Ministry of Heavy Industries, Department of Heavy Industry (DHI)

Ministry of Heavy Industries & Public Enterprises, Department of Heavy Industry, constituted a Committee to finalize the protocol for charging infrastructure for different combination of voltage and speed of charging. The Committee has submitted its report to the Government on 11th October 2017.

The Committee has come out with recommendations in the form of specifications for AC and DC chargers namely Bharat EV Charger AC-001 and Bharat EV Charger DC-001. These specifications are intended to cater to the immediate need of existing and announced electric 2W, electric 3W and passenger cars/vehicles having battery voltage less than 100 V. For more information, please click here[59]>>

12. International Cooperation on Auto sector

International Cooperation on Auto Sector	
INDIA - GERMANY	Joint Declaration of Intent Signed between the Federal Ministry of Transport, Building and Urban Affairs, Germany and Department of Heavy Industry, GOI on 23rd & 24th November, 2009.
INDIA - GERMANY	Joint Declaration of Cooperation signed between the Federal Ministry of Transport, Building and Urban Development of the Federal Republic of Germany and Department of Heavy Industry, GOI on 30.05.2011.
INDIA - THE NETHERLANDS	Joint Declaration of Intent signed between Ministry of Economic Affairs, Agriculture and Innovation, Kingdom of the Netherlands and Department of Heavy Industry, GOI on 19.04.2012
INDIA - GERMANY	Joint Declaration of Intent on Cooperation signed between the Federal Ministry of Transport, Building and Urban Development of the Federal Republic of Germany and Department of Heavy Industry, GOI on 30.05.2013.
INDIA - THE NETHERLANDS	Joint programme of Cooperation signed between Ministry of Economic Affairs, Kingdom of The Netherlands and Department of Heavy Industry, GOI in the presence of H.E. the Prime Minister of Netherlands on 05.06.2015.

Source: Department of Heavy Industry

[59] https://dhi.nic.in/writereaddata/UploadFile/REPORT OF COMMITTEE636469551875975520.pdf

13. Conclusion

Considering present scenario, it is likely that the automobile sector of India will go back to its pre-COVID-19 situation very soon. There are significant changes in the consumer preference and buying behaviour of the consumers during the period of Covid-19. The post COVID-19 era will bring in many challenges as well as many opportunities. The companies will now rely intensively on digital showrooms for increasing their customer base and the Electric Vehicles will surely make a place in the Indian market.

India's EVs market is still in an early stage when compared to the United States, China, and the European Union. Experts emphasise that what the sector requires is a continued investment in charging infrastructure, fiscal and non-fiscal incentives for EVs and a clear mandate for all stakeholders to shift to EVs. Traffic congestion is also an important problem in Indian cities. The characteristics of Indian roads and traffic make the problem interesting to solve. There is scope for evaluating existing ideas in different and challenging traffic scenarios, innovate new solutions and empirically evaluate ideas in collaboration with public and private sectors.

Multiple initiatives have been taken by the Government of India to promote manufacturing as well as the adoption of EVs. This has led to increased penetration of EVs in the Indian market.

Despite various proactive steps, serious concerns remain such as lack of adequate charging infrastructure, range anxiety (mileage between each charge) and the higher initial cost compared to fossil fuel variants. Consumer mind sets cannot address those problems since they require governmental support and solutions. Automotive players must explore ways to reduce battery cost, charging time and to increase driving range.

The new vehicle scrappage policy, announced by the Centre, will help reduce pollution by removing old vehicles and will help turnaround the fortunes of struggling automotive industry by boosting sales. It will also help to boost the demand of EVs in the country.

Key standardization bodies of India (BIS & ARAI) and their partners work towards developing standards that consider the uniqueness and complexity of the transport system in India. These local requirements should be tabled at global standardisation platforms for their harmonisation. This will help India in creating common standards while accounting for the Indian uniqueness and complexity, which in turn will ensure its interoperability, bring economies of scale and hence the affordability.

14. Glossary

Acronym	Expansion
ACMA	Automotive Component Manufacturers Association of India
AIS	Automotive Industry standards
AISC	Automotive Industry Standards Committee
AMP	Automotive Mission Plan
ARAI	Automotive Research Association of India
ATMA	Automotive Tyre Manufacturers' Association

BRT	Bus Rapid Transit
BS	Bharat Stage
BU	Billion unit
CAGR	Compound annual growth rate
CMVR	Central Motor Vehicles Rules
CMVR - TSC	Central Motor Vehicles Rules -Technical Standing Committee
DIPP	Department of Industrial Policy and Promotion
EVs	Electric vehicles
FAME	Faster Adoption and Manufacturing of Hybrid and Electric vehicles
FDI	Foreign direct investment
FY	Fiscal year
GDP	Gross Domestic Product
GTR	Global Technical Regulation
GUTS	Green Urban Transport Scheme
IS	Indian Standards
ITS	Intelligent transport systems
LCV	light commercial vehicle
M&HCVs	Medium & Heavy Commercial Vehicles
M&M	Mahindra and Mahindra
MoRTH&S	Ministry of Road Transport, Highway & Shipping
MVA	Motor vehicles Act
NATRiP	National Automotive Testing and R&D Infrastructure Project
NEMMP	National Electric Mobility Mission Plan
NMT	Non-Motorized Transport
OEMs	Original Equipment Manufactures
PVs	Passenger Vehicles
R&D	Research and development
SIAM	Society of Indian Automobile Manufacturers
SUVs	Sport-utility vehicles
SVT	Smart vehicle technology
TEDC	Transport Engineering Division Council
TMA	Tractor Manufacturers Association
TPEM	Technology Platform for Electric Mobility
USD	United States dollar
UVs	Utility vehicles
YoY	Year over year

15. References

Bureau of Indian Standards (BIS)

https://bis.gov.in/

Automotive Research Association of India (ARAI)
https://www.araiindia.com/

Ministry of Road Transport and Highways
https://morth.nic.in/

NITI Aayog
http://niti.gov.in/

Ministry of Power
https://powermin.gov.in/

Ministry of Heavy Industries and Public Enterprises
https://dhi.nic.in/

Ministry of Housing and Urban Affairs
http://mohua.gov.in/

ARAI ties up with the Atal innovation mission to boost start-up ecosystem for mobility sector
https://www.hindustantimes.com/cities/pune-news/arai-ties-up-with-the-atal-innovation-mission-to-boost-start-up-ecosystem-for-mobility-sector-101612436945481.html

Quarterly fact sheet: fact sheet on foreign direct investment (FDI) from April, 2000 to December, 2020
https://dipp.gov.in/sites/default/files/FDI%20Factsheet%20December%2020.pdf

EV reporter: Electric Vehicle Ecosystem
https://evreporter.com/

Concept Paper on Regulatory Framework for Promoting Electric Vehicles and their Impact on the Grid
https://www.rajras.in/wp-content/uploads/2020/06/Concept-Paper-on-EV-RERC.pdf

Top 10 Electric Vehicle manufacturers in India & their innovations
https://www.eqmagpro.com/top-10-electric-vehicle-manufacturers-in-india-their-innovations/

Registration fee waiver for new cars, 25% rebate on road tax
https://economictimes.indiatimes.com/industry/auto/auto-news/registration-fee-waiver-for-new-cars-25-rebate-on-road-tax-gadkari-unveils-vehicle-scrapping-policy/articleshow/81566911.cms

India plans $4.6 billion in incentives for battery makers in electric vehicle push: Document
https://energy.economictimes.indiatimes.com/news/power/india-plans-4-6-billion-in-incentives-for-battery-makers-in-electric-vehicle-push-document/78327671

India has so far installed 933 EV charging stations across the country: CEA
https://psuwatch.com/india-installed-ev-charging-stations-933-cea

Electric vehicles sales jump 142% in three years
https://www.eqmagpro.com/electric-vehicles-sales-jump-142-in-three-years/

Opinion: Top 10 disruptive trends in the Indian automobile industry
https://auto.economictimes.indiatimes.com/news/industry/opinion-top-10-disruptive-trends-in-the-indian-automobile-industry/79609205

Model Building Byelaws 2016 & Urban Regional Development Plans Formulation and Implementation Guidelines 2014 Amended for Establishing EV Charging Infrastructure
https://pib.gov.in/PressReleasePage.aspx?PRID=1564744#:~:text=The%20Ministry%20of%20Housing%20and,order%20to%20facilitate%20availability%20of

Tata Motors back to 3rd spot after 9 years: 69% sales growth in FY21
https://www.financialexpress.com/auto/industry/tata-motors-back-to-3rd-spot-after-9-years-69-sales-growth-in-fy21-safari-harrrier-sales-retail-numbers-commercial-vehicle-stock-share-price-passenger-cars-pv-commercial-vehilces-cv-sales/2225123/

Maruti Suzuki Performance FY21
https://timesofindia.indiatimes.com/business/india-business/maruti-suzuki-reports-sale-of-167014-units-in-march/articleshow/81823030.cms

M&M March auto sales at 40,403 units; tractor sales jump to 30,970 units
https://www.cnbctv18.com/auto/mm-march-auto-sales-at-40403-units-tractor-sales-jump-to-30970-units-8786831.htm#:~:text=The%20company's%20total%20Passenger%20Vehicles,from%20186%2C977%20units%20in%20FY20.&text=Mahindra%20%26%20Mahindra%20Ltd.,6%2C679%20in%20March%20lasy%20year.

Toyota Kirloskar Motor sells 15,001 units in March; FY21 sales down 18.36%
https://auto.economictimes.indiatimes.com/news/passenger-vehicle/cars/toyota-kirloskar-motor-domestic-sales-up-114-to-15001-units-in-march/81827359

Lockdown Effect: Indian automotive industry suffered Rs 2,300 crore loss daily
https://www.financialexpress.com/auto/industry/lockdown-effect-indian-automotive-industry-suffered-rs-2300-crore-loss-daily-oems-shutdown-factories-production-facility-cars-bikes-scooters/2150591/

Electric Vehicles Set to Revolutionise Last Mile Logistics In The Next Five Years
https://www.eqmagpro.com/electric-vehicles-set-to-revolutionise-last-mile-logistics-in-the-next-five-years/

Intelligent transportation system in India
http://www.jetir.org/papers/JETIRDH06013.pdf

Annexure: 1

List of standards published by TED 27:

S. No.	IS Number	IS Title
1	IS 15886: 2010	Road Vehicles â€" Battery Operated--Vehicles â€" Code of Practice
2	IS 17191: Part 1: 2019	Electric Power Train Vehicles Part 1 Measurement of Electrical Energy Consumption
3	IS 17191: Part 2: 2019	Electric Power Train Vehicles Part 2 Method of Measuring the Range
4	IS 17191: Part 3: 2019	Electric Power Train Vehicles Part 3 Measurement of Net Power and the Maximum 30 Minute Power

Source:https://www.services.bis.gov.in:8071/php/BIS_2.0/dgdashboard/published/standards?commttid=MzM5&commttname=VEVEIDI3&aspect=&from=&to=

Annexure: 2

List of standards published by TED 28:

S. No.	IS Number	IS Title
1	IS/ISO/TR 12859: 2009/ISO/TR 12859: 2009	Intelligent transport systems - System architecture - Privacy aspects in its standards and systems
2	IS/ISO/TS 13140: Part 1: 2011/ISO/TS 13140: Part 2: 2012	Electronic fee collection - Evaluation of on - Board and roadside equipment for conformity to ISO/TS 13141: Part 1 test suite structure and test purposes
3	IS/ISO/TS 13140: Part 2: 2012/ISO/TS 13140: Part 2: 2012	Electronic fee collection - Evaluation of on - Board and roadside equipment for conformity to iso/ts 13141: Part 2 abstract test suite
4	IS/ISO/TS 13143: Part 1: 2011/ISO/TS 13143: Part 1: 2011	Electronic fee collection - Evaluation of on - Board and roadside equipment for conformity to ISO/TS 12813: Part 1 test suite structure and test purposes
5	IS/ISO/TS 13143-2: 2011/ISO/TS 13143-2: 2011	Electronic fee collection - Evaluation of on - Board and roadside equipment for conformity to ISOTS 12813: Part 2 abstract test suite
6	IS/ISO/TS 14904: 2002/SO/TS 14904: 2002	Road transport and traffic telematics - Electronic fee collection (Efc) - Interface specification for clearing between operators
7	IS 15754: 2006/ISO 21214: 2006	Intelligent transport systems - Continuous air interface, long and medium range (CALM) - Infra - Red systems
8	IS 16490: 2016	LED Destination Board System for Buses - Specification
9	IS 16722: 2018	Radio Frequency Identification (RFID) System for Automotive Applications â€" Specification

10	IS 16833: 2018	Automotive Tracking Device (ATD) and Integrated Systems
11	IS 17270: 2019	Intelligent Transport Systems (ITS) : Reverse Parking Alert System (RPAS)
12	IS/ISO 17573: 2010/ISO 17573: 2010	Electronic fee collection - Systems architecture for vehicle - Related tolling
13	IS/ISO/TS 17574: 2009/SO/TS 17574: 2009	Electronic fee collection - Guidelines for security protection profiles
14	IS/ISO/TS 17575: Part 1: 2010/ISO/TS 17575: Part 1: 2010	Electronic fee collection - Application interface definition for autonomous systems: Part 1 charging
15	IS/ISO/TS 17575: Part 2: 2010/ISO/TS 17575-2:2010	Electronic fee collection - Application interface definition for autonomous systems: Part 2 communication and connection to the lower layers
16	IS/ISO/TS 17575: Part 3: 2011/ISO/TS 17575-3: 2011	Electronic Fee Collection - Application Interface Definition for Autonomous Systems Part 3 Context Data
17	IS/ISO/TS 17575: Part 4: 2011/ISO/TS 17575-4: 2011	Electronic Fee Collection - Application Interface Definition for Autonomous Systems Part 4 Roaming
18	IS/ISO 21214: 2015/21214: 2015	Intelligent Transport Systems â€" Communications Access for Land Mobiles (CALM) â€" Infra-Red Systems
19	IS/ISO 24014: Part 1: 2007/ISO 24014-1	Public transport - Interoperable fare management system: Part 1 architecture
20	IS/ISO 39001: 2012/ISO 39001: 2012	Road traffic safety (Rts) management systems - Requirements with guidance for use

Source:
https://www.services.bis.gov.in:8071/php/BIS_2.0/dgdashboard/published/standards?commttid=MzE5&commttname=VEVEIDI4&aspect=&from=&to=

Annexure 3

List of standards published by ETD 51:

S. No.	IS Number	IS Title
1	IS/ISO 15118: Part 1: 2013/ISO 15118-1	Road vehicles - Vehicle to grid communication interface: Part 1 general information and use - Case definition
2	IS/ISO 15118: Part 2: 2014/ISO 151128-2	Road vehicles - Vehicle - To - Grid communication interface: Part 2 network and application protocol requirements
3	IS/ISO 15118: Part 3: 2015/ISO 15118-4	Road vehicles - Vehicle to grid communication interface: Part 3 physical and data link layer requirements

4	IS/ISO 15118: Part 4: 2019/ISO 15118-3	Road vehicles - Vehicle to grid communication interface: Part 4 network and application protocol conformance test
5	IS/ISO 15118: Part 5: 2018/ISO 15118-5: 2018	Road vehicles - Vehicle to grid communication interface: Part 5 physical layer and data link layer conformance test
6	IS/ISO 15118: Part 8: 2018/ISO 15118-8	Road vehicles - Vehicle to grid communication interface: Part 8 physical layer and data link layer requirements for wireless communication
7	IS 17017: Part 1: 2018	Electric Vehicle Conductive Charging System Part 1 General Requirements
8	IS 17017: Part 2: Sec 1: 2020	Electric Vehicle Conductive Charging System Part 2 Plugs, Socket-Outlets, Vehicle Connectors, and Vehicle Inlets Section 1 General requirements
9	IS 17017: Part 2: Sec 2: 2020	Electric Vehicle Conductive Charging System Part 2 Plugs, Socket â€“ Outlets, Vehicle Connectors and Vehicle Inlets Section 2 Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories
10	IS 17017: Part 2: Sec 3: 2020	Electric Vehicle Conductive Charging System Part 2 Plugs, Socket â€” Outlets, Vehicle Connectors and Vehicle Inlets Section 3 Dimensional compatibility and interchangeability requirements for d.c. and a.c./d.c. pin and contact-tube vehicle couplers
11	IS 17017: Part 21: Sec 1: 2019/IEC 61851-21-1:2017	Electric Vehicle Conductive Charging System Part 21 Electromagnetic Compatibility (EMC) Requirements Section 1 On-board chargers
12	IS 17017: Part 21: Sec 2: 2019/IEC 61851-21-2:2018	Electric Vehicle Conductive Charging System Part 21 Electromagnetic Compatibility (EMC) Requirements Section 2 Off-board chargers

Source: https://www.services.bis.gov.in:8071/php/BIS_2.0/dgdashboard/published/standards?commttid=Mzc5&commttname=RVREIDUx&aspect=&from=&to=

Annexure 4

List of standards published by ARAI related to electrically propelled road vehicles and Intelligent Transport Systems (ITS):

S. No.	Code	Title
1	AIS-004 (Part 2)	Electromagnetic Radiated Immunity of Automotive Vehicles – Requirements & Methods of Tests
2	AIS-004 (Part 3) and Amd. 1	Automotive Vehicles - Requirements for Electromagnetic Compatibility

3	AIS-004 (Part 3) (Rev. 1)	Automotive Vehicles - Requirements for Electromagnetic Compatibility
4	AIS -038	Battery Operated Vehicles –Requirements for Construction and Functional Safety
5	AIS-038 (Rev.1):2015 and Amd.1	Electric Power Train Vehicles- Construction and Functional Safety Requirements
6	AIS-038 (Rev. 2)	Specific Requirements for Electric Power Train of Vehicles Part I: Requirements of a Vehicle with Regard to Specific Requirements for the Electric Power Train Part II: Requirements of a Rechargeable Electrical Energy Storage System (REESS) with Regard to its Safety
7	AIS-039	Battery Operated Vehicles – Measurement of Electrical Energy Consumption
8	AIS-040	Battery Operated Vehicles – Method of Measuring the Range
9	AIS-041	Battery Operated Vehicles –Measurement of Net Power and the Maximum 30 Minute Power and speed
10	AIS-048 & Amd. 1 and Amd 2	Battery Operated Vehicles - Safety Requirements of Traction Batteries
11	AIS-049 and Amd. 1 & 2	Battery Operated Vehicles - CMVR Type Approval for Battery Operated Vehicles
12	AIS-138 (Part 1)	Electric Vehicle Conductive AC Charging System
13	AIS-138 (Part 2)	Electric vehicle conductive DC charging system
14	AIS-140 & Amd 1 and 2	Intelligent Transportation Systems (ITS) - Requirements for Public Transport Vehicle Operation

Source: https://araiindia.com/downloads