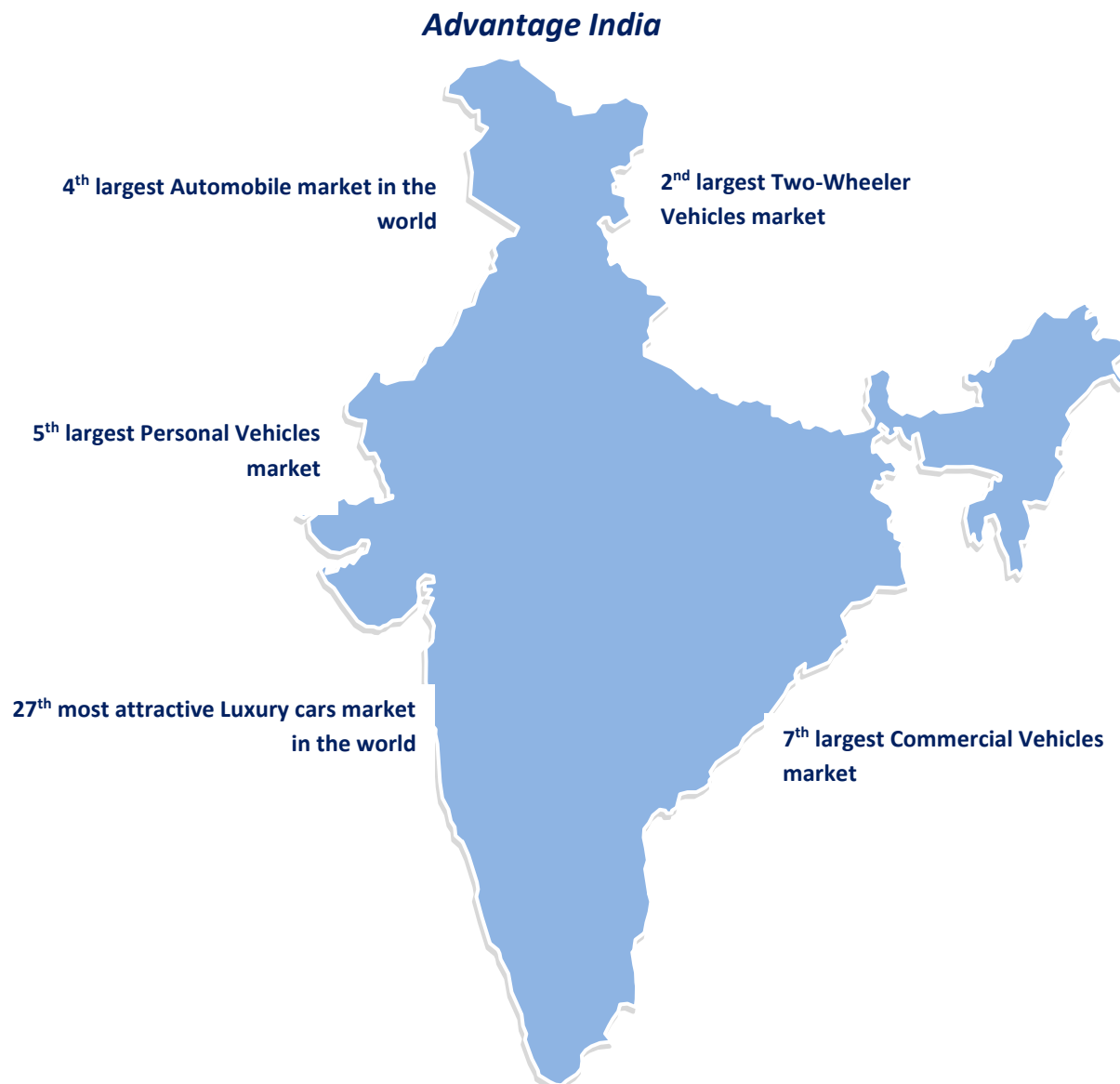


## Electric Mobility in India

Automotive industry globally is at the cusp of a major transformation. Growing concerns for environment and energy security clubbed with rapid advancements in technologies for powertrain electrification, increasing digitalization, evolution of future technologies and innovative newer business models and ever-increasing consumer expectations are transforming the automotive business.

One of the key facets of such a change is the rapid development in the field of electric mobility which might transform the automotive industry like never before. With an ambition to be among the top 3 in automobile manufacturing by 2026 (as per the Automotive Mission Plan 2016-2026), Indian auto industry needs to consider an innovative and pragmatic approach to ride this transformation wave. E-mobility by far is the greatest opportunity for the Indian industry to participate and emerge amongst the top in the globalized automotive world.



Historically, mobility and fossil fuels have been inextricably linked with electric vehicles being successful only in a few niche markets. However, over the last decade, a collection of circumstances have conspired to create an opening for electric mobility to enter the mass market. Those forces include:

#### Climatic Change

- The prospect of rapid global temperature increase has created the need for a reduction in the use of fossil fuels and the associated emissions. India has committed to cutting its GHG emissions intensity by 33% to 35% percent below 2005 levels by 2030.

#### Advances in renewable energy

- Over the last decade, advances in wind and solar electricity generation technologies have drastically reduced their cost and introduced the possibility of clean, low-carbon and inexpensive grids. India proposes to add 175 GW of renewable energy capacity by 2020 and to achieve 40 percent of its electricity generation from non-fossil sources by the same year.

#### Rapid urbanization

- Economic development, especially in emerging economies, is creating a wave of urbanization as rural populations move to cities in search of employment. While urbanization is an important component of the process of economic development, it also stresses upon the energy and transport infrastructure leading to congestion and pollution. According to a recent study by WHO, India is home to 14 out of 20 most polluted cities in the world. Electric vehicles (EVs) can improve that scenario by reducing local concentrations of pollutants in cities.

#### Data capture and analysis

- With the rise of GPS enabled smartphones and the associated universe of mobility applications, mobility has undergone a digital revolution. That digital revolution has created possibility of a greater utilization of existing transportation assets and infrastructure. For EVs, which rely on lower variable costs to offset relatively high fixed costs, this enhanced utilization is a critical element of achieving total costs of ownership compared to internal combustion vehicles.

#### Battery chemistry

- Advances in battery technology have led to higher energy densities, faster charging and reduced battery degradation from charging. Combined with the development of motors with higher rating and reliability, these improvements in battery chemistry have reduced costs and improved the performance and efficiency of electric vehicles.

#### Energy security

- The petrol, diesel and CNG needed to fuel an internal combustion engine (ICE) based mobility system requires an extensive costly supply chain that is prone to disruption from weather, geopolitical events and other factors. India needs to import oil to cover over 80 percent of its transport fuel. That ratio is set to grow as a rapidly urbanizing population demands greater intra-city and inter-city mobility.

## The Indian Context

### Opportunities

An infrastructure and consumer transition that affords opportunities to apply technologies to leapfrog stages of development

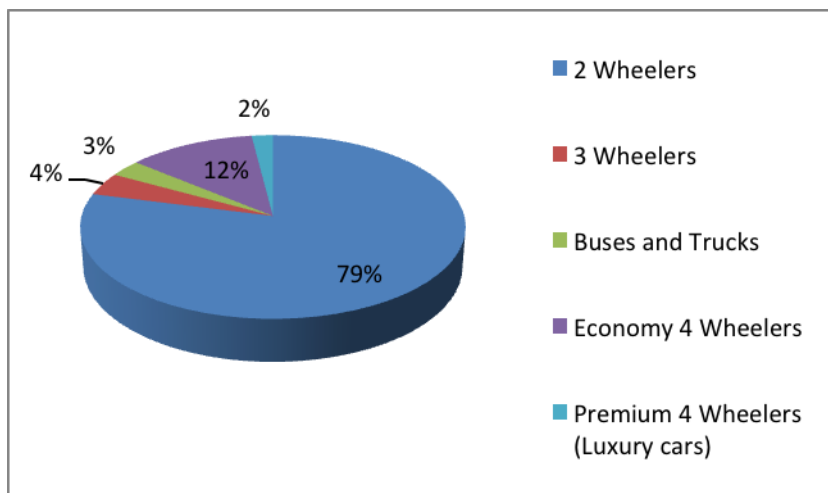
Abundance of exploitable renewable energy resources

A universal culture that accepts and promotes sharing of assets and resources for the overall common good

High availability of skilled manpower and technology in manufacturing and IT software



While India is operating in the same global context as other countries who have adopted an EV policy, it has a unique mobility pattern which other countries do not share. While vehicle growth in India is rapid, ownership per 1000 population has increased from 53 in 2001 to 167 in 2015, a key difference between India and other countries and the types of vehicles being used. India uses a large variety of motorized transport on roads and its auto-segments are quite different from that of most of the world. Based on the last six years of sales data, the vehicles on Indian roads are estimated to consist of:



In India, premium four wheelers (cars) are only 2% of the total sales. However, most advanced technologies are available in this category in global markets. In the near term, India should foster early adoption of vehicles by premium customers which will pave the way for consumer comfort with electrification, raise aspirations for indigenous products and make advanced technology available in the market. The presence of world-class technology will help India build a world-class ecosystem for high-quality component and subsystems usable for all kinds of vehicles.

In the longer term, India should establish technological and manufacturing leadership in the economy segment of the market. The prevalence in India of small vehicles such as two-wheelers, three-wheelers, economy four-wheelers and small goods vehicles is unique among large countries. These small vehicles require a unique set of technological and industrial capabilities. Here, India has an opportunity to take a leadership role in the

electrification of small vehicles. India's potential volumes for these vehicles as the nation grows, lays the foundation for transformational manufacturing and industrial policy. That focusses on the development of technological expertise and industrial capabilities in the production of small electric vehicles which can not only meet domestic demand but can also place India in a position of global leadership. As other countries begin to look at smaller vehicles with appropriate specifications, India can establish a position of leadership based on domestic demand.

Beyond significant domestic demand for smaller vehicles, another aspect of the Indian mobility market is supportive of electrification: its high level of sharing. Shared mobility in India has exploded, changing the way India travels. Taxi aggregators such as Ola and Uber increased from 130 million rides in 2015 to 500 million rides in 2016, leading radio taxis to account for 72% of the overall market. This high penetration of shared mobility in India increases both vehicle utilisation, which plays to the economic advantages of EVs, and also creates natural and large-scale purchases of EVs.

## Impact of EVs on Growth and Employment



Emerging opportunities in charging infrastructure, battery and power industries.



Transformation and careful handholding of auto ancillary MSMEs specialising in Internal Combustion Engines Vehicles (Petrol/Diesel vehicles)



India's crude oil import bill at the end of March 2019 is expected to be around USD 120 billion, up by 42% from USD 88 billion in March 2018. Just enabling India's 170 million two-wheelers to go electric, India can save upto USD 20 billion on the import bill.



Battery manufacturing industry in India can become bigger than the total amount spent on import of crude oil. This would provide a huge boost to the Indian economy. The revenue loss for governments from the taxes on the oil sector is expected to be replaced by higher tax revenues in other economic sectors



European Climate Foundation has estimated that through reducing oil demand by more efficient electric cars, employment will increase by 5,00,000 to 8,50,000 by 2030. Another report estimates that about 2 million additional jobs will be created by EVs by 2050. The report further adds that oil production and distribution has very low employment intensity of just four jobs per million Euros value added compared to 24 jobs per million Euros in the general economy. Therefore, any shift in expenditure from buying imported oil to other expenditure choices would generate additional employment. Further, as imported oil is replaced by electricity and batteries, large employment is possible in enhancing power-generation and distribution, and in battery manufacturing, including battery-recycling



Internal Combustion Engine vehicles (ICEs) are one of the main sources of air pollution globally. They negatively affect both human health and ecology. Emissions from ICE powered motor vehicles are responsible for about two-thirds of air pollution in urban areas. The current ban on older fuel cars in some Indian cities already shows a positive influence on air quality, and this can only further improve with the large scale introduction of EVs.

## Recent Trends

**Mahindra**

Mahindra has launched its new electric car and Tesla motors is also set to enter the Indian market. Suzuki Motors is setting up a battery plant in Gujarat. Electric buses from Tata Motors are in testing phase

**SALES**

India's electric vehicle (EV) sales increased to 56,000 units during FY 2017-18 from 25,000 in FY17 and are poised to rise further on the back of cheaper energy storage costs and the Government of India's vision to see 6 million electric and hybrid vehicles in India by 2020.



Sales of electric two-wheelers have crossed 54,000 vehicles in 2017-18

**SUNRA**

As of September 2018, China's leading Electric Vehicle (EV) company, Sunra, is planning to enter into Indian markets and set up a factory in Bangalore, Karnataka.

**Fortum**

As of December 2018, local arm of Finland based energy company Fortum India is planning to install about 720 charging facilities for electric vehicles by 2020 in seven cities in India.

**EM**  
EV MOTORS INDIA PVT. LTD

EV Motors, in partnership with DLF, ABB India and Delta Electronics, is also planning to invest US\$ 200 million to set up 6,500 electric vehicles (EV) charging stations in the next five years.

**OLA**

In January 2018, Ola announced plans to develop electric vehicles, including cars and auto-rickshaws for the Indian market.

**VOLVO**

As of November 2018, Volvo Cars India Ltd is planning to launch four plug-in hybrid vehicles in the next three years.

## Policies & Initiatives

### NATRiP

- Setting up of R&D centres at a total cost of US\$ 388.5 million to enable the industry to be on par with global standards.
- Under National Automotive Testing and R&D Infrastructure Project (NATRIP), five testing and research centres have been established in the country since 2015

### Department of Heavy Industries & Public Enterprises

- Worked towards reduction of excise duty on small cars and increase budgetary allocation for R&D
- Weighted increase in R&D expenditure to 200 per cent from 150 per cent (in-house) & 175 per cent from 125 per cent (outsourced)

### The Automotive Mission Plan 2016-26 (AMP 2026)

- AMP 2026 targets a 4-fold growth in the automobiles sector in India which includes the manufacturers of automobiles, auto components & tractor industry over the next 10 years.

### FAME

- Planning to implement Faster Adoption & Manufacturing Of Electric Hybrid Vehicles (FAME) till 2020 which would cover all vehicle segments, all forms of hybrid & pure electric vehicles. Under the scheme, the Government of India is planning to provide grants of up to Rs 105 crore (US\$ 16.33 million) to each of the selected city with population of more than a million, for buying electric buses, cars and three-wheelers in FY18. Additional funds will be provided for charging infrastructure. The scheme has further been extended to March 2019 from September 2018.
- The Government of India has shortlisted 11 cities in December 2017 to have electric vehicle based public transportation systems under this scheme. Number of vehicles supported under FAME scheme has increased to 192,451 in March 2018 from 5,197 in June.