

# ELECTRIC MOBILITY –

## Impact on Natural Gas Vehicles



*KPMG recently carried out a **study on Electric Vehicles Market – Demand Assessment and Market Scan** for Natural Gas Society. NGS brings to you the executive summary of the report...*



BY DEEPIKA LAL

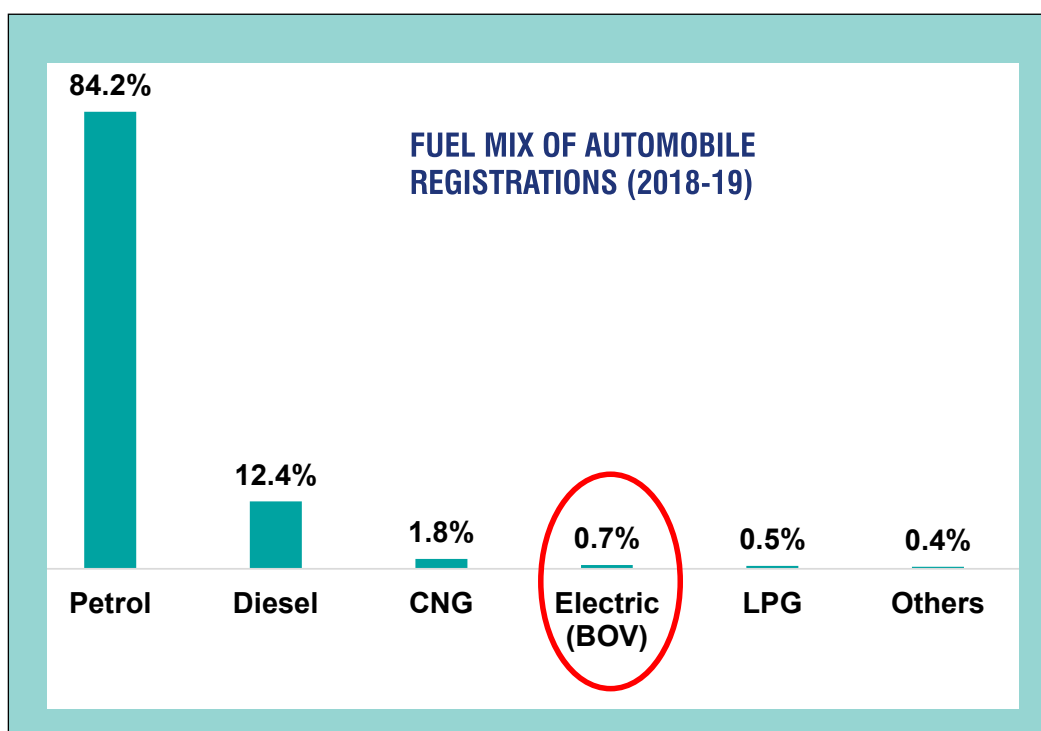
India's current automobile mix is predominantly dependent on petrol and diesel with a ~97% market share of the automobile registrations in 2019, followed by CNG with a mere ~2% share. Out of the 2.15 crore of the total vehicle registrations in FY 2019, mere 0.7% was electric-driven.

This is likely to change. First, the Govern-

ment plans to convert 30% of India's entire fleet to EVs by 2030. Second, with decreasing prices of Li-ion battery, EVs will become affordable even without subsidy. Third, the price of ICEs is expected to increase due to BS-VI and EV prices are likely to converge and will gain momentum. Fourth, 22 of the world's 30 worst cities for air pollution are in India, driving people

to move towards a cleaner mode of transport. So, given the above factors, the scenario is likely to move gradually towards adoption of automobiles using cleaner fuel – Natural Gas Vehicles (NGVs) and Electric Vehicles (EVs).

However, the rate of adoption of EVs is dependent on certain important factors – policy and regulatory framework, OEM preparedness, end-user economics, development of charging infrastructure/battery swapping and technology landscape.

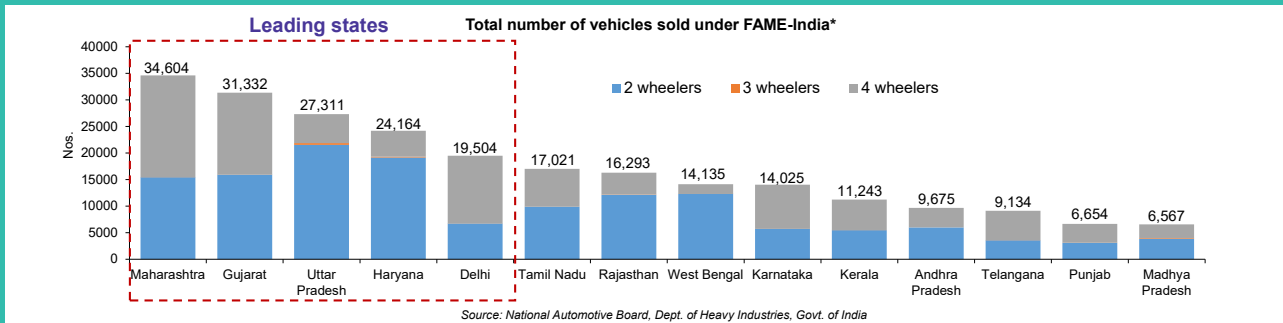


### Policy and Regulatory Framework:

There is strong policy push through subsidies and incentives for purchase of electric vehicles. FAME-I scheme acted as an initial demand driver for EV adoption. FAME-II scheme is building on the initial traction by offering a

ers providing a range of 100+ kms within a price range of Rs 1.5 lakhs. The upfront costs of three-wheelers have already reached the current cost of ICE/CNG vehicles. With major players such as Bajaj and Piaggio entering this segment, prices are further likely to reduce. Affordable

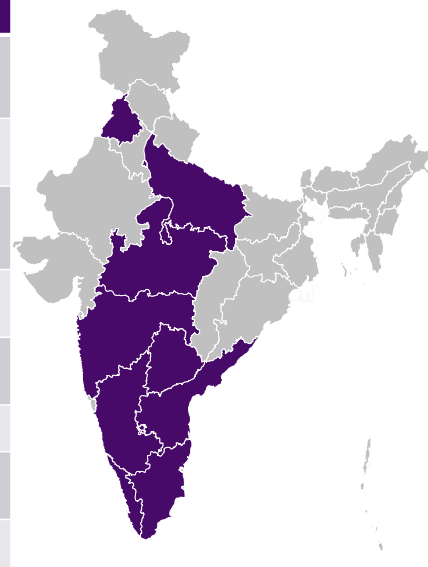
### IN INDIA THE GOVERNMENT IS PUSHING FOR EV ADOPTION BY OFFERING SLEW OF INCENTIVES UNDER THE FAME-I SCHEME



159,361 two wheelers, 1,278 three wheelers, 106,073 four wheelers and 27 buses have been sold under the FAME scheme till date 29 OEMs with 127 models have already been registered under the FAME scheme

### DIFFERENT STATES ARE PROMOTING EVS THROUGH EVS THROUGH VARIOUS POLICY MEASURES

Benefits/Incentives	Delhi	Maharashtra	Karnataka	Andhra Pradesh	Telangana	Kerala	Uttar Pradesh	MP	Punjab	Tamil Nadu
Waiver of road tax and registration charges	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Special Tariff Category for EV charging	✓	✓		✓	✓	✓	✓	✓	✓	
Customer Incentives/ Subsidy for EVs	✓	✓					✓			
Support for battery manufacturing			✓	✓	✓		✓	✓	✓	✓
Promotion of Research & Development		✓	✓	✓	✓	✓	✓	✓	✓	✓
Skill Development			✓	✓	✓		✓	✓	✓	✓
Incentives for Charging Infrastructure		✓	✓	✓	✓	✓	✓	✓	✓	✓
Manufacturing sops		✓	✓	✓	✓	✓	✓	✓	✓	✓



slew of demand incentives.

In addition, different incentives and benefits are being provided by the States for promotion of EVs. States are focusing on electrifying the public transportation fleet by replacing older fleet as well as meeting incremental demand.

Commercial fleet operators such as Uber, Ola, Blusmart, Meru Cabs, Zoomcar etc. have already pioneered the adoption of EVs in select geographies and are likely to expand to Tier-II cities.

### OEM Preparedness:

There are existing and upcoming models in electric three and four wheelers segment providing options across price and range to customers. New EV models across vehicle segments are coming up to facilitate the transition into electric. The cost economics of an electric three-wheeler is very favourable, whereas it has not yet reached cost parity in case of four wheelers.

There is preference of electric three-wheel-

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models will give a boost to the adoption of EVs particularly in this segment.

There is also a clear white space for an affordable electric four-wheeler model providing a range of 200+ kms. There are only few EV models in four-wheeler segment currently in the market, limiting the purchase of EVs by personal buyers. However, more EVs are coming up in four-wheeler category across prices ranging from Rs 6 lakhs to 25 lakhs giving buyers varied options to select from.

### End-user Economics:

Different type of EVs (electric bikes, e-rickshaws, auto-rickshaws, cars, buses, etc.) will meet varying needs of the end customer. Based on the varying level of usage, it would be essential to compute the Total Cost of Ownership (TCO) and compare the cost economics across different fuel-types.

In three-wheelers, average TCO of electric auto rickshaws is lowest mainly due to lower fuel expenses, and upfront cost spread over very high usage (5.84 lakh kms).

In private four-wheelers, the average TCO of a private EV with subsidy and without subsidy is 6.2% and 15.8% higher than a diesel car, while for a commercial EV, average TCO with or without subsidy is lesser than a diesel vehicle due to very low per km running cost. Also, average TCO of CNG is least of all comparable models mainly due to cheaper fuel, better mileage and low cost of retro-fitting.

In commercial four-wheelers, average TCO of EV with or without subsidy is lesser than diesel and petrol vehicle due to very low per km running cost. Again, average TCO of CNG is least of all comparable models mainly due to cheaper fuel, better mileage and low cost of retro-fitting.

### Charging Infrastructure:

Three types of charging infrastructure is needed – captive chargers (for residential areas and office spaces), public chargers (commercial areas) and privately-owned battery swapping stations (inter-city transport and long haulage).

The power ministry issued Guidelines for

Public Charging Infrastructure, October 2019. The Ministry of Housing and Urban Affairs has amended the Model Building Bye-Laws asking States to include 20% of the parking space component for EV charging infrastructure. Also, charging infrastructure is being gradually developed to support the EV ecosystem. Companies are inviting proposals for EV charging stations across cities.

### Technology Landscape:

Among the four major types of battery technologies, lithium-ion is preferred most by the large OEMs because of its highest performance. Lithium-Ion batteries have higher battery life and low maintenance costs. India imports 100% of its Li-Ion requirements. Unless domestic manufacturing is setup, the imports are set to increase exponentially as more and more automobile companies start to add EVs to their portfolio.

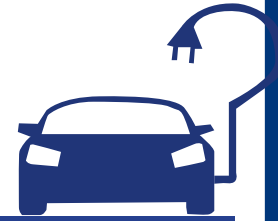
However, many players such as Reliance, Suzuki Motors, Amara Raja etc. have announced plans to setup Li-Ion manufacturing in India. Few units of some players are set to start commercial production in next few years. The units are being setup under the FAME India scheme of the government; they will also get subsidies/benefits under the respective state's EV policy.

All the above factors pose as both drivers and constraints in the adoption of EVs in India.

### Impact Assessment of EVs on CNG/LNG Sales

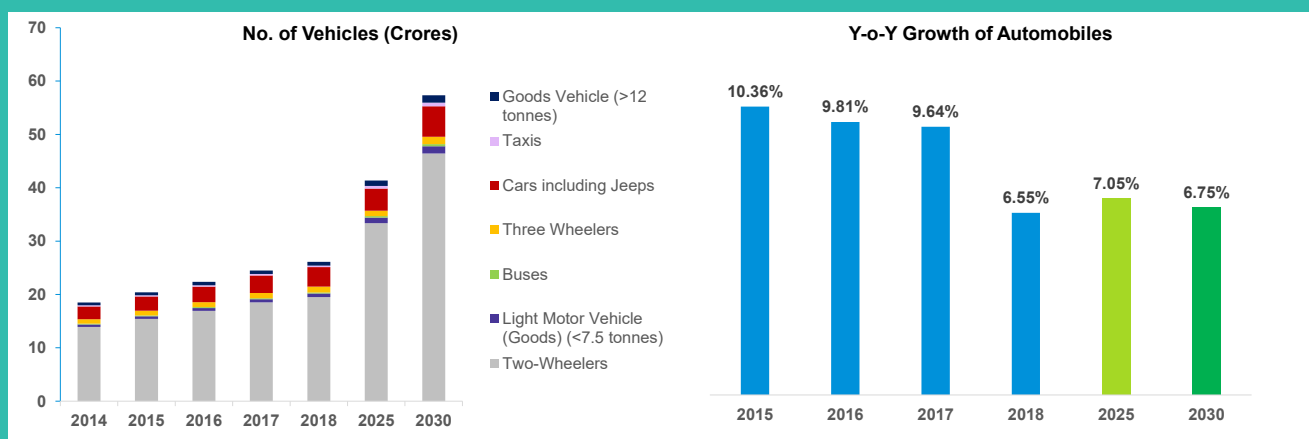
The demand for automobiles is expected to witness a muted but consistent growth in the coming years. Two-wheelers and four-wheelers growth in Tier-II and Tier-III cities in India is likely to contribute in the future. Commercial taxis are likely to make a larger share in the four-wheeler market segment.

In order to forecast the number EVs on Indian roads by 2025 and 2030, the demand for automobiles across vehicles segments was forecasted, followed by an analysis of the impact of the factors discussed above on EV adoption. The vehicles categories across which NGVs



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and EVs overlap have been identified, as it will drive the impact of adoption of EVs on sales of CNG/ LNG.

There are four vehicle segments with overlap between NGVs and EVs – intra-city buses, three-wheelers, taxis (commercial four-wheelers) and cars (personal four-wheelers). Analysis for each of these vehicle segments have been conducted separately for two scenarios – Realistic and Optimistic Scenarios.

Realistic Scenario has been considered with the following assumptions:

- Cost of batteries to reduce from 250 USD/KWh to 125 USD/KWh by 2024-25 and to 100 USD/KWh by 2030
- Range of vehicles will improve from 150-200 kms/charge to 500-600 kms/charge by 2030

- Public transportation to witness a higher shift to electric than private modes

Optimistic Scenario has been arrived at considering a faster adoption than the realistic scenario, with the following assumptions:

- Cost of batteries will reduce at a faster rate – will reach 125 USD/KWh by 2022-23 and 100 USD/KWh by 2027-28
- Range of vehicles will increase at a faster rate - from 150-200 kms/charge to 500-600 kms/charge by 2028
- Private cars and taxis also start making the transition to electric, assuming technology improvement leading to affordable models.

Based on the analysis of each of the factors discussed above, the projections for adoption of electric vehicles in 2025 and 2030 for the two scenarios have been concluded.

Realistic Scenario			
Vehicle Segment	2018	2025	2030
Buses	200	23,100	73,100
	0.01%	0.83%	1.82%
3-Wheelers	2,50,000	11,56,000	18,56,000
	3.79%	11.33%	13.58%
Taxis	1,750	58,200	1,69,200
	0.02%	1.19%	2.46%
Cars	5,250	39,800	1,14,800
	0.01%	0.06%	0.12%

Optimistic Scenario			
Vehicle Segment	2018	2025	2030
Buses	200	25,200	1,00,200
	0.01%	0.91%	2.50%
3-Wheelers	2,50,000	12,76,000	21,51,000
	3.79%	12.51%	15.74%
Taxis	1,750	2,12,400	5,12,400
	0.02%	4.34%	7.45%
Cars	5,250	1,84,400	4,34,400
	0.01%	0.28%	0.46%

Figures in numbers

Data Source of Base numbers

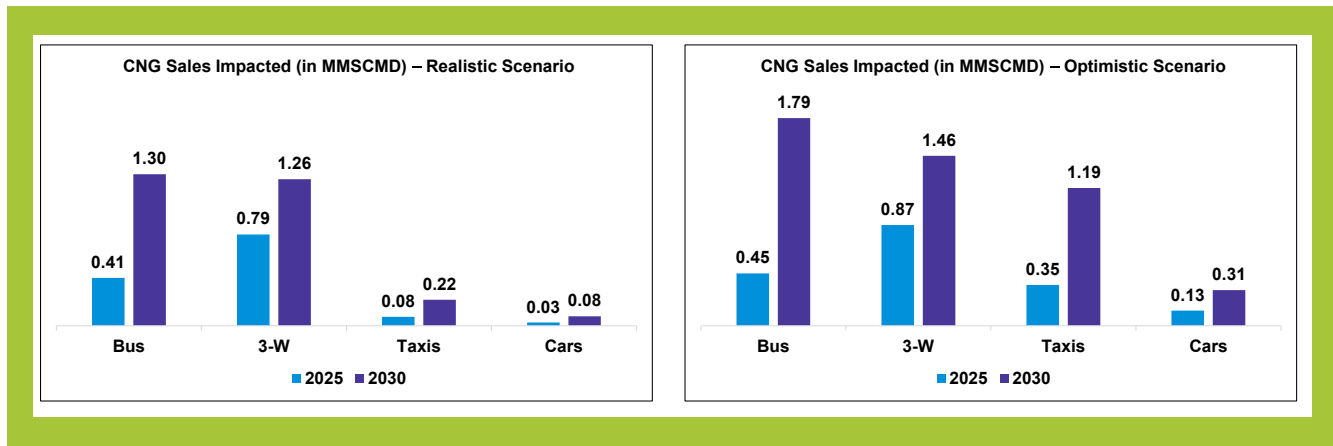
- ✓ Electric buses numbers - Published articles
- ✓ Electric three-wheelers numbers - Vaahan Portal
- ✓ Electric taxis and cars - Society of Manufacturers of Electric Vehicles (SMEV)

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## Impact on CNG Sales due to Adoption of EVs

Buses and three-wheelers run on CNG in very few states as of now with developed CNG infrastructure in place. EVs penetration will be faster, as there is no infrastructure constraints. States where CNG infrastructure is not yet de-

veloped, EVs will replace petrol or diesel demand. As and when CNG infrastructure reaches those states, NGVs will cater to the incremental demand. This means there is no major replacement of NGVs by EVs.



### KEY TAKEAWAYS:

- Three-wheeler category will lead the adoption of EVs in India, followed by intra-city buses. Taxi aggregators are gradually adopting EVs, but limited charging infrastructure is restricting their reach. Private cars will take some time for adoption, once it is economical for the personal buyers.
- The penetration of EVs in the automobile mix is forecasted to be ~2% in buses, ~14% in three-wheelers, 2.5% in taxis and ~0.2% in cars by 2030 in the case of realistic scenario. In the optimistic scenario, the share of EVs is expected to be ~2.5% in buses, ~16% in three-wheelers, ~7.5% in taxis and ~0.5% in cars by 2030. These numbers conclude that although the adoption of EVs will increase, the total automobile growth is also high and the share of EVs in the automobile mix will still be lower.
- Comparing the state of adoption of EVs and CNGs, it seems there will be no major replacement of NGVs by EVs. CNG will remain as one of the major fuels in the automobile segment till 2030. With the increasing infrastructure for enablement of CNG, more users are likely to adopt it. LNG will take its own pace for growth into commercialization and will not be affected by EV adoption since there are no overlaps in vehicle segments between these two fuel categories.



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