**Ashish Narayanan**
Manager, Strategic Business Development -
Automotive E&E, QuEST Global

# E-mobility in India - Technology for sustainable future transport

*Sustainable mobility is a team sport. We must bring together technology, systems-design methods, and business models to supply better mobility at a low cost to consumers and societies.*

In 1897, a resident of Calcutta brought the first motorized car to India, reportedly a (French) DeDion. What has changed since then?Nothing much, except the numbers.Around 300 million vehicles are running in every nook and cornerof India now. However,the basic design of automobiles remainsthe same as that of the 1900s - energized by oil, powered by combustion, driven mechanically by a person, and intended for a broad purpose.This was true until recently, a technocrat with no background in automotive crafted one of the most sought-after cars in the world–Tesla. From there, you can see a paradigm shift in the way manufacturers think about automobiles.At a time when the E-Mobility revolutionstarted by Teslais evolvingworldwide,E-Mobility has the power to ensure the sustainable growthof the transportation sector in India.

## The Indian scenario and way forward

India is the third-biggest oil consumer in the world who imports about 84% of its oil needs. This translates to $112 billion or 1/4th of the country's total import bills. This has also made the countrya significant contributor to global climate changes, placing it at 4th place in thelist of global greenhouse gas emitters. Along with this, road accidents have been a significant cause for concern across India. In 2018 alone, the country reported around 1.5 lakh fatalities due to road accidents.The traffic congestions in various key cities in the country and the huge infrastructure demands – mainly for roads, increasedsingle user cars etc. are some of the problems the country have beenfacing in the transportation sector.

Overcoming these problems requirerethinking the entire system, the way people move.It is not enough to focus on the automobile industry alone. The implications are much beyond the industry and affecting our entire growth potential of the country.

The solution must meet the needs of all users, businesses, and the country at large. The way forward is to build an integrated network of Connected, Autonomous, Shared, and Electrified vehicles (CASE) or in the more generic term, we can call it as the "E-Mobility."

## CASE –The Building Blocks of Future Transportation

### Connected vehicles

These communicate with surrounding vehicles and infrastructure through the digital 'cloud' to enable hands-free calling, navigation,emergency response and concierge services.They have matured rapidly after the GPS, SLAM, LTE, and going to redefine after the introduction of 5G. The connected features have gone beyond the comfort and convenience levels of the users, and now reached a level that helps us to invade traffic blocks, take the shortest and fastest routes, parking, etc. The connected car with advanced Intelligent Transportation System (ITS) can do wonders in theindustry. Positive signs are coming from various directions, as ITS is functional in all major cities, and governments are pitching for moresmart citiesthat will complement the connected vehicle ecosystem.

### Autonomous vehicles

One of the game-changersfor the Indian transportation industry is expected to be autonomous vehicles.Though the policymakers are a bit skepticalon the introduction of autonomous cars,we cannot move away from it. From an Indian perspective, it is time to derive a policy around it and overcome a host of our current challenges. For example, it is going to help us in the reduction of traffic accidents by eliminating human error, increasing road capacity and traffic flow by reducing the distance between cars, relieving car occupants from driving and navigation ac-

tivities, and allowing them to engage in other activities or rest. Since these cars are supposed to be less prone to crashing, they need fewer safety features and can,therefore, be smaller and lighter than current vehicles,making them better suited to electric power.

## Shared mobility

These serve several people throughout the day, in contrast to personally owned vehicles that are parked 90% of the time. Shared mobility is an umbrella term that encompasses a variety of transportation modes, including car sharing, bike sharing, peer-to-peer ridesharing, on-demand ride services, micro-transit, and other modes.

According to a McKinsey report, sharing cars likely means slower growth of vehicle sales. It also suggests substantial new opportunities for automakers, suppliers, mobility players, policymakers, and countries at large.The increasing popularity of shared mobility will slow global vehicle sales but not reverse them. If utilized in its full potential, Indian roads may see less traffic and 1/3 of the current vehicles will go off the streets. Together with autonomous cars, this would enable mobility players to reposition vehicles optimally, allowing smaller fleets to provide adequate coverage and reducing the fixed cost base.

## Electric vehicles

There was a time when people thought of electric vehicles as a distant option. However, in the recent past, it is proved that it is the only way forward and in the future.At a fundamental level, electric cars offer a dramatically lower operating cost-compared to conventional internal combustion engines. On average, electric vehicles are 75-80% cheaper from fuel and maintenance perspective, which is an important consideration for many consumers who have high usage. The new inventions in the battery and charging technologyare going to eliminate any hiccupsand ultimately change the perspective of EV penetration in India.According to a Niti Aayog report, India will need 50 GWh of battery storage capacity by 2022.This which shows the confidence our policymakers are putting on the Electric Vehicles.The required changes in India's "National Electric Mobility Mission Plan (NEMMP) 2020" can address the remaining limitations in the policy and present a positive picture to the public.

## A Sustainable Future

According to available projections, Connected Autonomous Shared Electric (CASE) vehicles would make up a significant



part of the total mobility fleet in the future and considerably decrease passenger-kilometer costs.Automotive and transportation are not the only industries that will be disrupted by this development.Autonomous mobility is also expected to affect city planning significantly and considerably change the laws of real-estate markets.

Technology is no longer the biggest hurdle.We need to create the collective will to move forward. Prototypes need to be deployed in respective communities so that we can learn what works. Such learning cycles are essential to prove what is possible, to identify what consumers like and dislike, to determine which business models are attractive, and to avoid unintended consequences. However, the effective roll-out of E-Mobility in the country entirely depends on three key aspects –the government, infrastructure,and automotive industry players.A consistent and stable policy on emission regulations along with incentives, subsidies, better infrastructure– road, signaling system and charging points, alternate business models for power and oil & gas companies,and a supportive ecosystemto prevent any job losses are some of the ingredients the stakeholders need to ensure to implement E-Mobility in India successfully.

While enabling automakers to develop secure and reliable connected vehicle services, we should address the complete vehicle and subscriber lifecycle & supporting a new era of connected safety with advanced driver-assistance systems as we blaze the trail of automated driving. For global automakers, engineering service enterprises should enable cognitive intelligence along with services like the development of IVI, instrument cluster, connected systems, autonomous systems, e-mobility, shared mobility and more.

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