

Transport and mobility

India has 14 of the twenty most polluted cities in the world; it spent \$106 billion in the first 11 months of current fiscal (2021-22) on oil imports. The automotive sector, a 200-billion-dollar industry in India, growing at nearly 10% and the largest employers in the engineering sector, is one of the major offender in this context. But the sector is set to have disruptive change in coming years.

By 2047, and probably much before, most of these Internal Combustion Engine (ICE) vehicles are likely to change to Electric Vehicles (EVs). They may be driven by a battery or Green Hydrogen, depending on how both these technologies evolve. Faster this happens, India would gain in terms of pollution control as well as foreign exchange outgo. However, the challenge is to look at these two systems and evolve a solution that does not hurt the industry and employment and, at the same time, creates benefits for all citizens in a sustained fashion. In one sense, we are talking about a paradigm shift that satisfies all the stakeholders. It must enable the existing large, medium and small industries to transition. This may be possible, only if every subsystem of the new vehicles is Made in India.

R&D and Manufacturing in India

Battery packs, which dominates the costs of EVs would anyway have to be designed, developed and manufactured here considering India's temperatures, road-conditions and low-affordability. Fortunately, India is quickly developing the capability. Equally important is to manufacture battery-cells locally. The recent PLI encourages this. As the chemistry changes every couple of years, bringing the costs down, India would need to carry out continuous R&D and collaborations, to keep the costs in par with the world. Electric Motors and Controllers constitute the second largest costs in EVs. This is where India can excel with R&D focused on commercialization. Vehicle Chargers is the third component and India will need to sharpen its power-electronics capabilities, to develop and manufacture them. India's vehicles are dominated by its two and three-wheeler industry. It is here that India would have to strive to maintain its leadership, as it transitions from ICE to EVs.

As Hydrogen-powering of EVs may happen in future, India would have to produce green-hydrogen at lowest possible costs. Thus, technologies for electrolysis and Fuel Cells (to convert Hydrogen to Electricity) must be developed at minimum costs. These technologies will be equally useful for making Green Ammonia fertilisers, steel making and cement making tomorrow.

Shared mobility and congestion

India's vibrant auto- industry is today focuses on personalised mobility that has congested our cities to such an extent that travel to work may take up to an hour. This cannot be the future. The answer would be to focus on (a) shared mobility and public transport and (ii) redesigning our cities and towns to overcome congestion and encourage use of public transport and walking or cycling.

The shared mobility involves simultaneous (buses and trains) or independent use of a system (taxi), irrespective of the ownership. Top on the list is the mass transit system. Buses or trains can move up to 25,000 people per hour. Public transport will be preferred by people only when it is convenient and faster for even the well to do people. The next important source is ride-sourcing; Ola and Uber have already made great strides, including shared-autos and taxis. Rapido is making

waves. A luxury 12 to 14-seater, which would pick one up within minutes and drop where one wants to go fast would be the next step; walking on each-end should be less than 100 meters.

Redesigning future living places (towns and cities) so that one should be able to travel to work within 15 minutes will be a challenge worth taking.

Road safety is another field, where significant attention is needed. This will involve designing of vehicles and roads as well as greater emphasis on traffic rules. India has far too many road-accidents today. This must not continue in future.

Goods transport

While trains and electric trucks can move goods between cities, smaller electric transport vehicles would be required for last-mile transportation. Enabled by mobile-data communication and the two-wheelers, Couriers, Swiggy, Zomato and Dunzo have emerged as great services over the last few years. These are only likely to expand. They are convenient to customers, low-cost and quick. All these two-wheelers are going to be electrified soon. Electric three wheelers (e-rickshaw to e-auto) will move larger goods quickly, not only in cities and towns, but also to and from rural areas. Start-ups are playing a great role in enabling all this. Over the next few years, one would see emergence of UAVs for very quick delivery of small-sized payloads (for example medicines). Regulations will be required, so that our air space is accident-free and avoids congestion.

Long-distance Transport

Transport, be it surface, water or air transport, are essential movers of the economy. Though road transport is more expensive than rail and waterways, the past few years have seen their growth outperforming other modes. One should not forget the advantages of each system. Road transport is the choice for perishable items and door-to-door delivery. Rail transport is recommended for bulk transport.

Challenges

1. Infrastructure and services: Space for non-motorized transport, vehicle pick-up and drop-off points etc.
2. What can be the policy and regulations?
3. How to promote mass transit, which is moving away from aspirations of the middle class?
4. How to integrate different transport modes?
5. How to promote broader geographic coverage?
6. How to address safety and security?

The critical question is: What can be a scheme for the future transport network in the country?