

Role of EVs in India's Sustainable Mobility Journey

As we celebrate yet another World EV Day, it is important to remember that mobility solutions should focus on multi-modal transport choices.

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Over the last 2 years, the sale of electric vehicles has picked up pace in India, with this year's sale already surpassing that of last year's by over 80%. As we observe the World EV day to create awareness about EVs and green mobility, several automobile companies have unveiled their plans of launching more EVs in the Indian auto market. EVs are gaining traction globally as an efficient means to decarbonise transportation and reduce fuel dependency.

In India, the EV market was (conservatively) valued at Rs 5,400 crore in 2021, according to a report by Fortune Business Insights. However, internal combustion engine (ICE) vehicles dominate Indian roads, accounting for 99% of the vehicle population.

How are EVs better than ICE vehicles?

Replacing an ICE car with an EV can help avoid about 2-tonnes of CO₂ tailpipe emissions annually. In addition, EVs have lower-lifecycle GHG emissions—19%–34% for e-cars and 33%–50% for e-two wheelers. With a potential increase in the renewable energy sources in the electricity mix as per current plans, the emissions are expected to reduce further by 2030.

In the long-term, EVs will be economically beneficial for users, particularly for commercial purposes. With [petrol](#) prices being around Rs 100 per litre, the energy cost of a petrol car is estimated to be more than Rs 6 per km, whereas that of an EV is only about Rs 0.5 per km (an average of 1/10th of an ICE vehicle).

Moreover, the maintenance cost of EVs is around 30%–40% lower than that of their ICE counterparts. However, despite these advantages, at present, the initial purchase cost of EVs is significantly high (1.3 to 2 times of ICE counterparts). Nevertheless, government initiatives, such as the Faster Adoption and Manufacturing of (Hybrid and) Electric vehicles in India (FAME) scheme, provide subsidies on the purchase cost of EVs.

Other strategies, like the Production Linked Incentive (PLI) scheme, which promotes local manufacturing of EV components, are expected to further reduce this purchase cost by 2030.

Current trends and future demands

With the transition to EVs becoming inevitable, India is showing great strides in accelerating its green mobility enterprise. Government schemes and rising fossil fuel prices have led to the deployment of about 15 lakh EVs on Indian roads; however, this constitutes only <1% of the total vehicle population in the country.

To address climate change impacts and the national fuel dependency, the energy ministry has set a target of 30% EV sales by 2030 (EV30@30). If this is achieved, EVs could constitute up to 5% of the vehicle stock. These trends indicate that EV adoption in the personal-use vehicle segment will be led by e-2Ws (60%–80%), whereas e-three wheelers will continue to dominate in the commercial vehicle segment (60% of total EV sales).

Further, the Grand Challenge initiative by the Convergence Energy Services Limited has aggregated a demand for about 5,000 e-buses across nine cities in 2022 and aims to deploy another 50,000 e-buses by 2027.

For such an uptake of EVs, an estimated battery capacity of up to 825 GWh and an annual energy demand of 39 billion units (~4% of current demand of 1,000 billion units) would be needed. Power infrastructure upgradation at the feeder level will be required to match the energy demand.

Is electric mobility clean?

Given our electricity generation remains predominantly (~72% of grid mix) coal based, charging EVs by drawing power from the existing grid would mean mere elimination of tailpipe emissions and hence cannot be termed a 'clean mobility solution'. Thus, along with EV uptake, it is equally important to increase the renewable energy share in the grid mix.

If the target to generate 46% of the country's electricity from renewable sources in 2030 is achieved, the EV30@30 initiative can avoid up to 25Mt CO₂ emissions. Furthermore, if 70% of the electricity used for charging EVs comes from renewable sources (as projected for the Sustainable Development Scenario by the International Energy Agency), there would be an additional emission reduction of 30Mt CO₂.

EVs and sustainable mobility goals

Many Indian cities like Delhi and Bengaluru are reeling under the issue of traffic congestion, primarily owing to increased personal-use vehicles for regular commute. Considering current EV uptake trends, EV adoption in the personal-use segment will most likely increase. This addition to the traffic streams, apart from ICE vehicles, may increase tailpipe emissions, although EVs do not emit at source.

Based on these scenarios, it is vital that EV adoption or uptake policies are meticulously framed. Multi-modal transport systems, with metro rail and e-bus fleets as the primary modes, coupled with electrified first/last-mile connectivity through shared (e-rickshaws) and micro-mobility (e-bikes) options or active transport (walking) offer a promising urban sustainable mobility solution.

EV fleets (e-auto rickshaws or e-bikes) powered by renewable energy sources coupled with reliable and convenient public transport services (metro or e-buses) are the way forward for Indian cities.

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