Electric vehicles have the potential to fuel India's growth

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A recent report by the World Health Organization revealed that 14 of the 20 most polluted cities in the world are in India. Emissions from the transportation sector contributed significantly to India's pollution levels. As per the Union ministry of environment, forest and climate change's estimates, the sector emitted about 188 MT of CO_2 till 2010; road transport alone contributed to 87% of the emissions. This sector is also a large consumer of oil. India's current oil import dependency is about 80%. According to the Petroleum Planning and Analysis Cell, diesel and petrol contribute to about 40% and 13% of oil consumption, respectively. The cell estimated, in 2014, that 70% of diesel and 100% of petrol demand was from transportation.

Given the context, electric vehicles (EVs) promise to be game changers. EVs are at least 3 to 3.5 times more energy efficient than the traditional internal combustion engine-based vehicles for routine operations. Also, there is no emission from EVs, hence, no local pollution. Thus, transitioning to EVs cannot only be a significant step towards reducing oil imports, but can also aid in improving local air quality.

Globally, there have been various efforts (including financial/non-financial incentives to end users) to promote EVs. Many countries have rallied towards the EV30@30 campaign, which aims for 30% sales share of EVs by 2030. The Netherlands, Ireland and Norway are leading the way, aiming to achieve 100% EV sales in passenger light duty vehicles and buses by 2030.

In India, initiatives such as the National Electric Mobility Mission Plan (NEMMP) and Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) are concerted efforts towards building an EV market. The procurement of over 500 electric buses by various state transport utilities is a testament to India's commitment.

India is also taking steps towards building a sustainable EV ecosystem. The department of heavy industry, Bureau of Indian Standards, and the Automotive Research Association of India are working towards establishing various technical standards for design and manufacturing of EVs and electric vehicle supply equipment (EVSE) or charging infrastructure.

Enabling systematic adoption of EVs requires coordination among urban planning, transportation and power sectors. A study by the Center for Study of Science, Technology and Policy (CSTEP) arrived at suitable routes for e-buses in Bengaluru. Upon analysing the constraints posed by location and size of depots, schedule of buses and electrical loading of the distribution network, using a geographic information system platform and considering the appropriate cost components, incentives and policy schemes to compare the total cost of ownership of electric and hybrid buses with that of diesel buses, it was found that around 164 routes were feasible for transitioning to EVs with minimal change in the system.

Enabling this ecosystem also requires policies that encourage domestic manufacturing of vehicles, batteries and EVSE. In-house manufacturing is key to building technological expertise and providing jobs to support our young demographic. Karnataka took the lead with its EV policy (2017); many states are in the process of following suit. Measures being considered in the policy design include fiscal incentives such as investment promotion subsidies and reimbursement of land conversion fee.

Despite various proactive steps, India still has several systemic, technological and material vulnerabilities. Our electricity distribution grid assets are currently unable to handle large-scale EV energy requirements. On the material front, based on current knowledge, India has very little known reserves of lithium; we also import nickel, cobalt and battery-grade graphite, which are crucial components in battery manufacturing. Unavailability of rare earth materials used for making magnets for EV motors is another constraint. India should consider signing a memorandum of understanding with appropriate countries for a continuous supply of raw materials. Organizations like the International Solar Alliance (ISA), initiated by India and France, can play a significant role in facilitating such trade. For example, ISA member countries like Australia, Chile, Brazil, Ghana and Tanzania are rich in lithium reserves. Similarly, nations such as Congo, Madagascar, and Cuba can partner for supply of cobalt; Burundi, Brazil, and Australia are rich in nickel reserves.

On the technological front, we still lack sufficient technical know-how in lithium battery manufacturing. In a welcome step, the Indian Space Research Organisation has expressed willingness to transfer its in-house technology non–exclusively to qualified production agencies. Further, the Central Electro Chemical Research Institute (Karaikudi, Tamil Nadu) and RAASI Solar Power Pvt. Ltd are expected to jointly start in-house lithium ion battery manufacturing soon. Other technological gaps include lack of semiconductor manufacturing facilities and controller design capabilities. These industries form the bedrock for manufacturing electronics for EVs; policies should bridge gaps that are hindering their growth.

Despite these bottlenecks, there is merit in being ambitious about EVs. The potential benefits on various fronts—from fiscal to health and employment—could be game-changing.

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