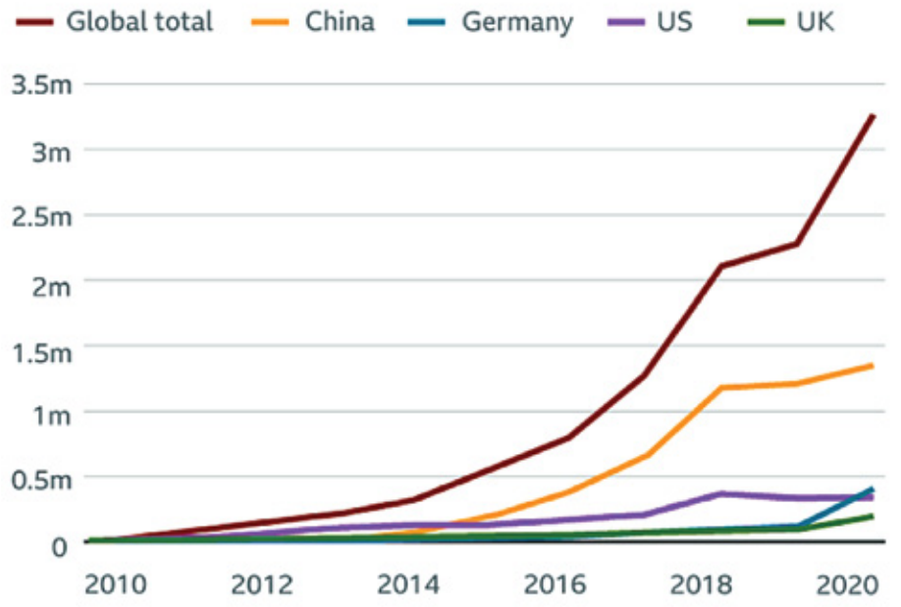
Whitepaper

Fast-Tracking Electric Vehicle Adoption in India

Climate change is an important, current, and ongoing issue that requires coordinated efforts at all levels. Managing the impacts of climate change necessitates international cooperation to help countries move toward a low-carbon economy. Global organizations, such as the United Nations Framework Convention on Climate Change (UNFCCC), have coordinated nationally determined contributions and enforced climate change-related goals through globally ratified agreements. Adopted in 2015, the **Paris Agreement** [1] under the UNFCCC, a legally binding international treaty on climate change, aims to substantially reduce global greenhouse gas emissions and limit the global temperature increase in this century to two degrees Celsius.

With countries focused on reducing greenhouse gas emissions and boosting environmental compliance, there is now a noticeable shift towards electric mobility. Global sales of electric cars raced forward in 2020, rising by 43 percent to a total of 3.2 million, despite overall car sales slumping by a fifth during the coronavirus pandemic [4].

Global sales of electric cars accelerate



Source: www.ev-volumes.com

India is one of the major consumer markets in the world today. According to a World Economic Forum report, it is positioned to become the world's third-largest consumer market by 2030, with consumer spending growing to USD 6 trillion [5]. Yet, Indian cities are far from being counted among the electric vehicle (EV) capitals around the globe today. According to a report by the International Council On Clean Transportation (ICCT), nearly 50 percent of the world's electric vehicle sales are concentrated in 25 global cities touted as the EV capitals of the world [9]. However, startups in India are spearheading a revolution in this area, and India may soon join the league of EV capitals. The country is paving the way for EVs and their technologies by announcing its plans for the decade ahead.

However, we need to overcome the following challenges to accelerate the faster adoption of EVs in India.

Range Anxiety - Customers are often worried about the vehicle's capability to reach its destination before the battery runs out due to insufficient charging infrastructure concentrated in few urban areas only.

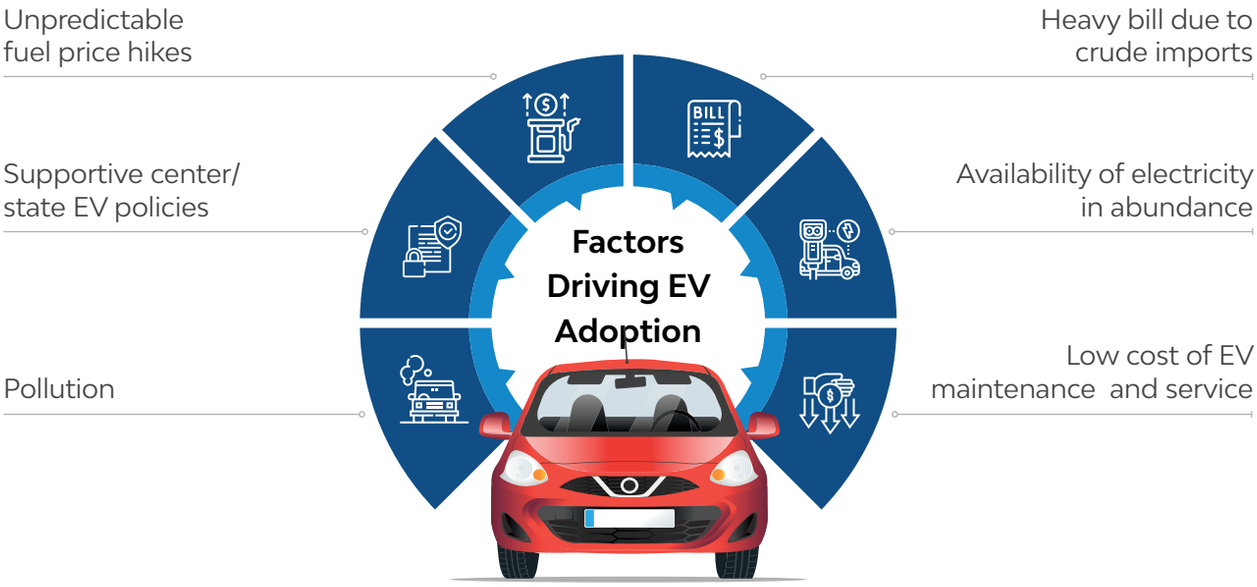
Product Model and Feature Range - There are hundreds of options available to buy a conventional fuel-powered car or two-wheeler. Only a few model options are available in the EV segment, driving the customers away from buying EVs.

High Price - Electric vehicles are way more expensive than their conventional fuel-powered counterparts. This huge price difference in India discourages buyers.

Battery Technology - India relies mainly on imports for lithium-ion EV batteries, resulting in the sky-high price for these critical components and eventually the EVs.

Resale Value – Most available EVs are not from established, trustworthy brands, and model options are limited. There is a lack of assurance about the fair resale value of electric vehicles.

The consumer perception about electric vehicles in India is still weak compared to internal combustion engine (ICE) vehicles due to the above-mentioned reasons. Despite this, Indian consumers/governments are becoming more open about adopting e-mobility than ever before. Below are the key factors driving EV adoption in India:



Mass adoption of EVs in India has started with two-wheelers, three-wheelers, and buses. The success of low-maintenance, homegrown e-rickshaws by manufacturers, such as Kinetic Green and Mahindra, has inspired EV startups. Additionally, state transport units (STUs) are being pitched as the solution for transitioning to EVs across states. STUs have already started running electric fleets, both intra-city as well as inter-city.

India can further accelerate electric vehicle adoption by focusing on the following areas:

More incentivization and subsidies by the government

The *Government's Faster Adoption and Manufacturing of Electric Vehicles* (FAME) scheme includes all EV types, including two-wheelers, three-wheelers, and cars. Phase II of the FAME plan is looking to support 7000 electric buses (e-bus), five lakh electric three-wheelers (e-3W), 55000 electric four-wheeler passenger cars (e-4W), and ten lakh electric two-wheelers (e-2W) [10]. The government can also boost demand further with free vehicle registrations, discounts in toll tax, and low insurance premiums due to pollution-less features.

Few sectors are ahead of others in EV adoption

The COVID-19 pandemic has acted as a catalyst to accelerate the adoption of electric vehicles in the last-mile delivery sector. E-Commerce giants have seen EVs as an effective replacement for fuel-intensive automobiles, especially for last-mile delivery, to reduce service and maintenance costs. These companies have not only begun to use electric bikes and three-wheelers for last-mile delivery but also want a significant ramp-up of their electric fleet.

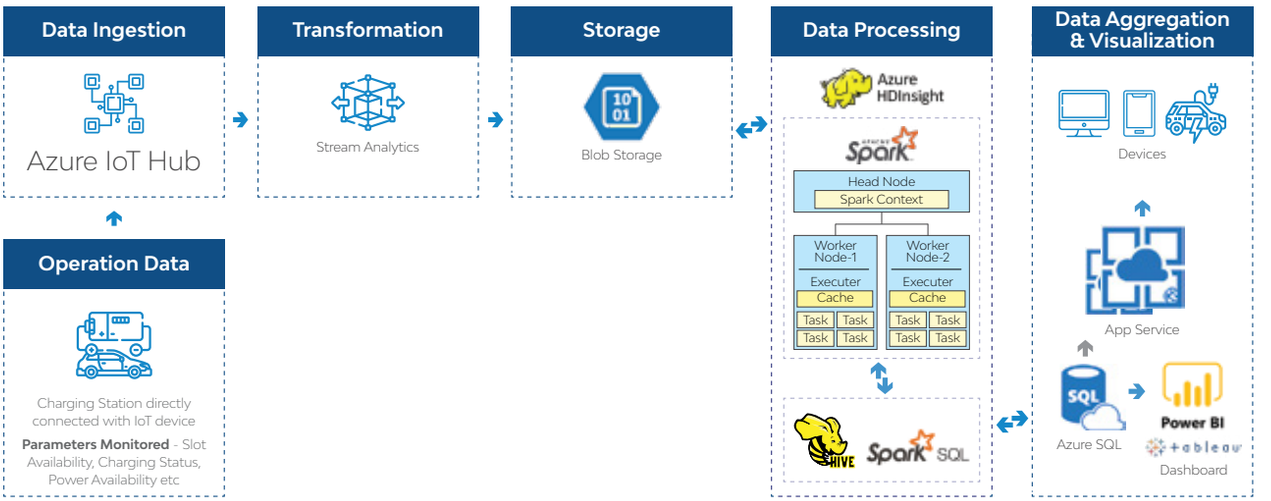
Improve charging infrastructure

Good infrastructure for electric vehicle charging is critical. India should adopt a program to modify existing fuel stations and mandatorily add charging stations to complement EVs. India should also, expedite installing photovoltaic (PV) canopies in parkings, providing EV users access[6]. To charging stations and storing solar energy in a separate battery system when not in use [6].

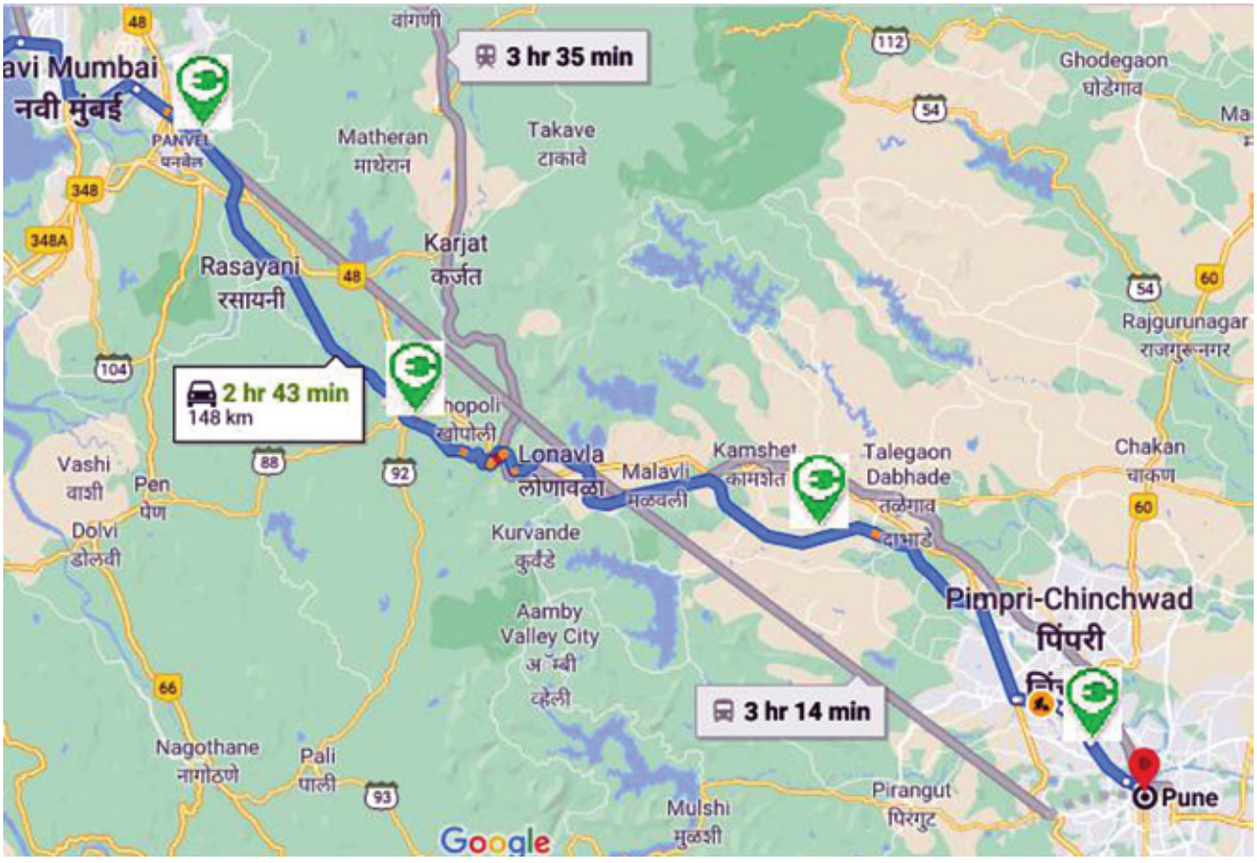
Charging point management system

With the growing number of electric vehicles (EV) and charging points, charging point availability must be coordinated intelligently. It is essential to have a mobile-enabled charge point management system (CPMS) built on a cloud platform and have functions ranging from charging operations, billing and payment, and home/workplace charging to driver self-service tools. Once a charging station setup by any vendor is connected to this CPMS, each charge point can be conveniently monitored and controlled from the same. You could locate EV charging points and check their availability on the go, reserve charging slots proactively, and check charging station compatible with your vehicle and charging tariff through integration with major payment channels. Smartphone app or vehicle dashboards could act as end-user touchpoints for such a system, providing a trouble-free, safe, and enjoyable charging experience.

The following diagram depicts the IoT architecture for the cloud-first CPMS:



Telematics can help capture parameters like remaining electric charge left, current vehicle location, vehicle range, and more for the EVs to help proactively identify nearby electric charging stations, preventing the vehicle and its passengers from being stranded midway. These in-built vehicle apps can provide the shortest path by considering available charging stations, vehicle charge remaining, and other vehicle parameters.



Future Innovations to reduce dependence on charging infrastructure

Self-charging electric vehicles

A solar car that's not dependent on the power grid could recharge sustainably from anywhere with the panels installed on its roof. With improving solar technology, a few self-charging solar cars have started coming to market. Tesla's Cybertruck will offer a solar roof option on the truck's bed. Sono Motors' new technology integrates solar cells into polymer body panels to replace conventional painted metal bodywork [8]. A future cell technology with efficiencies above 50 percent would be a game-changer and probably make solar cars ubiquitous.

Futuristic batteries

Heavy batteries are a limiting factor in the feasibility of solar cars. A breakthrough battery with more favorable energy-to-weight characteristics would revolutionize electric transportation and make solar cars far more realistic. Promising new technologies that utilize materials like graphene, solid polymers, and ceramics are poised to create the next generation of powerful batteries with higher energy density, better service life, faster charging, improved safety, and potentially even lower costs.

Conclusion

The Government of India has shown clear indications that it is keen to accelerate India's transition to Electric Vehicles (EVs). According to the Energy Efficiency Services (EES), by 2030, around 79 million EVs will ply on the roads, and 8 million public charging stations (including all chargers) will be installed [9]. In the first phase, the focus is on setting up charging stations in major cities. The next phase should focus on energizing national highways and subsequently Tier-II and Tier-III cities. However, there still exist ambiguities about how this transition may occur. Indian travel behavior, modal split, and consumption patterns are quite different from those observed in developed countries. Low vehicle ownership, low affordability, and varying access to electricity make the Indian EV scenario unique.

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Yash has over 15 years of experience and is responsible for digital transformation and service delivery for industrial and automotive manufacturing clients in North America. He has a strong consulting, product and program management experience, spanning across multiple geographies (North America, Europe and Asia Pacific) and industries (Manufacturing, Life Sciences, Apparel, Energy, Utilities). His area of expertise includes consultative selling, solution development, Innovation, leadership development and digital technology enablement.