

Disruptive dimensions of mobility in India's new "green age"

Harnessing step change towards sustainable transportation



AUGUST 2022

Disclaimer: This report is solely based upon existing data and material, and the related analysis of the proprietary voice of consumer's (VoC) survey questionnaire to selected stakeholder's network. Views expressed in the report highlight the aspects that may be considered in line with fostering disruptions in India's mobility which are oriented for sustainability.

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2022



Address

Delhi: 5th Floor Caddie Commercial Tower, Aerocity (DIAL), New Delhi - 110037

NCR: 3rd Floor, Joy Tower, C-20, 1/1A, C Block, Phase 2, Industrial Area, Sector 62, Noida, Uttar Pradesh - 201301

Online

connect@enirac.com

www.enirac.com

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1.Tracking Mobility Transformation in India



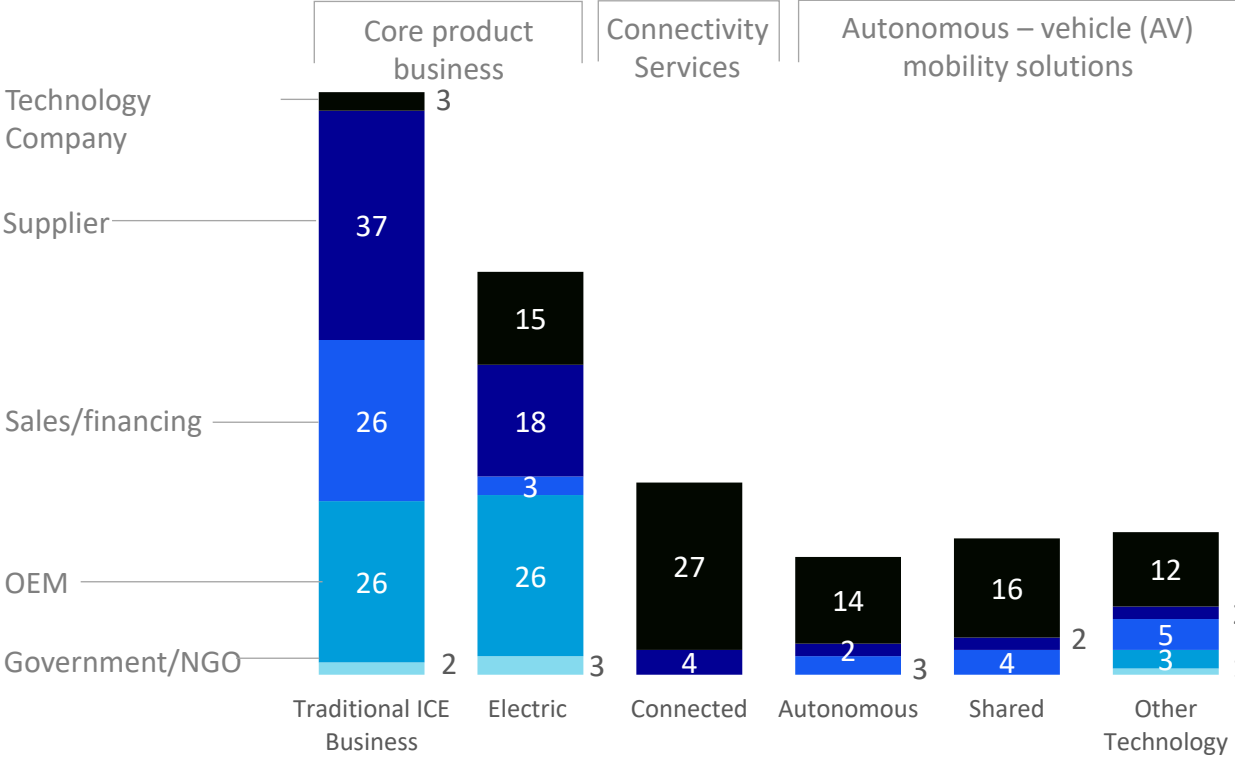
Global future mobility ecosystem

Globally, the mobility ecosystem is undergoing a transformational, technological and economic shift which is fundamentally changing the way people and goods are being moved. The automotive sector coupled with transport are experiencing heavy disruptions, with new markets originating, the existing ones showing converging dynamics and others witnessing a declining trend which shall end up into vanishing existence. Many new age start-ups and new market entrants are challenging the incumbents who are focused on leveraging their experience and develop a sustainable market model. The mobility transformation is majorly driven by three main trends:

- Electrification of vehicles and availability of alternative power trains
- Connected and autonomous vehicles
- Mobility-as-a-Service (MaaS)

Significant investments have been routed globally among the above listed trends, wherein each have great potential to disrupt the entire mobility ecosystem. Coupled with advent of greener alternatives as fuel like hydrogen cells and bio-fuels, the current vehicle ecosystem shall radically become more efficient, data enabled and sustainable. As the ecosystem for mobility would keep evolving its anticipated market size is expected to tip a whopping \$1 Trillion by 2030.

Exhibit 1: Total new OEM partnerships since 2014 till 2022 by organization type, number

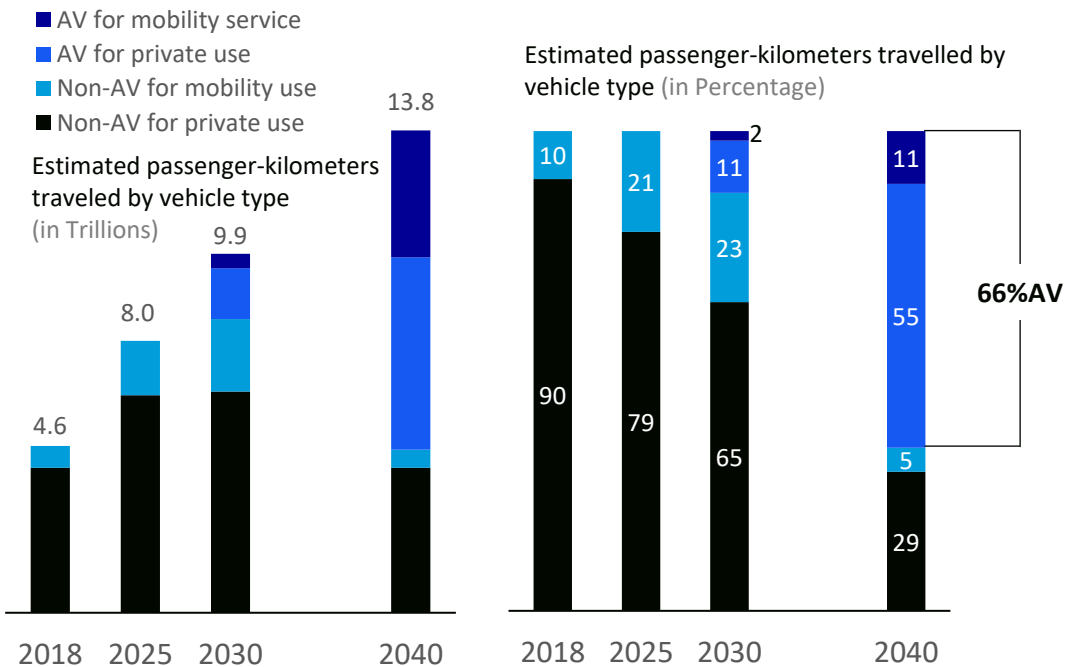


Source: eninrac research & analysis, McKinsey

Autonomous – vehicles (AV) likely to take front seat by 2040 globally!

China is expected to lead the global markets for AVs and has the potential to be the largest one by 2040. It is likely that the share of AVs will contribute approximately 70% of the passenger-kilometers travelled in 2040 which can attract a revenue of \$1.1 trillion from mobility services and \$0.9 trillion from sales of autonomous vehicles by that year. To understand that in terms of number of vehicles will make up just over 40% of the new vehicle sales in 2040, and nearly 12% of vehicle installed base.

Exhibit 2: AVs to contribute 40% of new vehicle and nearly 12% vehicle installed base

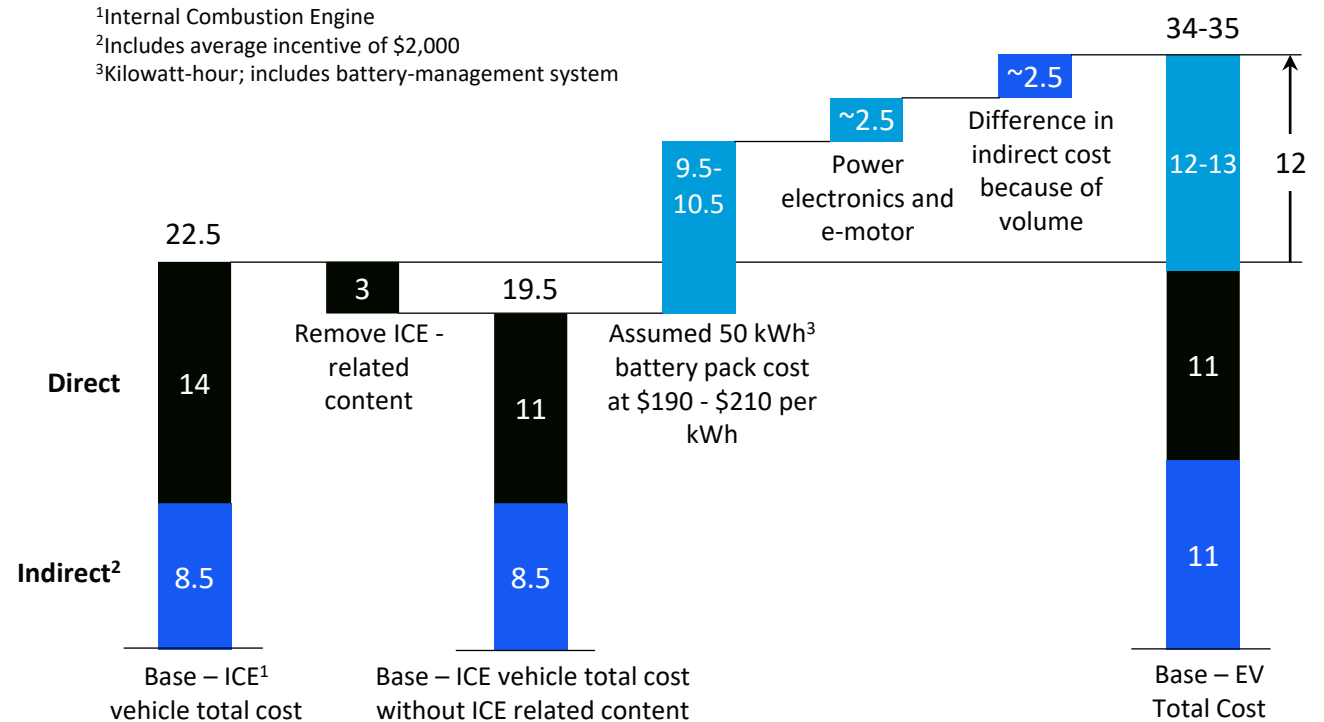


Source: eninrac research & analysis, McKinsey

Challenge to transform EVs to profitability remains to be tamed

The challenge to make EVs profitable remains to be addressed globally. Although, OEMs along the globe are working hard to bring the cost gap of EVs and ICE down but it will take some time to reach at par. **Currently a gap of nearly \$ 12000 exists between EVs and ICE** which is massive for country like India. Battery pack remains the biggest cost driver for EVs around the globe for which the OEMs are focused upon native EV design and cooperation among each other to bring down the costs. There is an ardent need to scale up battery manufacturing so that EVs could become a sustainable option in long run.

Exhibit 3: Cost-Walk of ICE¹ & EV C-Car (Estimated average per vehicle, \$'000)

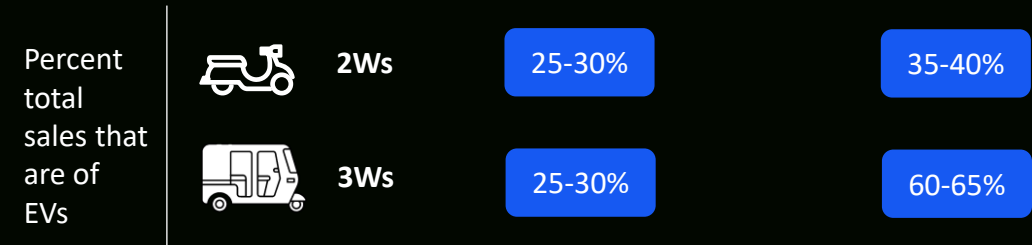
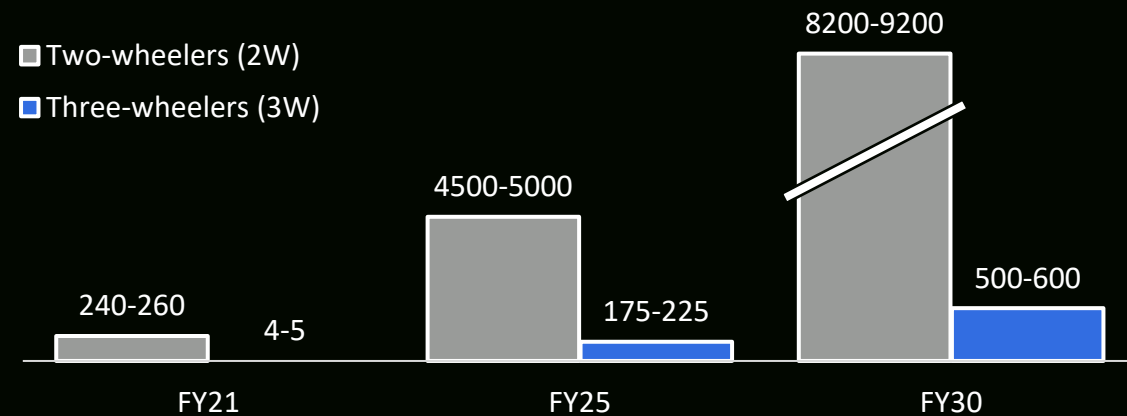


Source: eninrac research & analysis, UBS & McKinsey

Demand for 2W & 3W e-mobility will lead India's surge for electric vehicles by 2030

The demand for small format e-vehicles in India is witnessing a north-bound trend and is likely to drive the EV ecosystem in the country. It is estimated that by 2030 the 2W & 3W fleet size could reach or cross 9 Million on cumulative basis. Further the push for augmenting the infrastructure to help lead the EVs penetration is quintessential in the country.

Exhibit 4: Estimated demand of electric 2W and 3W in India ('000 units Base Case)

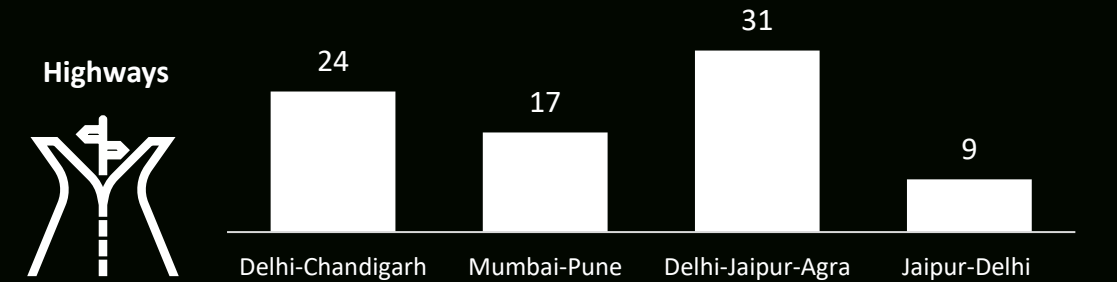


Source: eninrac research & analysis, UBS & McKinsey

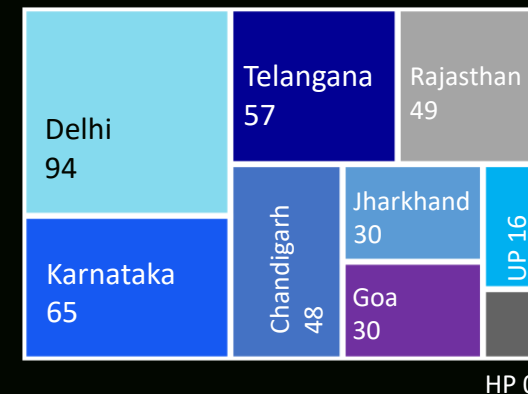
EV charging stations & chargers will need adequate push to enable sustainable growth electric mobility in India

The EV charging stations sanctioned by Ministry of Heavy Industries, Gol stands at 520 of which 479 have been installed till July 2022. The spread of 479 involves 398 installed in different states and 81 charging stations on highways as indicated in Exhibit 5.

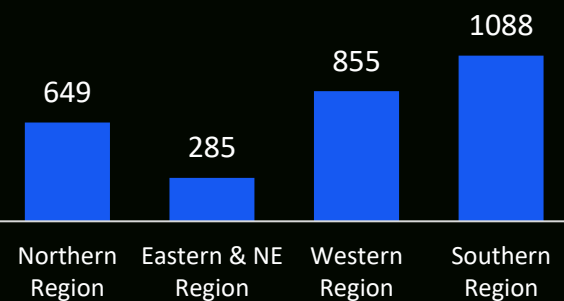
Exhibit 5: EV Charging stations installed under FAMEI on highways in India as of July 2022 & Region wise EV Charger sanctioned under FAME II



State wise Charging Stations under FAME I



Region wise EV Chargers Sanctioned in India under FAME II (as of July 2022)



Source: eninrac research & analysis,

2.Sustainable Transportation Initiatives in India

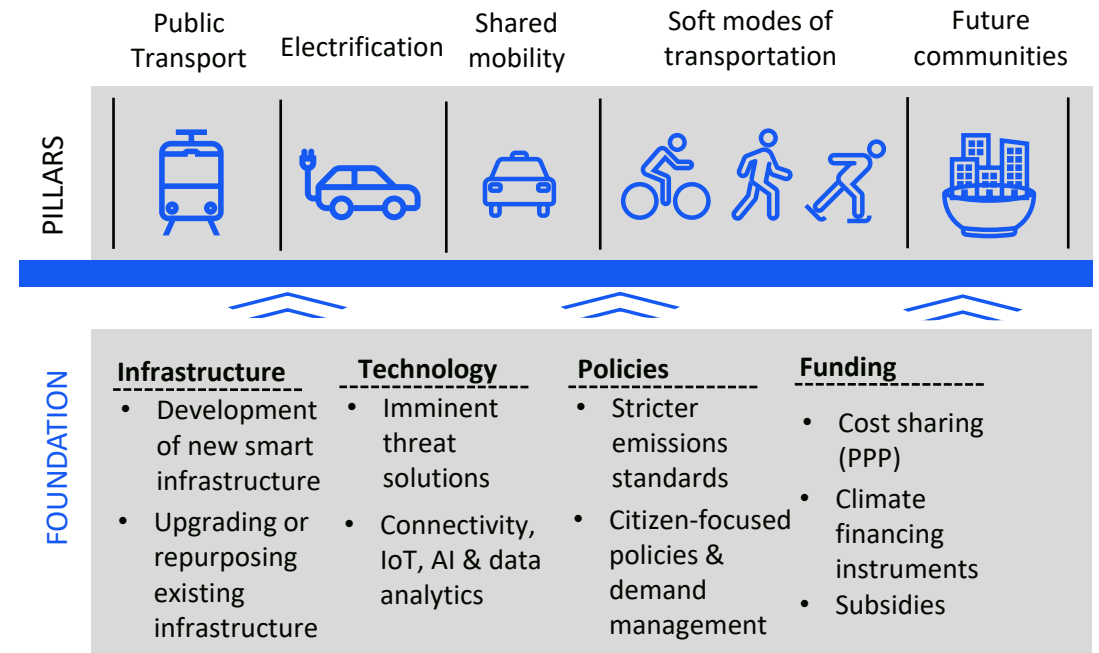


India & sustainable mobility – Need of the hour

India is not completely starting from scratch in terms of sustainable transportation initiatives. Both at the concurrent Government levels steps have been taken to bring initial investments in new transportation modes and technologies.

- a. **Electric Vehicles:** Electric buses are already plying in various Tier I and Tier II cities in India since last couple of years. Delhi has recently got a dedicated EV bus fleet to meet the demand of local public transport in the region.
- b. **Shared Mobility:** Like e-mobility the shared mobility demand for shared mobility is going to rise as well in the country. This shall at large be driven by three use cases like e-commerce/small format, food delivery & grocery delivery. The growth for these use case shall exceed 40%-50% if the penetration of EVs are being supported by supportive ecosystem.
- c. **Micromobility:** In the country in cities like Delhi, Bangalore & Ahmedabad are offering e-scooters and docked bicycles. Delhi metro also offers e-bicycles on rentals and has seen shared mobility penetration in the city.
- d. **Mass Transit:** There has been significant investment in metro projects and mass rapid transit systems in the country. All major cities are having either the running metro projects or are having them under construction.

Exhibit 6: Framework of action plan on sustainable mobility in India



Source: eninrac research & analysis

The framework for India to adapt a sustainable mobility model will have five major contributing pillars on a foundation of four key elements of infrastructure, technology, policies & funding respectively.

3. Pillars & Key Foundation Elements for Mobility in India



Identified Pillars of Mobility in India

India is a vast country and with growing population the nature of public transport, goods movement and other mobility shall have to adapt accordingly. For this the identified pillars are depicted as below:

- a. **Public Transport:** A multi-modal, integrated, and robust public transport system is central to sustainable mobility systems. Governments at concurrent levels should continue to invest in these systems, with the goal of eventually shifting to a fully electric fleet. Advancing public transport ridership has allowed urban areas across the globe to overcome many less-than-efficient mobility and societal outcomes.
- b. **Electrification:** GoI has already enabled incentives coupled with State level incentives on offer for greater adoption of EVs. With this intent the country witnessed nearly 0.55 Million of EVs sold within a period extending from January to August 2022 which is anticipated to reach beyond 0.8 Million by December 2022. This shall be leading to almost 65% yoy growth for the same period in 2021.
- c. **Shared Mobility:** Cities in India can move commuters more efficiently by reducing the reliance on personal vehicles and using shared mobility solutions to increase riders per vehicle. The market expansion of ride-hailing players like OLA & Uber has proven that shared mobility as a business model works well within a lightly regulated market, while improving asset utilization.

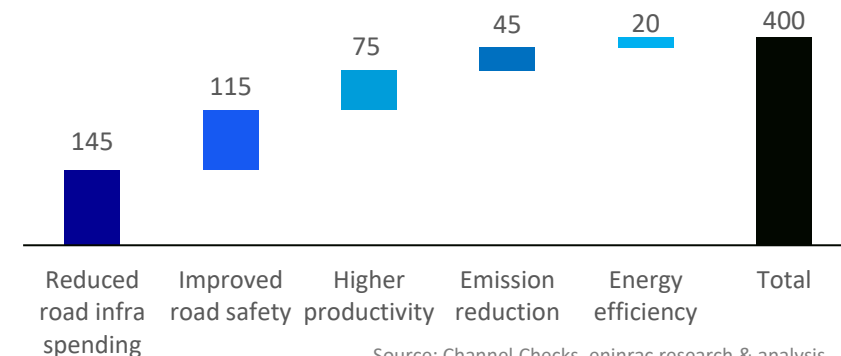
- d. **Soft Transport Modes:** Micromobility solutions can increase the options for urban residents and increase usage of public transport by addressing first-mile and last-mile connection challenges. State governments should continue to deploy such alternatives as bike-sharing and e-scooters in major cities apart from Delhi, Mumbai, Bengaluru and Chennai.
- e. **Future Communities:** Governments can reduce the need for transportation through sustainable urban designs that use new living and community concepts to make vital goods and services available within walking distance from residential areas

Key Foundation Elements of Mobility in India

The key elements which are fundamental to have sustainable mobility in the country shall be:

- Adept Infrastructure
- Higher Technology Penetration
- Right Policy Environment
- Oriented Capital Expenditure & Funding

Exhibit 7: Economic value creation potential of sustainable mobility in India in US\$ Billion by 2040



Source: Channel Checks, eninrac research & analysis

4. Future of Transport

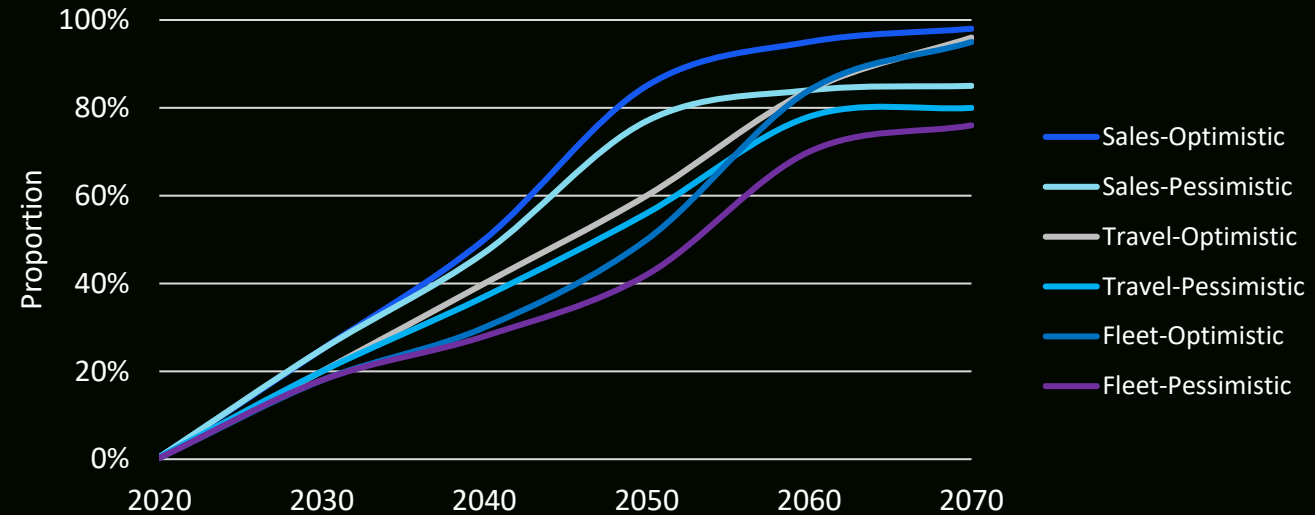
System in India – AV & Vehicle Market Share



Automation Level/Scenarios	Description
Level 0	No Automation
Level 1	Automation of one primary control function, e.g, cruise control, self-parking etc.
Level 2	Partial driving automation. Automation of two or more primary control functions which can work together to relieve the driver of control of those functions
Level 3	Conditional driving automation. The vehicle can control all safety-critical function under certain traffic or environmental conditions
Level 4	High driving automation. Self-driving without human controls, with a well-defined operational design with operational capability even if a human driver doesn't respond
Level 5	Full driving automation. Self-driving. Automation without human controls in all driving environments that can be managed by human driver.

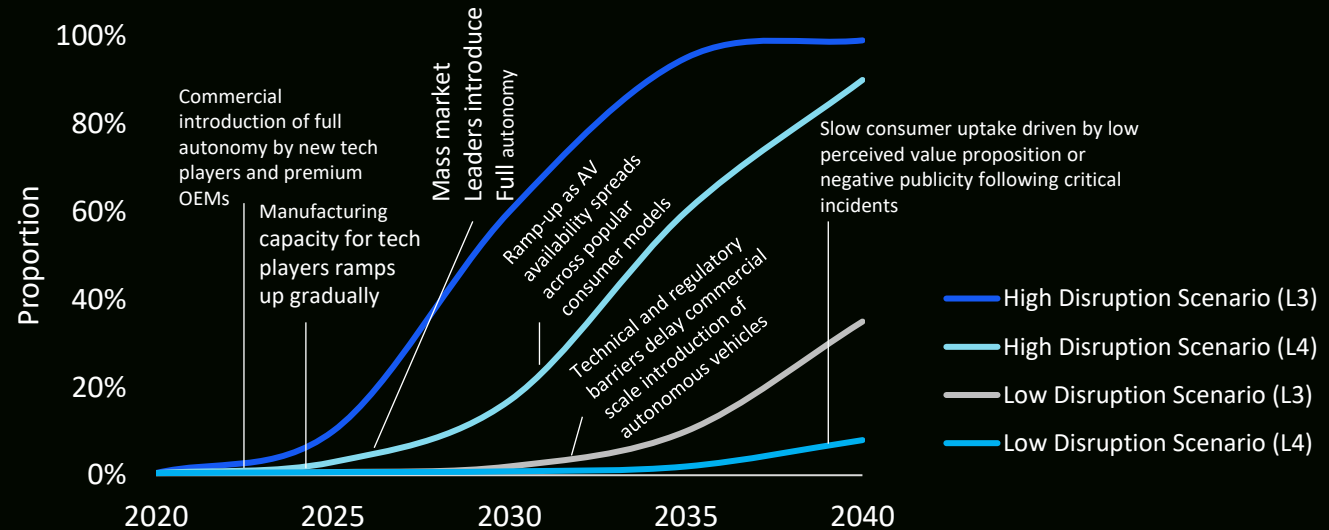
Source: Society of Automotive Engineers, eninrac research

Exhibit 8: Autonomous vehicles sales, fleet & travel projections in India by 2070



Source: eninrac research & analysis, Litman

Exhibit 9: New vehicle market share of self-driving vehicles in India



Source: eninrac research & analysis, McKinsey

5.Expanding EV Adaption in India



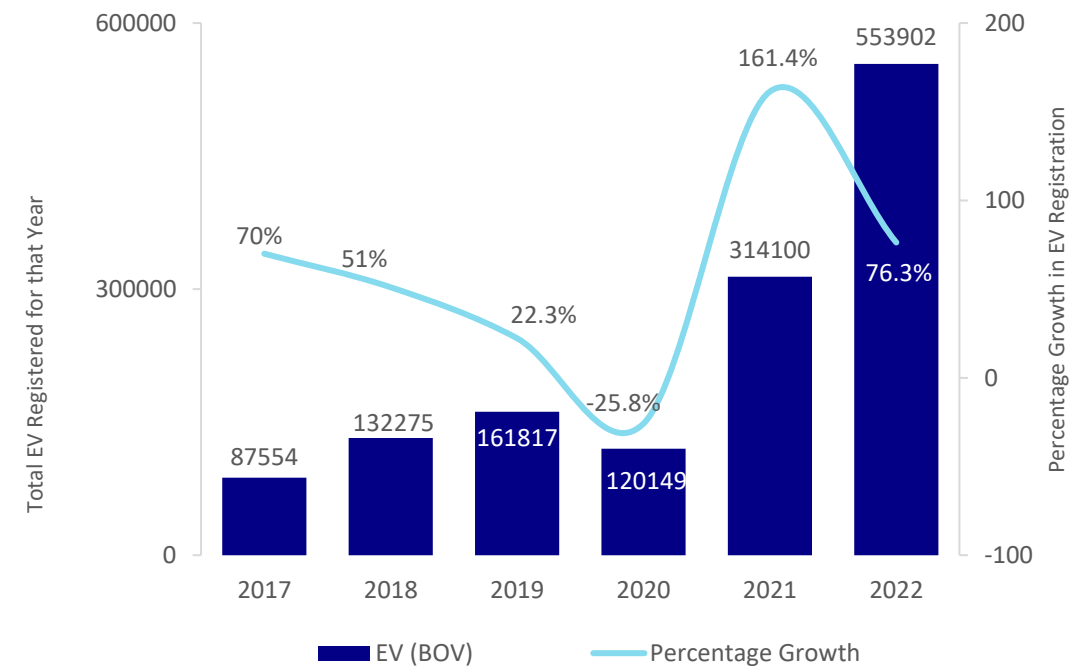
Electric vehicle landscape in India

The electric vehicle landscape is rapidly changing in India as both technology and interest evolve, and the coming years will see many more EVs take to the roads, seas, and skies. In India, electric vehicles sales has grown at a CAGR of 83% since 2018 till 2022, making the total EV count to reach a hallmark of 1.4 Million in Aug'2022.

Considering the same growth only that Indian EV sales has witnessed over the past four years, it is anticipated that the total EV count in India will hover around 9.1 Million by 2036 —providing both a glimpse of a green future and significant economic opportunity. As the central and respective state governments are giving impetus on developing the electric vehicle segment in the country, the progress is seen at concurrent levels. In India, presently 20 states have announced their EV policies for encouraging EV manufacturing, EV demand and development of supportive charging infrastructure. In this regards, Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME I & II) was launched. FAME I was launched in 2015 , while FAME II was introduced in 2019 with more embellished EV targets.

Phase-II of FAME India Scheme was notified on 8th March 2019 for a period of three years commencing from 1st April 2019, with a total budgetary support of Rs. 10,000 crore. This phase mainly focusses on supporting electrification of public & shared transportation and aims to support through subsidies - 7090 e-Buses, 5 lakh e-3 Wheelers, 55000 e-4 Wheeler Passenger Cars and 10 lakh e-2 Wheelers. Till July 2022, about 4.7 lakh electric vehicles have been supported under FAME II by the way of demand incentives.

Exhibit 10: YoY additions in Electric Vehicle (BOV) registrations in India from 2017 till 2022



Source: eninrac research & analysis, MORTH

Key initiatives taken by GoI for adoption of EVs in India

Increase in demand incentive for e-2W : The demand incentive for electric two wheelers (e-2W) has been increased to INR. 15,000/KWh from INR. 10,000/KWh with an increase in cap from 20% to 40% of the cost of vehicle from 11th June 2021, thus enabling cost of Electric two wheelers at par with that of ICE two-wheeler vehicle

Introducing production linked incentive (PLI) : The GoI on 12th May 2021 approved a Production Linked Incentive (PLI) scheme for manufacturing of Advanced Chemistry Cell (ACC) in the country in order to bring down prices of battery in the country. Drop in battery price will result in cost reduction of electric vehicles

Incentivizing EVs under PLI : Electric Vehicles are also incentivized under Production Linked Incentive (PLI) scheme for Automobile and Auto Components, which was approved on 15th September 2021 with a budgetary outlay of Rs. 25,938 crore for a period of five years

Reduction of GST on EVs: GST on electric vehicles has been reduced from 12% to 5%; GST on chargers/ charging stations for electric vehicles has been reduced from 18% to 5%

Exempting battery operated vehicles from permit requirements: Ministry of Road Transport & Highways (MoRTH) announced that battery-operated vehicles will be given green license plates and be exempted from permit requirements

Waiving road tax: MoRTH issued a notification advising states to waive road tax on EVs, which in turn will help reduce the initial cost of EVs.

Sale of electricity as “service”: Ministry of Power, India has allowed sale of electricity as ‘service’ for charging of electric vehicles. This would provide a huge incentive to attract investments into charging infrastructure

Reduction in the interest paid on loan of EVs: In the Union Budget of 2019-20, the Ministry of Finance, India announced provision of additional income tax deduction of INR 1.5 lakh on the interest paid on loans taken to purchase electric vehicles

Ease in grant of driving license : The Ministry of Road Transport & Highways, India has notified certain specifications for the grant of license to age group of 16-18 years to drive gearless E scooters/ Bikes upto 4.0 KW

Providing EV charging stations in private & commercial buildings : Ministry of Housing and Urban Affairs, India has made amendment in the Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines to provide for electric vehicle charging stations in private and commercial buildings

Small format mobility – ideal for India's EV expansion vision

Covid'19 has presented the globe with an unprecedented economic, humanitarian & healthcare challenge. India was no different, a serious setback was witnessed by country's industrial segment, with automotive being among the hardest hit sector. In 2018, India's auto industry experienced a sharp decline in the sales of commercial vehicles after the regulatory change in the axle load norms. Credit availability fell, demand slowed (especially in infrastructure and mining), and discretionary spending dropped, all of which contributed to a decline in auto sales. In early 2020, just as the industry was expected to recover, the pandemic added to the pain of already plummeting sector. Covid'19 further increased – cash flow tightening , supply chain disruptions, delays in raw material sourcing and decreased – consumer demand , imports, labor availability. Although many challenges were faced by the auto segment , but the covid'19 accelerated some beneficial trends as well. For example, demand of electric two wheelers & three wheelers increased because of the growth of various use cases, such as last-mile delivery, ride hailing, and rentals.

Some of the most exciting developments that relates to the growth of electric vehicles in India is the – small format mobility, which includes electric (e) 2 W & 3W. Looking into the growth trajectory of EVs in India of past five years , it is pertinent to note that the same has increased at a CAGR of approximately 29% from 2018 till Aug 2022, courtesy e-2W & 3W. For e-2Ws much of the demand is witnessed by low to medium income group people, fleet aggregators that deals in – last mile deliveries, bike taxis etc. such as Zepto, Blink it, Zomato, Swiggy, Ola, Uber etc. For the e-3Ws, a lot of demand is observed for the e-rickshaws from the riders due to its affordability. Also, with the increase in ecommerce options, e-bulk order home deliveries etc. - many such service providers have also started adopting e-3W good carriers for meeting door to door deliveries of bulk items.

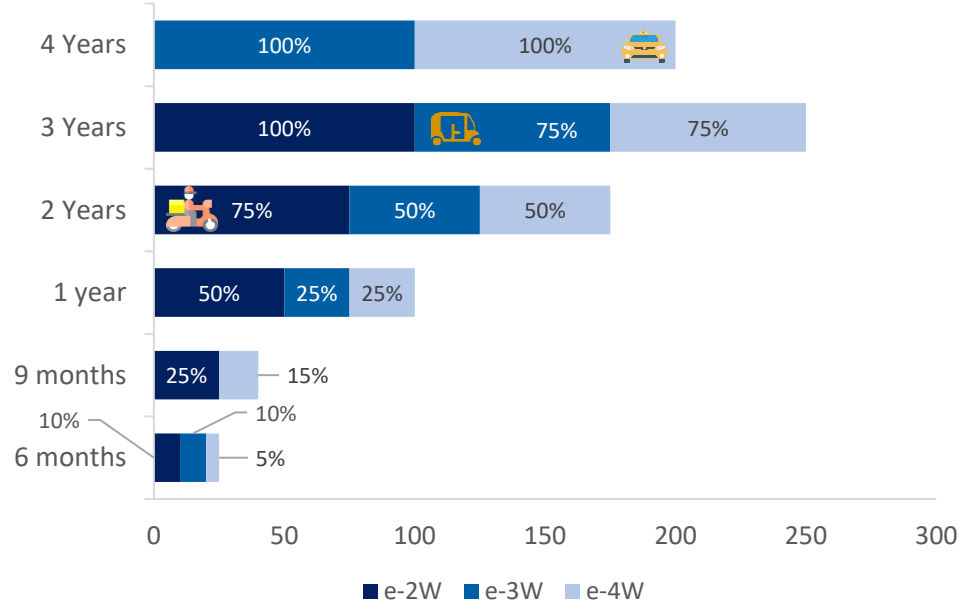
Within the small format segment, several enablers are already encouraging the growth For instance, small format EVs achieve faster parity with traditional internal combustion engine (ICE) vehicles, as their total cost of ownership (TCO) is lower, given their lower fuel and maintenance costs. They are also less dependent on charging infrastructure, since their power requirements are lower, and they are more likely to come in models that allow battery swapping. Both features may alleviate concerns about vehicle range. Some of the key developments that could help the small-format e mobility market in India are as follows –

Incentives from India's central and state governments to encourage EVs: The Faster Adoption and Manufacturing of Hybrid and EV (FAME) program, which was first implemented in 2015 and updated in 2019, provides consumers and domestic companies with various incentives. For instance, in phase two of FAME, the government announced an outlay of USD 1.4 billion till 2022. In addition to subsidizing EV purchases and essential infrastructure development, the funding will provide local manufacturers with incentives to produce EVs

Dedicated policies by respective state governments to involve EVs in the commercial fleet: In July 2022, the government of Delhi announced the draft aggregator fleet scheme. One of the key feature of this scheme was setting targets to have more electric vehicles in the fleet managed by the aggregators such as -Ola, Uber, Meru Cabs, Zomato, Swiggy and even other services operational in the National Capital Territory of Delhi. The entire fleet should comprise electric vehicles by April 1, 2030.

Small format mobility – ideal for India’s EV expansion vision

Exhibit 11: Target to achieve new EV fleet by 2026 from the launch of the scheme



Source: Government of Delhi

Lower battery pack prices: According to industry estimates, the price of a battery pack in India could fall to USD 110 to USD 120 by 2030, making EVs much more affordable. A combination of scale, technology, and market maturity will drive this decline

Increased consumer readiness: Across use cases, more consumers must be willing to opt for EVs over ICE vehicles. As per industry insights, one major roadblock is the perceived safety of EVs. This was the top concern after TCO and the availability of charging infrastructure. As more EVs hit the road, and as consumers become more familiar with them, their comfort level may increase

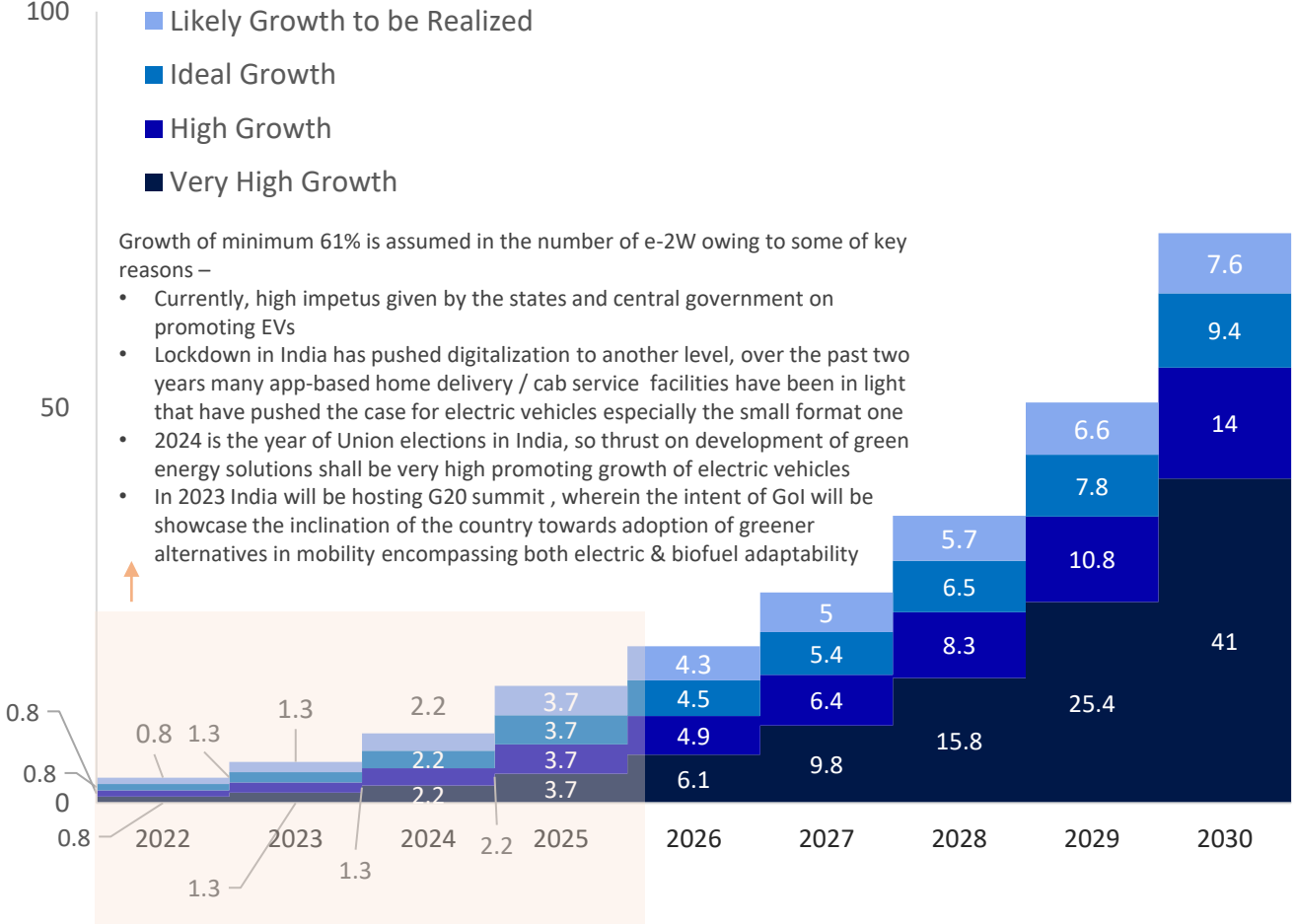
Eninrac analysis suggest that demand for small-format e-mobility options could rise substantially over the next decade. For 2W e-vehicles, sales could reach upto 41 Million by 2030 in the most optimistic scenario (i.e., very high growth scenario) , while the bare minimum growth shall lead the number of EVs around 7-8 Million. Exhibit 3 presents four growth scenarios for e-2W in India till 2030.

Like e-mobility, demand for shared mobility is expected to increase in the next decade, largely driven by three use cases. For 2W vehicles, last-mile delivery for food, grocery, and e-commerce is the major demand driver. Other popular 2W use cases include ride hailing and self. driving rentals, with YoY growth of 40 to 50 percent and 100 percent, respectively, through 2025. For 3W vehicles, passenger mobility will be the greatest demand driver, with expected YoY growth of 40 to 50 percent, followed by goods delivery, with YoY growth of 14 to 16 percent.

Small format mobility – ideal for India’s EV expansion vision

Exhibit 12: Scenario wise Anticipated Growth (Numbers in Million) of e-2W in India till 2030

Number of e-2W (Millions)



Growth of minimum 61% is assumed in the number of e-2W owing to some of key reasons –

- Currently, high impetus given by the states and central government on promoting EVs
- Lockdown in India has pushed digitalization to another level, over the past two years many app-based home delivery / cab service facilities have been in light that have pushed the case for electric vehicles especially the small format one
- 2024 is the year of Union elections in India, so thrust on development of green energy solutions shall be very high promoting growth of electric vehicles
- In 2023 India will be hosting G20 summit, wherein the intent of GoI will be showcase the inclination of the country towards adoption of greener alternatives in mobility encompassing both electric & biofuel adaptability

“Anticipated number of EVs that can be realized in India till 2030 shall hover between 50-60 Million with An average growth of 39%. This can be possible with growth in the supportive charging infra, grid facilitation, increase in user index value, reduction in battery prices, continued policy support from central & state government etc. ” – Eninrac Research

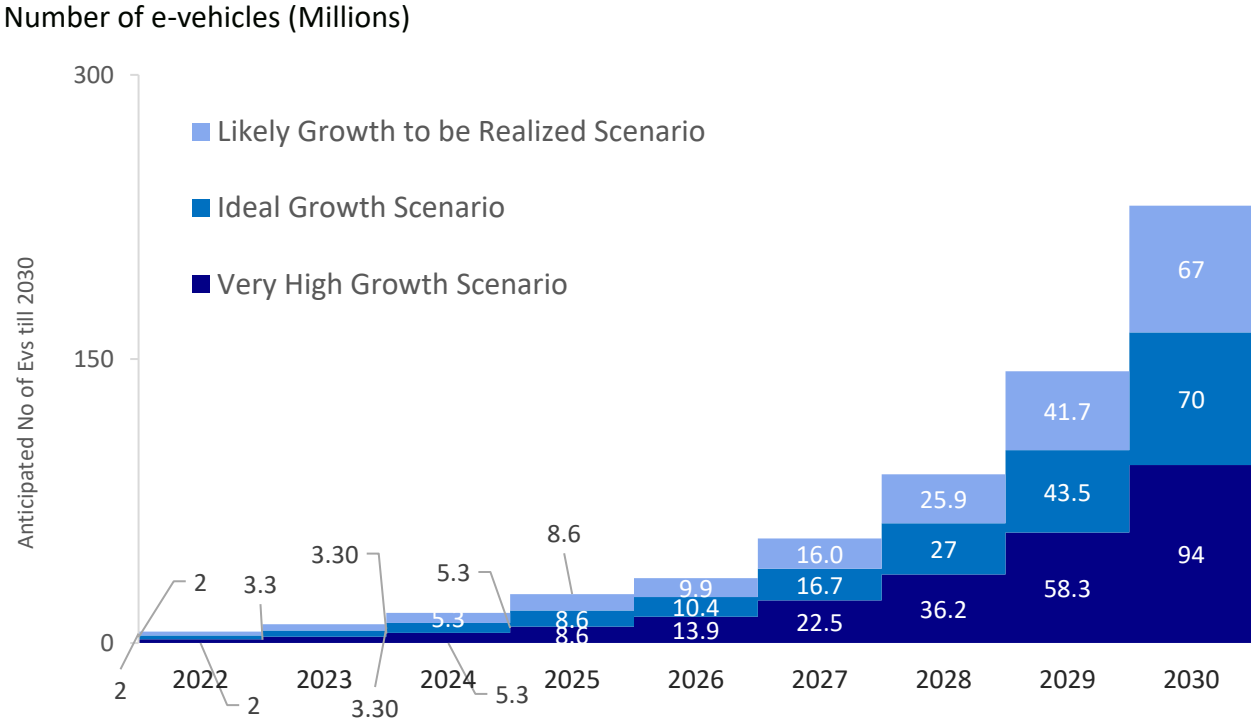
Assumptions :

- The anticipated numbers are for the calendar year(i.e., from Jan-Dec)
- Analysis is done on the current share of e-2W in total EVs. Currently e-2W constitute 32% of total EVs in India
- The yoy growth assumed from 2022 to 2025 is 61%*
- *indicates growth witnessed from 2021 to 2022
- Very high growth scenario (VHGS) signify 61% yoy growth in the e-2W from 2025 to 2030
- High growth scenario (HGS) signify 30% (half of the growth from VHGS) yoy growth in the e-2W from 2025 to 2030
- Ideal growth scenario (IGS) signifies 20% (one-third of the growth from VHGS) yoy growth in the e-2W from 2025 to 2030
- Likely to be realized growth (LRG) signifies 15% (one-fourth of the growth from VHGS) yoy growth in the e-2W from 2025 to 2030

Source: eninrac research & analysis, Channel Checks

Small format mobility – ideal for India’s EV expansion vision



Exhibit 13: Anticipated growth in the electric vehicles in India till 2030



Assumptions: Same as followed in Exhibit 3

Source: eninrac research & analysis & Channel Checks

Exhibit 14: Number of use case will drive growth in shared mobility for small-format vehicles

	Use case	Kms travelled per day	Growth rate (2030)
	E-commerce/ small format	90-100	17-20
	Food delivery	120-130	17-20
	Grocery delivery	70-80	27-35
	Self-drive rentals	30-40	100
	Ride hailing	70-80	40-50
	Goods mobility	110-120	15-17
	Passenger mobility	120-130	35-45

Source: eninrac research & analysis, Mckinsey & Channel Checks

6. Making EVs Profitable



Cost advantages of small format electric mobility

Covid'19 has presented the globe with an unprecedented economic, humanitarian & healthcare challenge. India was no different, a serious setback was witnessed by country's industrial segment, with automotive being among the hardest hit sector. In 2018, India's auto industry experienced a sharp decline in the sales of commercial vehicles after the regulatory change in the axle load norms. Credit availability fell, demand slowed (especially in infrastructure and mining), and discretionary spending dropped, all of which contributed to a decline in auto sales. In early 2020, just as the industry was expected to recover, the pandemic added to the pain of already plummeting sector. Covid'19 further increased – cash flow tightening, supply chain disruptions, delays in raw material sourcing and decreased – consumer demand, imports, labor availability. Although many challenges were faced by the auto segment, but the covid'19 accelerated some beneficial trends as well. For example, demand of electric two wheelers & three wheelers increased because of the growth of various use cases, such as last-mile delivery, ride hailing, and rentals.

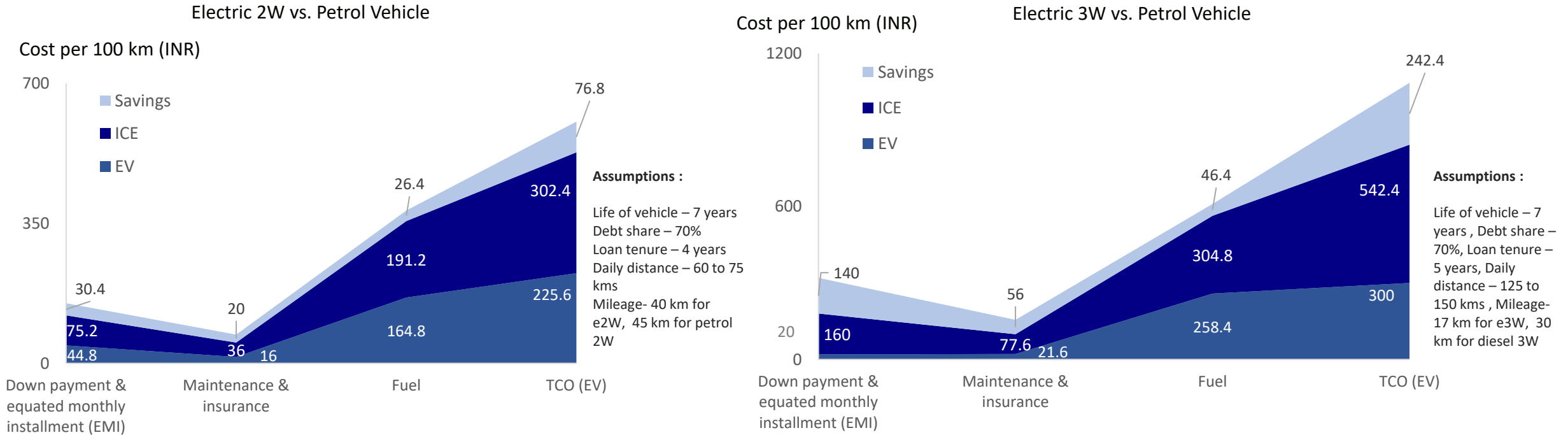
Some of the most exciting developments that relates to the growth of electric vehicles in India is the – small format mobility, which includes electric (e) 2 W & 3W. Looking into the growth trajectory of EVs in India of past five years, it is pertinent to note that the same has increased at a CAGR of approximately 29% from 2018 till Aug 2022, courtesy e-2W & 3W.

For e-2Ws much of the demand is witnessed by low to medium income group people, fleet aggregators that deals in – last mile deliveries, bike taxis etc. such as Zepto, Blink it, Zomato, Swiggy, Ola, Uber etc. For the e-3Ws, a lot of demand is observed for the e-rickshaws from the riders due to its affordability. Also, with the increase in ecommerce options, e-bulk order home deliveries etc. - many such service providers have also started adopting e-3W good carriers for meeting door to door deliveries of bulk items. Within the small format segment, several enablers are already encouraging the growth. For instance, small format EVs achieve faster parity with traditional internal combustion engine (ICE) vehicles, as their total cost of ownership (TCO) is lower, given their lower fuel and maintenance costs. They are also less dependent on charging infrastructure, since their power requirements are lower, and they are more likely to come in models that allow battery swapping. Both features may alleviate concerns about vehicle range.

If we compare an electric bike with a petrol bike's cost, an electric bike take 2-5 unit's electricity to fully charged and the cost of electricity is INR 4-8 per unit (it shall vary as per the living area). If we talk about petrol bikes, then their average is 40 to 50 km per liter and its cost will be around INR 90 to 110. The cost of electric bike is around INR 5000 for 50,000 km, that is; 1km=10-15 paisa and a petrol bike costs around INR 1 Lakh for 50,000 km that is; 1 km = INR.2

Cost advantages of small format electric mobility

Exhibit 15: Cost advantages of small format electric mobility over conventional vehicles



Source: eninrac research & analysis, Mckinsey, Industry Interactions

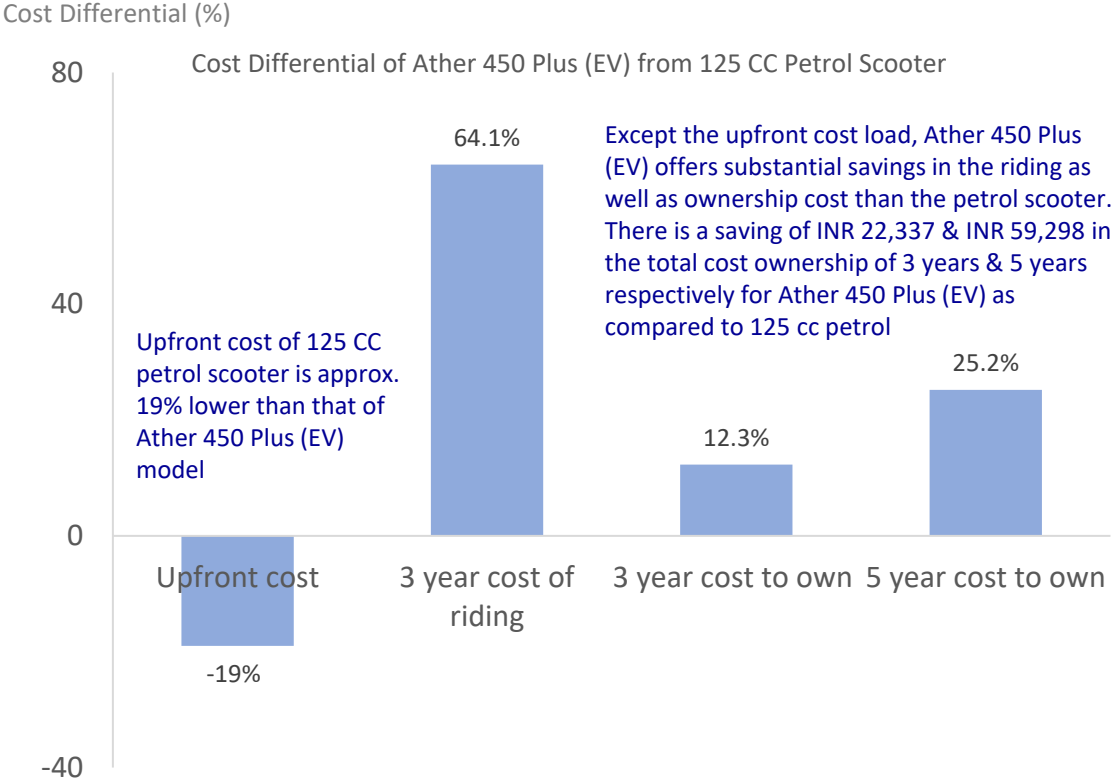
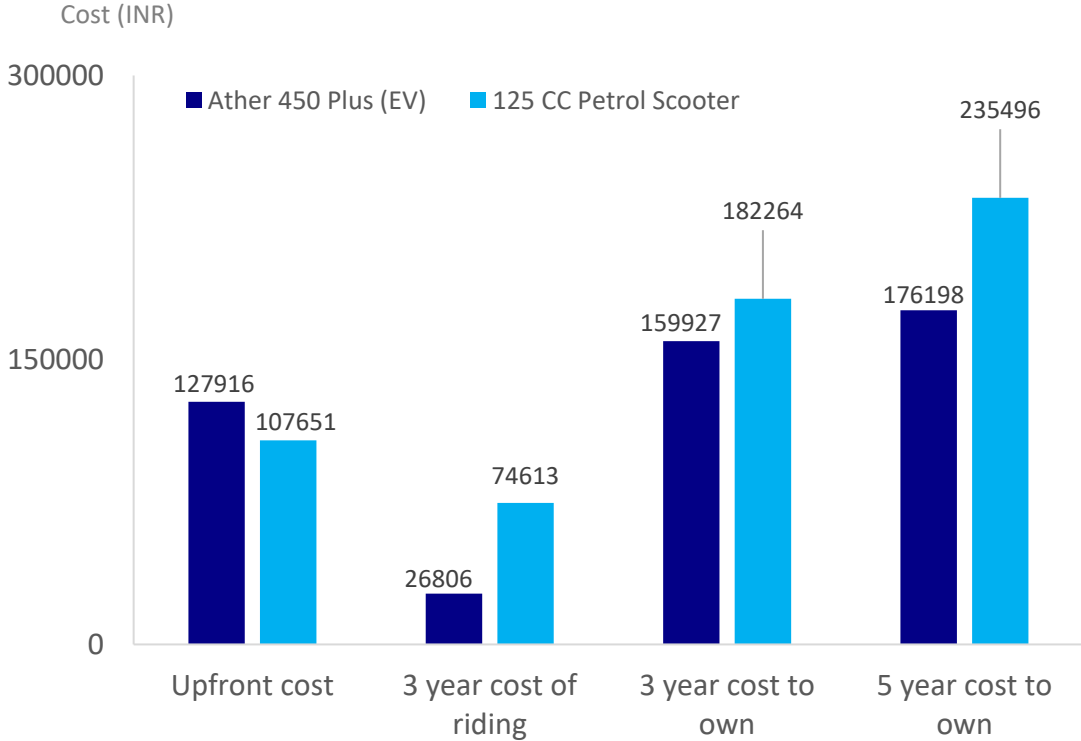
Speaking about the maintenance cost linked with the petrol scooter, lets understand the cost outlay for a period of 3 years

- Petrol scooters contain a lot of moving parts and an oil-filled engine. Most petrol scooters have annual maintenance expenditures of INR 6000, equating to INR 18,000 over a three-year period
- Keep in mind that petrol scooters have a lot of parts, including an engine, transmission, gearbox, converters, filters, and engine parts. These can malfunction, necessitating replacement or repairs. Let's assume that part repair/replacement costs total Rs 6,000 over the course of three years. So, during a three-year period, the total maintenance cost for a petrol scooter could be INR 24,000

“The per kilometer cost of electric bike costs around 10-15 paise , while that of a petrol bike costs around INR 2” – Zypp Electric

Cost advantages of small format electric mobility

Exhibit 16: Total cost ownership comparison of Ather electric scooter with 125CC petrol scooter



Source: eninrac research & analysis, Ather Energy, Industry Interactions

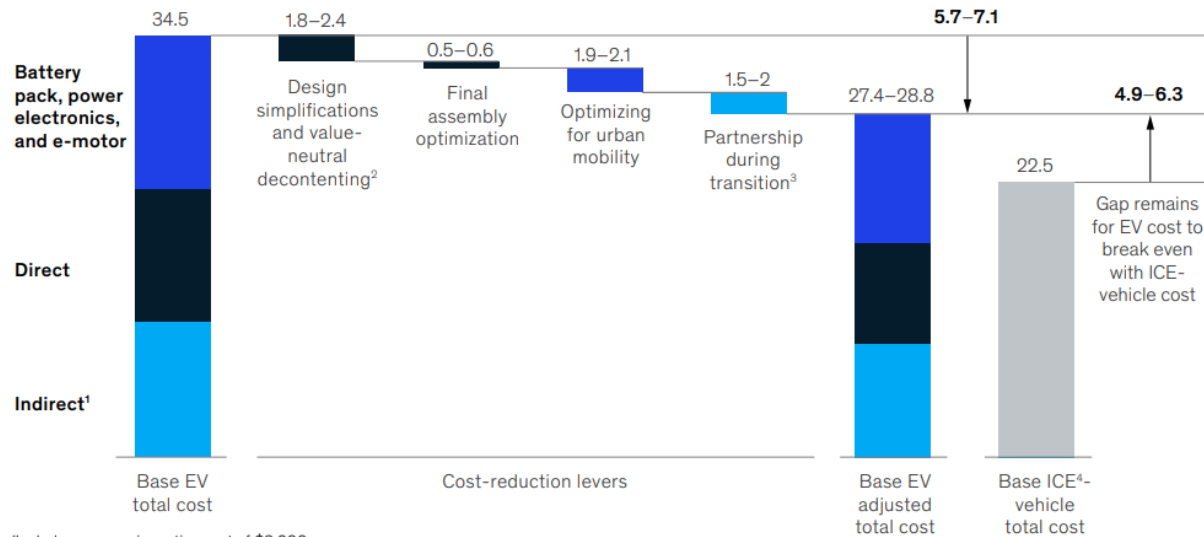
Making EVs profitable

Optimizing electric vehicle designs for the market: OEMs can reduce their EV costs by nearly 20% by pursuing strategic de contenting paired with a dedicated EV platform. This could be accomplished leveraging new freedom in design unlocked by using electric rather than ICE subsystems and applying leading strategies in low-cost ICE design and from cutting-edge EV-focused OEMs.

Exhibit 17: Cost reduction levers could bring down electric vehicle costs considerable

Base electric-vehicle (EV) total cost, with cost-reduction levers

estimated average per vehicle, \$ thousand



¹Includes average incentive cost of \$2,000.

²Reduction in non-internal-combustion-engine (ICE) content that does not affect safety.

³Assumes combined average annual production of ~150,000 units.

⁴Internal combustion engine.

Design simplifications: OEMs can take lessons from leading e-vehicle concepts, for which our proprietary teardown study revealed that cockpit, electronics, and body simplifications netted up to \$600 in reduced costs, without removing core feature content tied to value generation for the OEM. Eliminating extra displays, buttons, switches, wiring, modules, and additional structural components, as well as reducing the overall design complexity, drove major savings. As per industry interactions, companies can extract component savings of 20 to 30 percent with these design approaches, including by adjusting material specifications and negotiating with suppliers with the shared objective of EV profitability

Optimizing urban mobility: For many customer segments, today's EVs offer either too little driving range, such as smaller EVs with ranges of fewer than 160 kms, or too much, such as luxury EVs with ranges of approximately 482 kms, when compared to actual driving patterns. The average vehicle kms traveled (VKT) for an urban population is around 30-35 kms per day in India, and it increases to around 40-50 kms per day when accounting for demographic groups that drive more. Assuming today's battery efficiency in kilowatt-hours (kWh) per mile, a potential sweet spot for urban customers is approximately 25 kWh of energy. However, if we account for consumer preference to use the same vehicle for suburban and occasional rural travel, the optimal battery capacity increases to approximately 40 kWh, equating to ~250 kilometers, based on average VKT in rural areas. A reduction in battery capacity to 40 kWh, from 50 kWh, would save \$1,900 to \$2,100 today, while the range would still enable most consumers, especially those in urban environments, to complete trips without any sacrifice to their daily routines.

Making EVs profitable

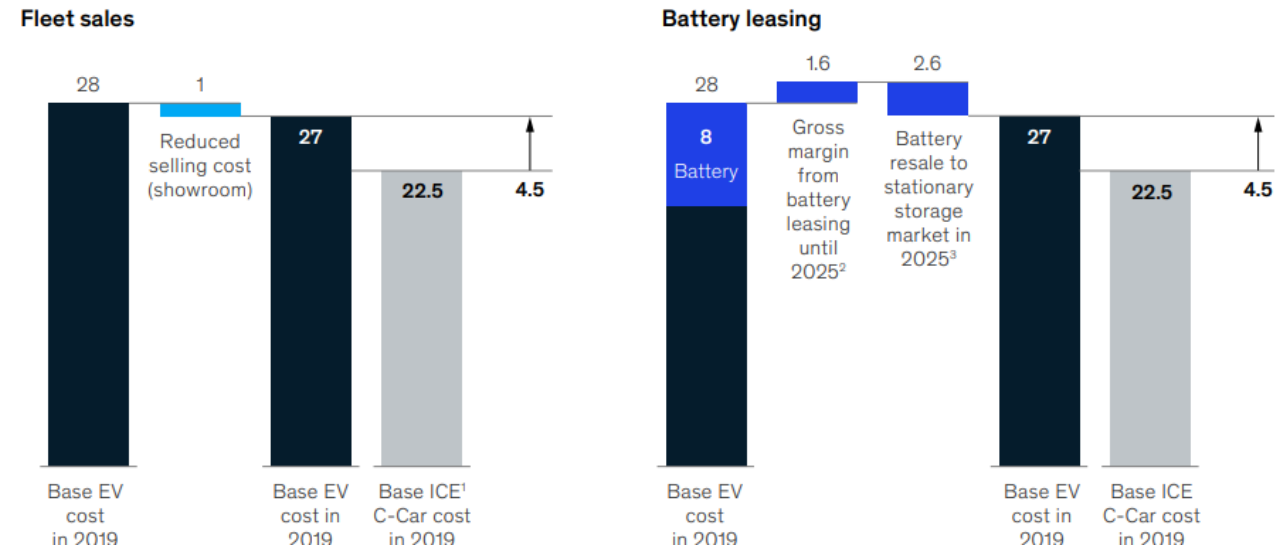
Final assembling optimization: As per industry insights, EV design also suggests that a purpose-built EV platform is simpler to assemble and could deliver up to \$600 in savings per vehicle in lower fixed-cost allocation. That savings come from having fewer components to assemble in an optimized EV platform and requiring less capital in EV-only plants versus complex plants that combine ICE-vehicle and EV lines

Partnership during transition: During the next five to seven years, as the industry transitions toward electrification but struggles with profitability, automakers should more strongly consider partnering and collaborating with competitors. At a time when OEMs face the possibility of retooling numerous models and platforms for electrification, collaborating with other OEMs can reduce the fixed-cost burden of R&D, tooling, and plants. Benefits will be especially high if OEMs can share EV platforms and plants, which can still enable multiple model variants. These alliances will also be most beneficial when they enable higher-volume procurement of the same battery cells and power electronics to take advantage of scale that is otherwise elusive when going it alone. In fact, some automakers have already announced a range of different global partnerships focused on reducing the cost of designing and producing EVs.

Exploring new business models: Automakers that take a bolder approach to closing the profitability gap can also experiment with a range of new business models for niche segments. For example, ideas include targeted direct sales to fleets and battery leasing. Economically, it makes sense to target fleet customers with EV models, given that these fleets typically fall into a high-mileage category in which the total cost of ownership (TCO) of EVs is beneficial—and they prioritize TCO higher than other buying factors. Direct selling to these customers can reduce selling costs. OEMs could offer to lease batteries separately from the vehicle and resell older batteries to the stationary storage market for secondary use. Battery leasing has a potential to attract consumers who shy away from purchasing an EV due to uncertainty in performance and degrading capacity of batteries today

Exhibit 18: New business models , such as fleet sales and battery leasing , could improve profitability

Base electric-vehicle (EV) total cost with new business models for improved profitability, price per vehicle, \$ thousand



1. Internal combustion engine.
2. Assumes 5-year leasing period; assumes 30% gross margin on depreciated value of battery pack
3. Assumes 70% original capacity; assumes resale to remanufacturer at ~\$65 per kilowatt-hour in 2025 (assume no margin by OEM on resale of battery pack; remanufacturer could potentially derive margin from repurposing battery pack)

Source: McKinsey, Industry Interactions

7. Way Forward for India's Sustainable Mobility Plan



Looking at the road ahead, India aspires to reach its vision of 100% EVs by 2030. Surely, factors such as increasing government support, decreasing cost of technology, growing interest of the country in EVs, distressing pollution levels, would accelerate India's transition to EVs and enable the government to near its vision. However, there is still a long way to go. India's progress on electric mobility has been commendable, but the transition will certainly take place at a steady pace. What is important is that the right path has been laid and the shift has started to happen.

Actions needed for sustained growth of cleaner mobility in India

- a. **OEMs:** Re-imagination GTM strategy for OEMs in India is required especially in a post-pandemic era. The pandemic has increased consumer comfort with contactless purchases, and 25 percent of Indian customers are now willing to use digital channels to buy high-value items.⁷ As in other countries where e-commerce has taken off, businesses are most likely to win if they offer a seamless omnichannel experience, where customers can easily switch among modes as they consider and purchase items. To manufacture EVs or their components, both OEMs and suppliers must invest in new equipment and capabilities. Close collaboration is essential to ensure a mutual understanding of supply chain requirements, essential components, and end products. Ideally, OEMs will offer long-term contracts to reassure suppliers that their investment will pay off. These agreements also guarantee OEMs a stable source of components..
- b. **Government & Industry Associations:** Industry bodies or associations, as well as government, must help develop a path forward for the automotive and mobility sectors. This may include creation & maintenance of incentives to encourage EV adoption; this could include offering policies that enable development of the local supply chain to reduce dependence on imports of critical components; this is especially important for EVs, since over 60 to 70 percent of their components (in value terms) are imported. Also, the R&D facilitation and ensuring liquidity through various mechanisms; for instance, the government could incentivize banks to lend money and fleet operators could partner with non-banking financial corporations to disburse loans
- c. **Mobility-Service Providers:** Mobility-service providers with small-format vehicles will gain strength in the current downturn. However, players who are dependent on four-wheelers will have to identify new business models, such as self-drive rentals and long-term lease rentals, to stimulate business. Having an extensive number of EVs in the fleet would reduce operating costs and increase drivability, which is a major factor when consumers are choosing a vehicle. It would also allow seamless integration of electronics and telematics. Mobility-service providers can collaborate with OEMs to create a path forward for the industry. Together, they could play a pivotal role in managing the downturn, embracing discontinuities, and sharing the financial and intellectual challenges involved in developing capabilities that will allow them to embrace disruptions like ACES.

8. Key Takeaways



Steps to Increase Penetration of EVs in India	Current Status in India
ICE engines to be banned by 2030	✗
Imposition of fines targets for corporate CO ₂ emissions are exceeded	✗
High Import Duties	✓
Purchase Incentives/Tax Deductions	✓
Sound Incentive Scheme	✗
Establishing Charging Infrastructure	✓
State wise End Subsidies to OEMs	✓
Economic Recovery Plan for EVs	✗
Road Tax Incentives	✓
Bonuses for Leasing	✗
Funds to Commercial Vehicle Segment	✗
Fleet Exchange Program	✗
Funds for Battery Cell Production	✗

9. About Eninrac Consulting



eninrac is a leading provider of research, analytics and advisory services for your business nestled under different industry with unique insights to stakeholders across the globe. eninrac blends extensive knowledge of all aspects of your business industry to provide unmatched analytical insights, innovative strategies, and measurable value creation. We add value with pace, certainty and strategic agility and strive to exceed client expectations by delivering consistent results. We help our clients in unlocking potential and empowering organizations to achieve business objectives and goal effectively. We at eninrac put clients at the centre of our business and transform their risks into high rewarding opportunities through our innovative solutions.



Ravi Shekhar

Director & Head,
Research & Consulting,
Delhi-NCR Office,
Joy Tower, Block-C, Industrial Area,
Sector 62, Noida -201 301
M: +91 83687 15735
E: rv@eninrac.com



Nitika Sharma

Vice President,
Corporate Strategy & New Business,
Delhi-NCR Office,
Joy Tower, Block-C, Industrial Area,
Sector 62, Noida -201 301
M: +91 88603 18090
E: nsharma@eninrac.com

Contact:



Anurag Kumar Dubey

Senior Manager,
New Business,
Delhi-NCR Office,
Joy Tower, Block-C, Industrial Area,
Sector 62, Noida -201 301
M: +91 72900 16953
E: akdubey@eninrac.com



The life of a man consists not in seeing visions and in dreaming dreams, but in active charity and in willing service

- Henry Wadsworth Longfellow

Contact Us

Contact – Head Office

Address : 5th floor, Caddie Commercial Tower, Aerocity (DIAL), New Delhi - 110037



connect@enirac.com

Contact – NCR Office

Address: 1st Floor, Joy Tower, C-20, 1/1A,C Block, Phase 2, Ind. Area, Sector 62, Noida - 201301



+91 7290016953

Contact – Mumbai Office

Address : 4th Floor Duru House, Juhu, Opposite JW Marriott, Mumbai, Maharashtra



www.enirac.com

