



## DECARBONIZING INDIA'S ROAD FREIGHT

# Toward a cleaner, greener, and electric future for commercial vehicles

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### Executive Summary

On June 30, 2022, WRI India hosted an in-person event on 'Decarbonizing India's Road Freight: Towards a Cleaner, Greener, and Electric Future for Commercial Vehicles.' The event was held under UPS Foundation's "Accelerating Commercial Fleet Electrification" initiative for India. Over the course of four deep-dive sessions, held in Bengaluru, WRI India brought together more than 20 leading commercial electric vehicle (EV) manufacturers, logistics operators, financing experts, and practitioners to discuss India's electric vehicle transition trajectory. The stakeholders, representing the commercial vehicle ecosystem, deliberated on the opportunities and challenges in scaling up commercial freight electrification in the country.

The event underscored the tremendous growth in urbanization and e-commerce activity in India and the corresponding rise in emissions, which accounts for the majority of India's total transport emissions. One of the important insights of the session was that with its rapidly evolving domestic ecosystem and significant freight movement corridors, India is well positioned to lead the electrification of commercial vehicles and policy support is necessary to ensure an accelerated transition.

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WORKSHOP ON DECARBONIZING  
INDIA'S ROAD FREIGHT

The contents of this report reflect the views of the workshop participants and do not necessarily reflect the views of the World Resources Institute or other conference partners. The content of this report aims to faithfully reflect the conversations and content generated at the workshops, but some text has been edited for readability.

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## Some of the key insights and recommendations provided by the panelists were the following:

- Provide policy and regulatory support to accelerate the transition of road freight.
- Evolve new technologies, standardize processes, and forge mutual collaborations among various stakeholders to usher in decarbonization strategies for the sector.
- Institute production-linked subsidies, which will cut costs and encourage more manufacturers and business enterprises to switch to EVs.
- Develop viable business models and financing structures to enable smaller lenders to join the market for electrification of fleets.
- Identify specific use cases to showcase the viability of electric freight vehicles in Indian conditions.

## Introduction

Urban freight transport is of crucial importance to the economic vitality of urban areas, providing both urban residents and businesses the necessary goods and services. Today, close to 71 percent of the freight transported in the country is completed on road. However, although it provides necessary commodities and services, freight transportation has a negative impact on metropolitan areas. Each of these freight operations generates vehicle travel, which causes air pollution, congestion, traffic accidents, and many other problems for urban transportation systems. Based on a report released by NITI Aayog, the CO<sub>2</sub> emissions from freight transport are projected to increase from 220 to 1,214 million tons between 2020 and 2050. To address and mitigate these negative effects, policymakers must design urban freight sustainability plans that seek to strike a balance between the economic, social, and environmental implications of urban freight transport operations.

The sessions aimed to discuss these salient issues and deliberate upon four critical themes regarding the electrification of the commercial freight sector:

- **Lack of data on urban freight movement:** As urban logistics activities are mostly managed by the private sector, data on freight movement in the city, which are required to improve the efficiency and decarbonization of the freight sector, are lacking.
- **Policy and regulatory gaps:** Although FAME (Faster Adoption and Manufacturing of Hybrid & Electric Vehicles) 1 & 2 provide incentives to promote personal EVs and buses, commercial freight vehicles are currently not under their ambit. Regulatory mechanisms and transition pathways have not been defined in states that have a limited focus on this sector.
- **Technological hurdles:** In addition to challenges related to the weight of the battery required to support large payloads and long-distance travel, the topography, climate, temperature, and road conditions also affect the performance of electric freight (e-freight) vehicles.
- **Lack of financing options:** Owing to the lack of information on the lifecycle, performance, and viability of e-freight vehicles, this sector has extremely limited financing options, with companies having to rely on investor capital or customized financing packages with non-banking financing companies (NBFCs).

Figure 1 | Key Players in the Indian Electric Freight Ecosystem



Source: Data compiled from various sources by WRI India

## Ensuring Decarbonization of Road Freight

### Present Status of Freight Electrification

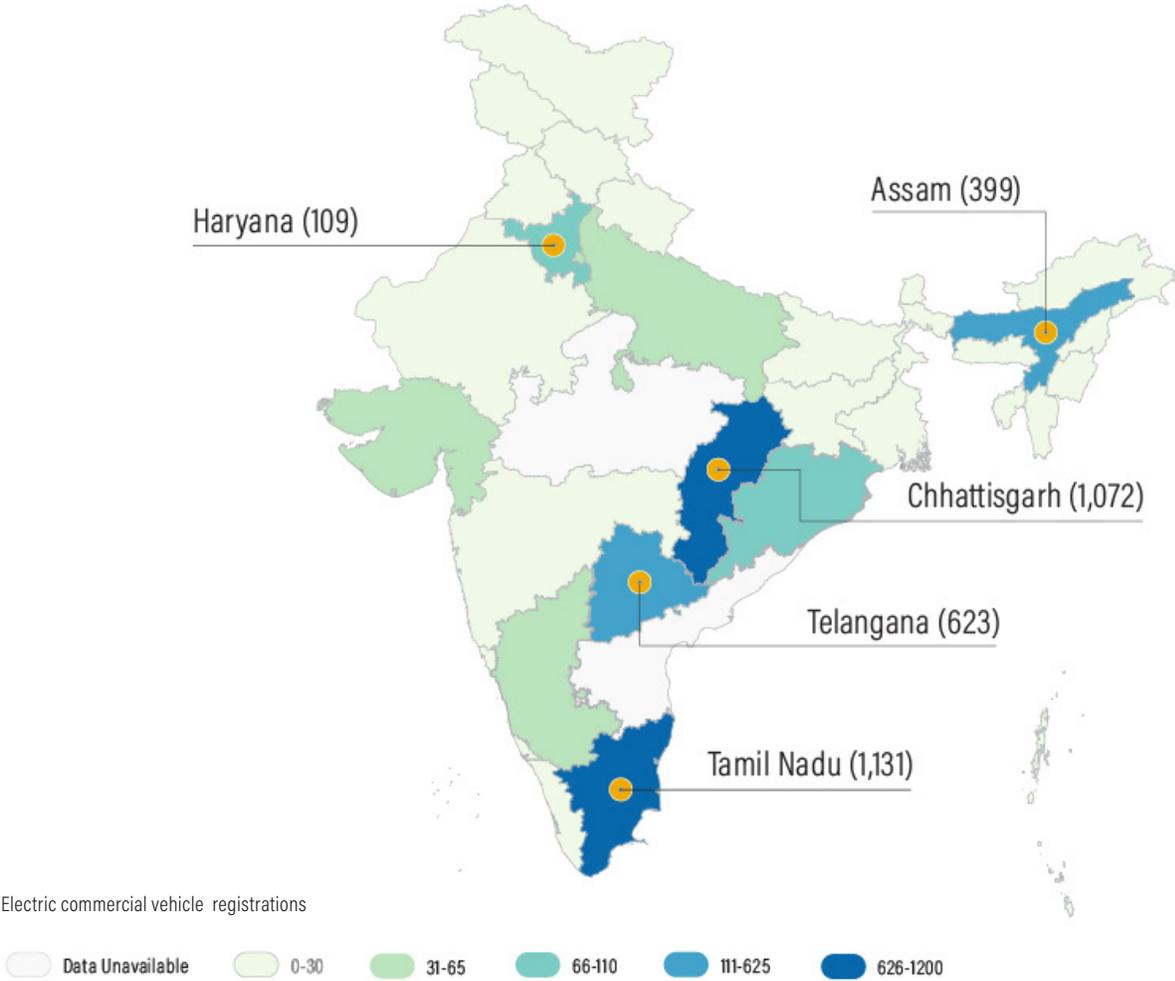
Currently, countries around the world are promoting e-freight vehicles by introducing various programs, schemes, and incentives, working with governments at various levels. In India, this adoption is still at an early stage. Original Equipment Manufacturers (OEMs) are only now starting to create a reliable product architecture to make the electric vehicle comparable with diesel vehicles in robustness. This section gives an overview of the status of the adoption of freight electrification in the Indian context.

The domestic ecosystem for electric road freight is steadily evolving, with both legacy players and start-ups making rapid inroads into the segment. Figure 1 shows the key players of the three main segments within the electric road freight ecosystem: OEMs, Electric Mobility-as-a-Service (eMaaS), and battery solutions and charging infrastructure providers. The other key component of this ecosystem is the logistics segment, with many Indian companies having already started this transition by using EVs in their fleets.

Over the past decade, India has seen tremendous growth in urbanization, e-commerce activity, and first-and last-mile delivery requirements. The electrification of commercial road freight has therefore become a necessary step to combat the adverse environmental impact of increased economic activity.

Figure 2 shows the growth in electric commercial freight registrations across Indian states. The highest number of electric commercial vehicles are registered in Tamil Nadu and Chhattisgarh followed by Telangana, Assam, and Haryana. These are the states that are actively addressing the need to decarbonize the commercial freight sector by shifting to EVs.

Figure 2 | Electric Commercial Vehicle Registrations in India (as of June 2022)

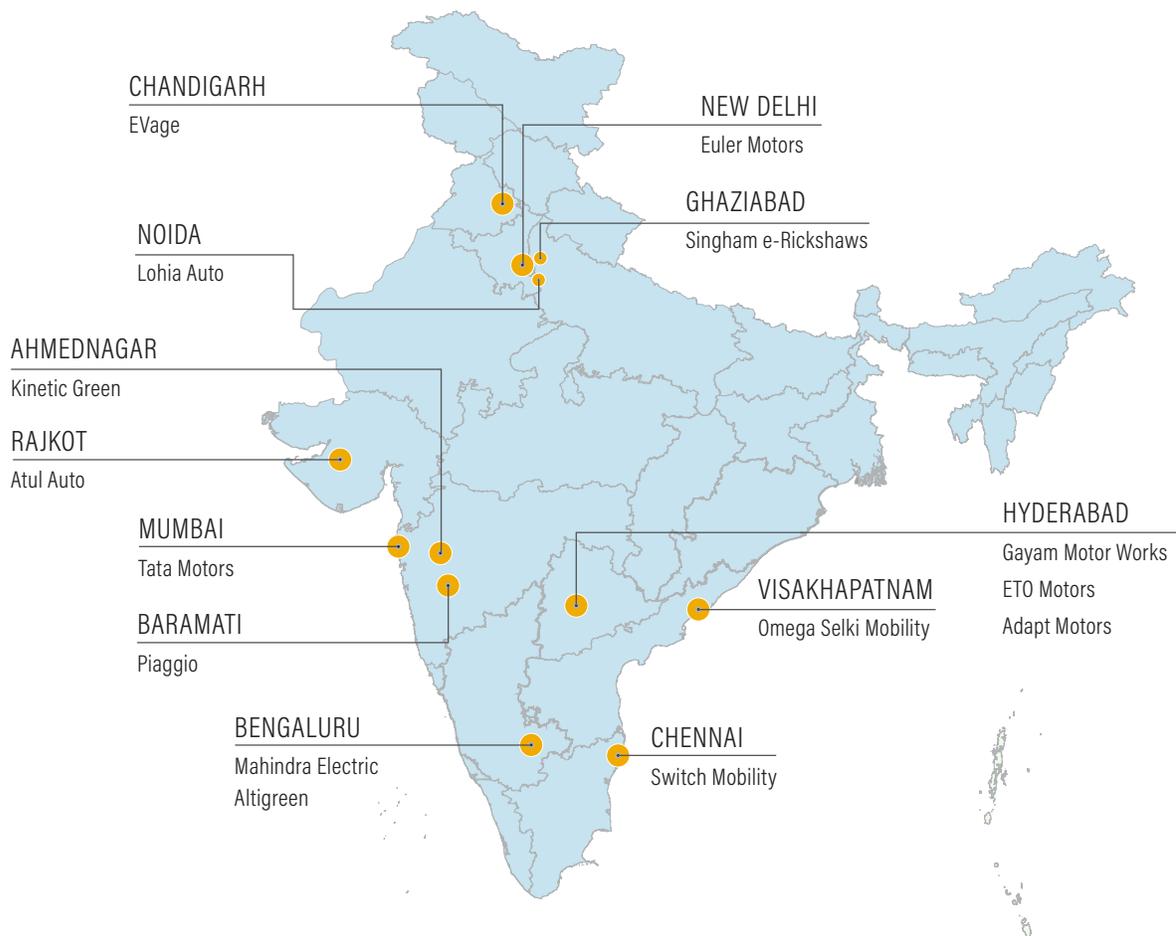


DISCLAIMER: This map is for illustrative purpose and does not imply the expression of any opinion on the part of WRI India concerning the legal status of any country or territory or concerning the delimitation of frontiers or boundaries.

Source: Vahan (Ministry of Road Transport & Highways), Telangana Open Data Portal

India currently has scores of e-freight vehicle manufacturers spread across 20 states (see Figure 3). The supply-side landscape has seen a significant rise in the entry of start-ups providing models for various categories of freight vehicles. The key supply-side players in the e-freight segment are in Delhi, Bengaluru, and Hyderabad, which are the fast-emerging manufacturing hubs for e-freight vehicles.

Figure 3 | Electric Commercial Vehicle Manufacturing Locations in India

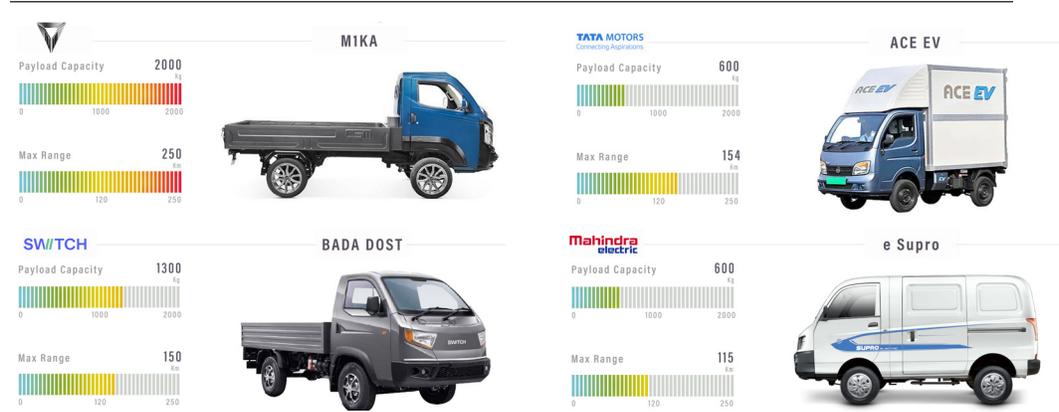


DISCLAIMER: This map is for illustrative purpose and does not imply the expression of any opinion on the part of WRI India concerning the legal status of any country or territory or concerning the delimitation of frontiers or boundaries.

Source: Data compiled from company websites by WRI India

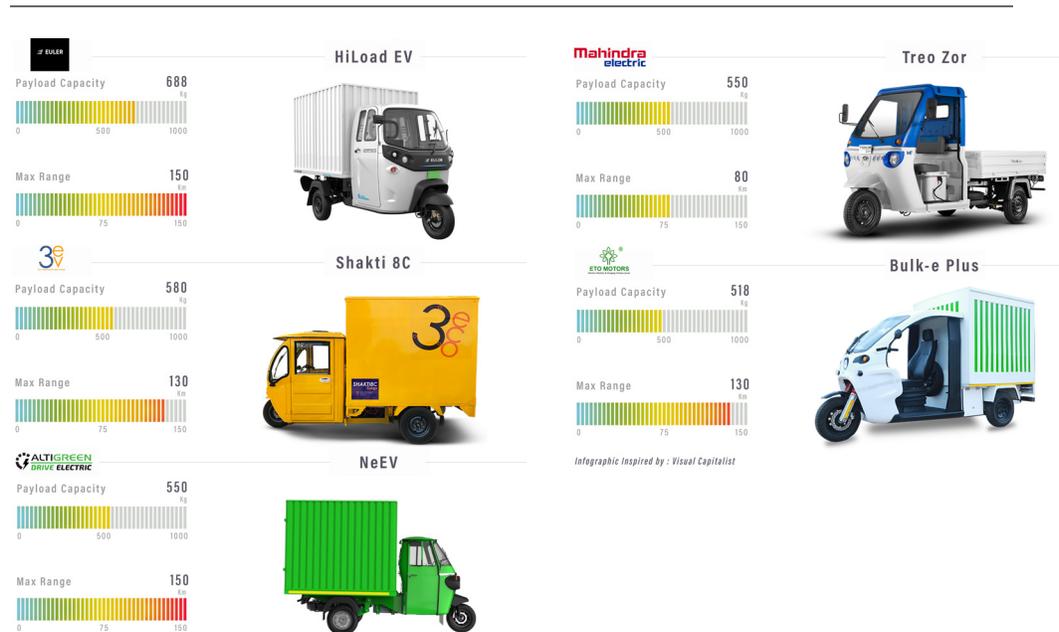
Figures 4 and 5 show some of the top models of electric commercial vehicles in India along with their payload and battery capacities. These models, catering to first- and last-mile delivery requirements, have specifications that are tailormade for Indian conditions. These figures (1 to 5) illustrate the policy, regulatory and technological changes happening in India, which, with continued efforts and awareness, will help in faster EV adoption.

Figure 4 | Top Electric Four-Wheeler Cargo Models in India



Source: TrucksDekho.com

Figure 5 | Top Electric Three-Wheeler Cargo Models in India



Source: TrucksDekho.com

## Pathways

A significant transition to electrification is being witnessed in the two-wheeler, three-wheeler, and bus segments in India. However, it is the commercial freight segment, one of the largest sectors, that would be critical for achieving India's ambitious net zero emissions targets.

With new commercial freight models emerging in the market, the need of the hour is the supporting charging infrastructure to supplement this growth. The ideal method to stimulate investment in charging infrastructure would be to have an open grid system, in which individual, vehicle-to-grid, and grid-to-vehicle power transfer could be incentivized.

Most importantly, when a policy on EVs for freight is deliberated, all the stakeholders must be included. Policy should be formulated by holding consultations with experts and end users. Reskilling and skill development must occur in tandem to augment after-sales, maintenance, and servicing.

### Electrification of the commercial freight segment currently faces the following challenges:

- **Regulatory and policy hurdles:** The current scenario is characterized by fragmented regulatory services and the absence of cohesive national/state policies with limited information around transition pathways and technology to achieve long-term emissions targets.
- **Lack of standardization:** With electric mobility still being an evolving technology, there is a lack of industry standards in battery management systems, data collection, and so on.
- **Operational inefficiencies:** Vehicle overloading and high speed of operations are some of the main reasons for the lower performance experienced by several e-freight vehicles on-ground today.
- **Lack of financing support:** Small-scale owners of freight vehicles cannot afford to own EVs due to the high cost and would rather lease them. Over 50 percent of their time is spent on finding leasing and funding channel partners for their business.

## Session Outcomes

This section highlights the key insights and recommendations provided by the seminar panelists. The sessions helped characterize the rapidly evolving commercial freight electrification scenario through the lenses of technology, policy, regulations, and financing. These findings may help inculcate a sense of cohesion and collective purpose among the stakeholders, which would enable them to collaborate and develop efficiencies using data-based decision-making to accelerate the decarbonization of the freight transport sector.

### Key Lessons and Entry Points for Action

#### 1. Applications of e-Medium and e-Heavy Commercial Vehicles in India

In India, medium and heavy commercial trucks account for only a small percentage of the total road vehicle stock but contribute to 30 percent of the overall vehicular road transport emissions (ITF 2021). A determined transition to e-MCVs and e-HCVs can result in cumulative CO<sub>2</sub> savings of 2.8–3.8

gigatons through 2050, which is equal to or more than India's current yearly GHG emissions for the entire economy. However, early adoption of medium and heavy commercial electric freight will be predominantly fueled by industrial consumption. Considering the increased demand for commercial freight vehicles due to the sustained growth trajectory of the logistics sector in India and its associated adverse impact on the environment, energy security, and public health, freight decarbonization should be prioritized.

**ENTRY POINTS FOR ACTION:** Market leaders must be persuaded to electrify their fleets for long-distance intercity operations by conducting pilots in the medium and heavy commercial vehicle segments. Think tanks and research institutions can bridge the gap by enabling dialogue and information exchange between the demand- and supply-side players in the ecosystem to help accelerate and match products for operational and specific infrastructural requirements. To achieve the larger goal of net zero by 2070, a systemic approach must be developed in India that encompasses all stakeholder communities such as OEMs, logistics operators, aggregators, driver partners, research organizations, digital players, financiers, and the government to make this transition feasible.

## **2. Exploring the supply-side mandates**

Often, the overarching strategic goal of supply-side mandates is to build a localized supply chain, and incentives bundled in such mandates will ideally contribute to economies of scale that translate into lower manufacturing costs. Components of the ecosystem such as localization of batteries, cells, traction motors, and power electronics are crucial for building capacity and for the growth of supply-side manufacturers.

Many states are developing policies to provide capital subsidies and land allocation concessions to attract industries and to foster a robust public charging infrastructure with multiple EV charging ports and high-powered DC chargers. For example, Uttar Pradesh's state EV policy offers up to 20 percent capital subsidy and land development incentives for setting up manufacturing units in the state. Delhi and Maharashtra specifically offer charging service operators (CSOs) land at discounted rental rates.

**ENTRY POINTS FOR ACTION:** In the e-freight ecosystem, OEMs, financiers, and policymakers are showing a keen interest in decarbonizing this sector by providing initiatives to strengthen supply-side mandates as it is critical to align with market demands to ease the shift to EVs.

In addition to providing capital and infrastructure subsidies, governments could assess the technological limitations and residual performance of batteries and absorb the risks of vehicular underperformance in the early periods of the transition to support the growth of e-freight models. Electrifying medium and heavy commercial trucks in India's price-sensitive markets requires policymakers, regulators, financiers, think tanks, and e-freight manufacturers to come together as "Champions of Change" to raise awareness of freight electrification.

## **3. Provide policy and regulatory support to accelerate the transition of road freight**

To ensure decarbonization of the transport sector, various government plans and policies target the electrification of vehicles in India, such as FAME 1 & 2 and the National Electric Mobility Mission Plan (NEMMP) 2020, which offer incentives for electric two-wheelers, three-wheelers, buses, and four-wheelers. However, commercial vehicles are currently not covered and are not directly targeted under the FAME scheme. Policies or regulations can increase the investment for building the charging infrastructure. The government's policy goals should emphasize diverse EV use cases, carriers, and freight forwarding enterprises. Vehicle type approvals and conventional vehicle testing

norms should also be upgraded over time. Another important aspect is that industries must be motivated to build renewable energy power plants, which would ease the transmission of power and help stabilize the power grid, which some fear could become unstable as more EVs are sold.

**ENTRY POINTS FOR ACTION:** Governmental incentive schemes with a focus on commercial vehicles, such as FAME, which effectively hastened the adoption of electric buses in India, will be required to drive OEMs to increase their R&D investments. Improving the financing mechanism by devising an appropriate policy to give Indian carriers and freight providers easy access to bank loans should be the current focus.

#### 4. Standardization of the freight industry across various verticals is required

**Standardization in telematics:** Telematics data provide real-time monitoring of the driving patterns, fuel economy, and vehicle condition of cargo-delivering trucks, enabling detection of snags or failures that might delay a delivery or disrupt the supply chain. Currently, not much data is collected on freight movement as most vehicles lack the required equipment. A regulatory push is needed to improve data collection within the sector through the use of GPS devices onboard freight and logistics vehicles, whichever fuel technology they use.

**Standardization in freight movement:** This can create uniformity across the industry. An indication of global technological progress in the e-freight segment is the development of EV truck corridors to standardize freight mobility. For example, in Germany, a test system has been created on a public road that allows trucks to draw electric power from overhead cables on a 10 km stretch. Efforts to create such infrastructure have also been underway in India, for example, an electric highway has been successfully trailed on the Delhi - Jaipur highway and is expected to be operational for public by 2023.

**Standardization in palletization:** Cargo packing should be optimized using techniques such as palletization, which is the process of arranging goods on a pallet to consolidate them and facilitate faster loading and unloading. A combination of such standardization, skilling, and technology would create a more space- and time-efficient method of transportation that would speed up the turnaround per trip.

**ENTRY POINTS FOR ACTION:** To future-proof e-freight vehicle telematics, data collected by these devices can be used to understand not only vehicle and battery performance, but also driver behavior. This possibility can be used by financiers to incentivize OEMs and fleet operators to support the transition, as battery technology and charging infrastructure require standardization for integration. For example, regulatory bodies could devise protocols to integrate the battery management system (BMS) and charging standards for each vehicle and charging type, which can be coded in during the production phase itself.

#### 5. Technological advancements and vehicle reliability

An increased focus on R&D in EV technology and indigenous production of battery cells in India, which would decrease the overall cost of production for OEMs, could unlock the value proposition of e-freight throughout the vehicle's life cycle to generate more revenue. Even if subsidies are decreased or withdrawn in the future, the total cost of ownership (TCO) benefits would be significant, and a positive gain may occur even over the lifecycle of the vehicle. In India, 80 percent of commercial fleet operators are single- or two-vehicle owners. They need to be assured of the dependability of e-vehicles before they decide to invest in them. As EVs are still in the nascent stage in India, customers need to be reassured that they can withstand abuse and wear and tear like ICE vehicles. They cannot afford to be stuck on a highway with no charge left in the vehicle and a looming deadline for shipment delivery. Although e-freight vehicle payload,

gradeability, and range are important parameters for fleet operators, reliability is crucial.

**ENTRY POINTS FOR ACTION:** For timely delivery by e-freight vehicles that will ensure high customer satisfaction scores, vehicle reliability is the most important factor considered by operators. When vehicle performance is degraded by overloading and other factors, the result is downtime, which has a significant negative impact on profitability and margins. Therefore, compliance with regulations should be strictly enforced across the ecosystem.

## **6. Develop viable business models and financing structures to support smaller lenders**

Currently, the financing models in the e-freight segment are fragmented, with the OEMs' business time spent acquiring leasing and finance channel partners for funding the business. The most challenging part here is that financiers are unsure about the performance of e-freight vehicles and whether they will survive the duration of the loan. The second most important factor is the primary maintenance cost of an EV, which is considered expensive beyond a three-year guarantee. The OEM pays an input Goods and Services Tax (GST) of 18 percent to 28 percent throughout the manufacturing process but receives only 5 percent of the GST back when the vehicle is sold. The rest is trapped in an inverted duty structure, so the OEM's profit is effectively tied to the GST refund. Financing companies using traditional business models require security deposits from OEMs ranging from 5 percent to 10 percent of the vehicle's cost and buyback guarantees as well, placing OEMs in a tough spot. Therefore, leasing models are preferable for drivers and logistics partners as it allows them to lease the vehicle initially and buy them back later, thereby strengthening the confidence of those who are using EVs for the first time. Fleet operators will also be helped if financial structures are evolved that enable smaller lenders to join the market and achieve a certain level of scale.

**ENTRY POINTS FOR ACTION:** The current financial market is highly unorganized, with many leasing programs focused on private EVs and three-wheelers. Technology must be harnessed to support creative business models and solutions that benefit all stakeholders. In addition, India is attracting international attention, and global equity investors are ready to back asset-heavy platforms because of a move toward green financing. The inflow of global capital investments must be leveraged to help the e-freight financial market achieve financial parity with the traditional auto industry's leasing structures. Buyback assurance business models, currently prevalent in the passenger EV sector, should be adopted in the e-freight vehicles sector as well. The potential of this model to give confidence to not only consumers but also to banks and other NBFCs should be assessed.

## **7. Identify specific use cases to showcase the viability of e-freight vehicles in Indian conditions**

While developing a business roadmap for EVs in the commercial freight sector, multiple use cases should be considered, but initial adoption would be driven by specific use cases where the routes and the range can be well defined. This helps optimize the whole network and develop the supporting charging infrastructure for long-haul trucking at the origin, enroute, and also at the destination. Deploying e-freight trucks as a pilot study in specific sectors such as food and pharmaceutical industries—to show their viability in a complex perishable sector involving refrigeration procedures—or on certain business routes with the highest traffic volume could be explored, which would go a long way in improving their acceptability in the logistics sector.

**ENTRY POINTS FOR ACTION:** Specific use cases, for example ports could be preferred to the urban city environment for e-truck pilots because they offer a flat terrain, and the vehicles can maintain a constant speed. Also, the port areas are free of substantial vehicular traffic, which makes them ideal for

deploying an on-ground pilot for assessing the commercial utility of e-trucks.

### **8. Reskilling must be developed side by side to develop the after-sales, maintenance, and servicing segments**

The traditional automotive industry is characterized by consolidation of technology by the OEMs, unlike the EV industry, where multiple key components of motors, batteries, and drive trains are developed by various companies. This scenario requires more cooperation and similar technical skill sets, which the OEMs are tackling by providing workforce training. However, the critical aspect of on-ground servicing must also be considered, because for drivers their livelihood depends on reliability. If an ICE vehicle breaks down, it can be easily repaired in a roadside workshop, which is improbable with the electric variant. Therefore, in addition to workforce skilling, it is important for the EV ecosystem to upskill the R&D and service engineering staff to improve high-value manufacturing and technological innovation.

**ENTRY POINTS FOR ACTION:** In view of the evolving EV ecosystem, a significant transition from traditional ICE jobs is imminent. Governmental stakeholders in partnership with OEMs and educational institutes could create vocational courses and skill development programs for mechanics, drivers, and charging infrastructure staff to upskill them and make them industry ready.

## APPENDIX A

### Workshop Participants

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