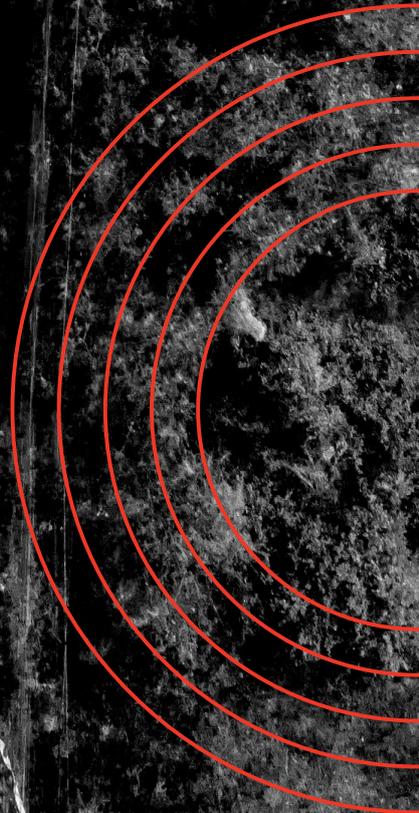


# Early market outlook report

Electrification of medium and heavy-duty trucks in India



AHEAD



Supporting partners:



## Message from the India Executive Director

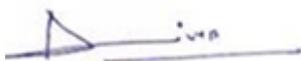
Transport is one of the major contributors to climate change, accounting for around a quarter of global energy-related greenhouse gas emissions. One of our objectives at Climate Group is to bring about change in the transport system. We do this by forming strong corporate and government networks that promote greater action and ambition on climate. We focus on creating platforms to enable scalable, replicable & equitable transition in this sector.

Electric transport offers a cutting-edge technological solution as it contributes to significant reductions in tailpipe emissions. Our [EV100](#) initiative convenes leading businesses who are committed to transitioning to 100% electric vehicles (EVs) and making them the new normal by 2030. These businesses are setting a benchmark in their operations by way of this transition and by installing charging infrastructure at their premises for staff and customers.

Likewise, the early adoption of electric medium and heavy-duty trucking can be propelled by businesses. To stimulate a faster switchover to EVs, Climate Group has launched [EV100+](#) (in September 2022), which brings together companies that have made the commitment to transition to zero emission medium and heavy-duty vehicles (MHDVs). Like EV100, it will generate a powerful demand signal for MHDVs from businesses, serve as a platform to share knowledge and enable policy.

Globally we're witnessing zero emission MHDVs gaining a big push, with specks of this transition in India being visible through the adoption of e-trucks by some Indian companies. JSW Steel has become the first Indian company to make the EV100+ commitment, and we expect this momentum to spread across several industry sectors where zero emission MHDVs are chosen over their incumbent diesel equivalents.

While the trucking industry in India is poised to grow, combined efforts from industry and government can help the country meet its net zero goals, in conjunction with its economic aspirations. The transition to electric medium and heavy-duty trucks is a critical aspect in the decarbonisation of the mobility sector. This Market Outlook Report will help create foundational awareness about the Indian trucking sector and establish a fact-based narrative for electric truck adoption in India, while underscoring the need for a time-bound transition.



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सत्यमेव जयते

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### Foreword

At COP26, India took a quantum leap of committing itself to become a net zero economy by 2070. Emissions from medium and heavy-duty vehicles accounts for over 30% of all on-road emission while it constitutes only 2% of the total vehicle population in India. Decarbonisation of road freight is imperative for India to achieve its net zero goal.

India's National Electric Mobility Mission Plan (NEMMP 2020) launched in 2013 laid out an early roadmap to support Electric Vehicle (EV) adoption, which now has been reinforced by two rounds of the FAME scheme to promote electric and hybrid vehicles and allied manufacturing. Such policies have boosted the Indian EV industry. According to a NITI study on future passenger and freight vehicle sales, India's weighted-average EV sales penetration has the potential to be about 70 percent in 2030.

EVs are witnessing an explosive growth in India in the light-duty, freight and last mile goods delivery sector. EVs for public and personal mobility use is also steadily rising with electric buses and cars being deployed. However, the EV transition in the medium to heavy-trucking segments from diesel vehicles is yet to take off. Any early adoption of EVs in the trucking segment is bound to grow in applications where its viability is on the horizon first. The learnings can be easily leveraged for long-haul trucking in the future.

Similar to the transition unfolding globally, the transition to electric trucks in India will also be propelled by demand generated by companies in the first place. Already a few Indian companies including JSW, Tata Steel and Dalmia Cement are running programs to pilot and use electric trucks for reducing logistical costs. The foundational technology of electric buses, e-vans etc. can easily transfer to trucks.

This Early Market Outlook Report on Medium and Heavy Trucks prepared by Climate Group and PManifold Business Solutions is good reckoner providing an overall status of the trucking market in India and establishing the need for and challenges of electrification. In a scenario, where we expect the EV transition to first happen in certain trucking applications, the report has appraised several such use cases and enablers for adoption.

At NITI Aayog, we recognize that these are important facets of the trucking industry that need to be studied. We recognize the role that businesses can play in contributing to a successful shift towards sustainable freight movement through corporate adoption of electric trucks, it will help us inform new policies in the future.

Yours Sincerely

(Sudhendu J. Sinha)



एक कदम स्वच्छता की ओर

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# Acknowledgment

Climate Group appreciates the support of ClimateWorks Foundation, Shakti Sustainable Energy Foundation and We Mean Business Coalition. We would like to thank the CALSTART team for sharing their insights and results of market research from the “Industry Assessment & Roadmap for Zero-Emission Medium and Heavy-Duty Trucks in India, 2021” report.

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## About Climate Group

Climate Group is an international non-profit, publicly launched in 2004, with offices in London, Amsterdam, Beijing, New Delhi, and New York. Our mission is to drive climate action, fast. Our goal is a world of net zero carbon emissions by 2050, with greater prosperity for all. We do this by forming powerful networks of business and government, unlocking the power of collective action to move whole systems such as energy, transport, the built environment, industry, and food to a cleaner future. Together, we're helping to shift global markets and policies towards faster reductions in carbon emissions.

## About pManifold Business Solutions

Incorporated in 2010, pManifold is e-Mobility, New Energy & Utilities focused Strategic Research and Consulting company that is enabling Smart and Clean Tech Markets development and growth in 1) Energy 2) Transport and E-Mobility 3) LVDC 4) Solar 5) Enviro 6) Urban sectors. It is helping industries and organisation innovate and transform their solutions, services, and business model, for faster reforms, higher customer experience and profitable market growth. It has successfully worked with various country governments across world and with prestigious organizations including GIZ, UNEP, ADB, World Bank, etc. It has a cross-functional skilled team and completed 250+ projects across 20+ countries.

### Disclaimer

*The report is a collaborative work of Climate Group and pManifold Business Solutions. It does not mean, however, that every group within the companies endorses every word in the report. The early market outlook report has been prepared for general informational purposes only and is not intended to be relied upon as accounting, tax, legal or other professional advice and does not accept any responsibility for the consequence of its use.*

*The examples quoted in the report and the list of identified use cases are by no means exhaustive. The industry is rapidly evolving in regard to electrification of MHDts in India and has a promising growth potential in each use case that can be observed in the near future.*

## About our supporting partners



ClimateWorks Foundation is a global platform for philanthropy to innovate and accelerate climate solutions that scale. Our global programs and services equip philanthropy with knowledge, networks, and solutions to drive climate progress. Since 2008, ClimateWorks has granted over \$1.3 billion to more than 600 grantees in over 50 countries.

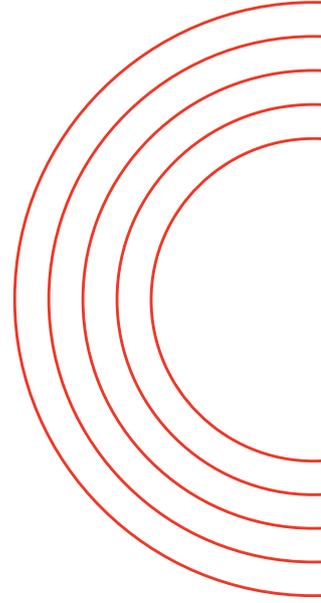


Shakti Sustainable Energy Foundation seeks to facilitate India's transition to a sustainable energy future by aiding the design and implementation of policies in the following areas: clean power, energy efficiency, sustainable urban transport, electric mobility, climate change mitigation and clean energy finance.



We Mean Business is a global nonprofit coalition working with the world's most influential businesses to take action on climate change. Its mission is to catalyse business and policy action to halve emissions by 2030 and accelerate an inclusive transition to a global net-zero economy by 2050.

# Preface



Today trucks are a key enabler of global economic activity and play an essential role in delivering goods or commodities across every point of the economic value chain. However as the world entered the 21<sup>st</sup> century, with a pressing need to tackle GHG emissions and climate change, the evolution of trucks must be fast-tracked. The necessity for electrification of trucks also arises with the decarbonisation and carbon-neutrality goals of the Paris Agreement. Targeting electrification of medium and heavy-duty trucks (MHDT) by 2040 needs deliberate efforts from all stakeholders.

This report outlines the landscape of the Indian trucking industry, focussing on the electrification of the medium and heavy-duty trucks (MHDT) segment, and explores potential alternatives in the process. It anticipates that the GHG emissions might rise exponentially with developments in the MHDT sector due to projected economic growth, raising concerns for air quality, energy security and industrial competitiveness. The report presents a snapshot of various use cases and their profiles. The existing policies and programmes are shown alongside the potential enablers of

the regulatory framework to facilitate corporate responsibility and contributions to electrifying MHDTs. While investigating the need for electrifying MHDTs, the early market report intends to put the spotlight on increasing demand for electric MHDTs and underlines the requirement of targeted policy.

Against the backdrop of the transition to electric vehicles (EVs) in the passenger & light duty vehicles segment, this report discusses the principal elements of the MHDT sector that will play a vital part in decarbonising freight transport in India. Corporates need to co-create with the government, and steady support from both will be essential for the regulation and implementation of policies. Continual demand signals from businesses to acquire resources and establishing infrastructure for electrification will enhance the ambition to electrify MHDTs.

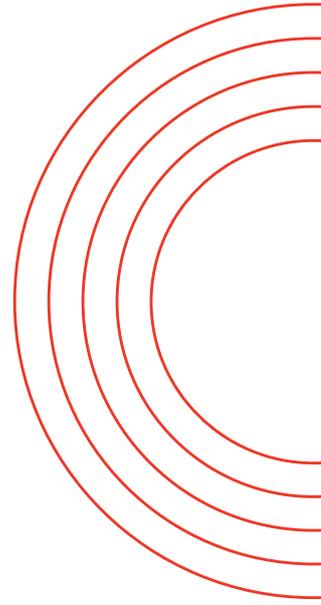


PERMA

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TATA

# Landscape of Indian trucking industry



**MHDVs are vehicles, including passenger buses and goods vehicles, with GVW greater than or equal to 3.5T. All goods vehicles with GVW greater than or equal to 3.5T are classified as medium and heavy duty trucks.**



MHDTs come under the broad umbrella of medium- and heavy-duty vehicles (MHDVs), including passenger and goods vehicles. MHDVs are vehicles, including passenger buses and goods vehicles, with GVW greater than or equal to 3.5T. All goods vehicles with GVW greater than or equal to 3.5T are classified as medium and heavy duty trucks. This Early Market Outlook report focuses predominantly on the Indian trucking industry, i.e., the MHDT segment, because of its potential impact on decarbonisation efforts across the transport sector. Several aspects have formed a crucial part of this chapter, including the constituents of road transportation and mapping of various stakeholders in the heavy trucking industry. In addition, this chapter lays the foundation for the following chapters, with a primary focus on understanding the operational challenges across the industry. A deep dive into such roadblocks of MHDTs

further allows for identifying essential elements of truck electrification-friendly factors, as discussed in subsequent chapters.

## Classification of on-road vehicles

The Indian automotive industry is categorised based on vehicle types (2- and 3-wheelers, passenger vehicles and goods carriers) and classes (primarily by vehicle capabilities and passenger or payload capacity). Among these, goods vehicles form a crucial part of the transport ecosystem as they are relatively small in volume but account for a much larger share of fuel consumption and emissions,<sup>1</sup> essentially classified as light, medium or heavy goods vehicles as shown in Figure 1.

Trucks with GVW higher than 3.5T account for the most significant proportion of transport activity, with a share of over 80% of total road freight traffic.<sup>2</sup> These vehicles account for a high load capacity and drive large distances, typically for long-distance transport of large amounts of goods. Light commercial vehicles (GVW < 3.5T) have a limited modal share in India due to their low load capacity and ownership rates analogous to passenger cars. The ownership of these vehicles grows proportionately with increasing income and tends to stabilise once incomes exceed USD 30,000 per capita (IEA, 2017).<sup>2</sup>

**Figure 1: Classification of on-road vehicles in India<sup>3</sup>**

Vehicle category	GVW	Passengers	% Share	
Two wheeler (NT)	2WN	≤ 2	72.8%	
Two wheeler R (T)	2WT	≤ 2	0.0%	
Two wheeler (invalid carriage)	2WIC	≤ 2	0.0%	
Three wheeler (NT)	3WN	≤ 5	0.1%	
Three wheeler (T)	3WT	≤ 1.5 T	2.7%	
Light motor vehicle	LMV	≤ 9	17.5%	
Four wheeler (invalid carriage)	4WIC	≤ 9	0.0%	
Light passenger vehicle	LPV	≤ 9	1.2%	
Light goods vehicle	LGV	≤ 3.5 T	2.9%	
Medium motor vehicle	MMV	≤ 5 T	> 9	0.0%
Medium passenger vehicle	MPV	≤ 5 T	> 9	0.1%
<b>Medium goods vehicle</b>	<b>MGV</b>	<b>≤ 12 T</b>	<b>0.3%</b>	
Heavy motor vehicle	HMV	> 5 T	> 9	0.0%
Heavy passenger vehicle	HPV	> 5 T	> 9	0.3%
<b>Heavy goods vehicle</b>	<b>HGV</b>	<b>&gt; 12 T</b>	<b>1.7%</b>	
Others	OTH	Equipment, Excavators, etc.	0.3%	

1 Globally Freight vehicles constitute a small share of global on-road fleets (less than 4%) and vehicle-equivalent miles travelled (10–15%). Yet they account for a high proportion of the on-road sector's energy consumption, greenhouse-gas emissions (27%), and toxic air pollutants (over 50% in the case of PM2.5 and NOx); ICCT 2019

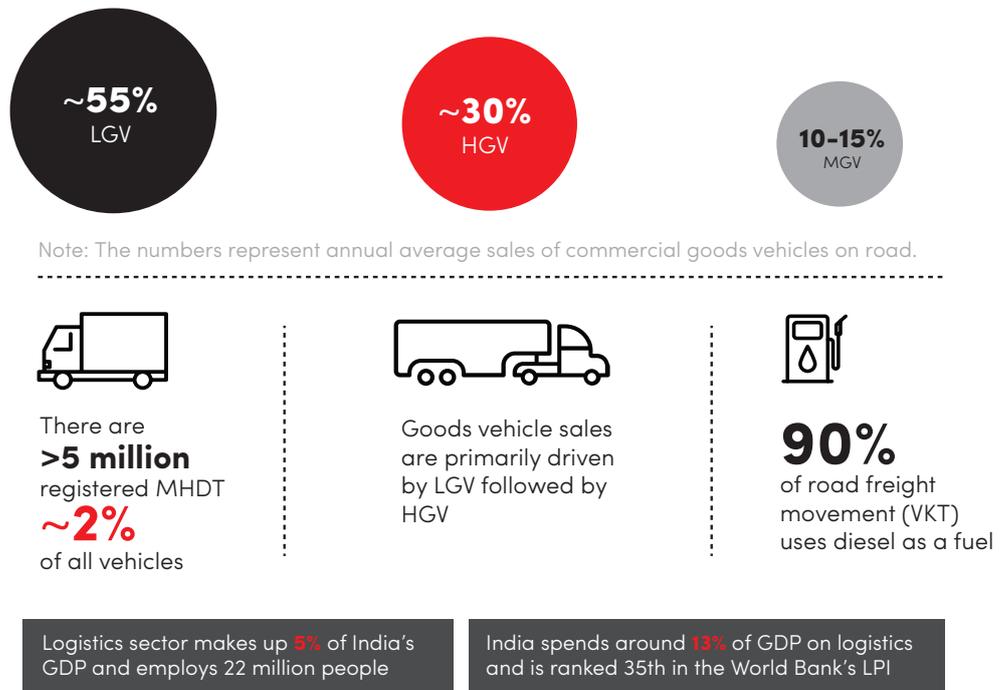
2 Decarbonising India's Transport System: Charting the Way Forward, ITF

3 Automotive Vehicle Classifications – Automotive Research Association of India (ARAI)

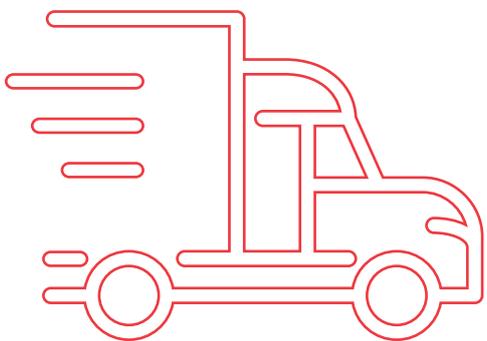
## Salient features of Indian trucks

The Indian trucking industry has become the sixth largest market, with a sale of 210,967<sup>4</sup> MHDT vehicles in 2021. MHDTs are vehicles with GVW ranging from 3.5 T to 55 T. Figure 2 broadly characterises the on-road fleet alongside the sales trend for these vehicles. The MHDT segment essentially fosters trade and ensures efficient transportation of goods throughout India.

Figure 2: Key features of trucking industry<sup>5</sup>



Note: **VKT** – Vehicle Kilometers Travelled, **LGV** – Light Goods Vehicles, **MGV** – Medium Goods Vehicles, **HGV** – Heavy Goods Vehicles, **LPI** – Logistics Performance Index, **GDP** – Gross Domestic Product



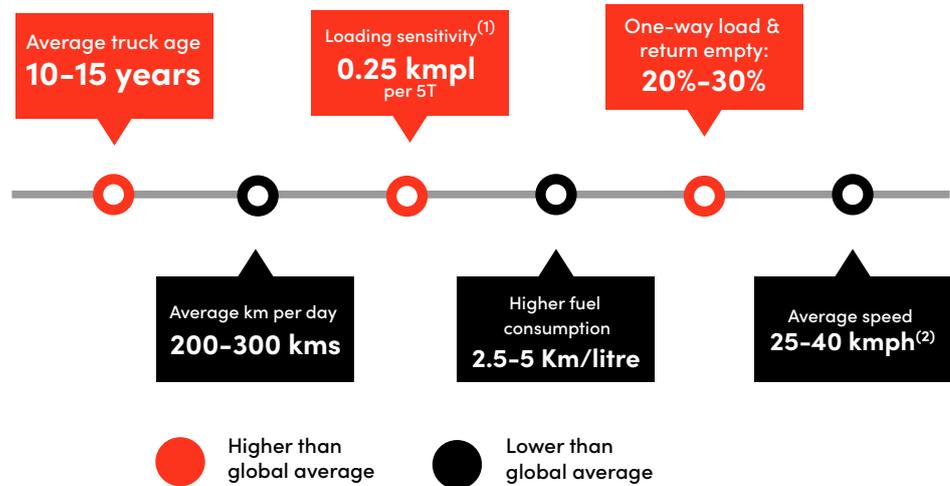
The Indian trucking industry is **the sixth largest market** in the world with more than **5 million registered vehicles accounting for 2% of all vehicles in India**

4 [Vahan Dashboard](#) by MoRTH (2020-21)

5 pManifold analysis on data presented in Webinar organised by WRI on "Accelerating the Electrification of Urban Freight Sector'21" & [Vahan Dashboard](#) by MoRTH

Another set of statistics presented in Figure 3 compares the Indian trucking industry with the global market (US and EU) to showcase the highly unorganised and unregulated trucking ecosystem in the Indian transport sector.

**Figure 3: Unique operational characteristics of Indian trucking industry**



Note:

(1) Loading sensitivity is the sensitivity of fuel consumption to payload carried. 5T increase in payload results to 0.25 km/l decrease in fuel efficiency

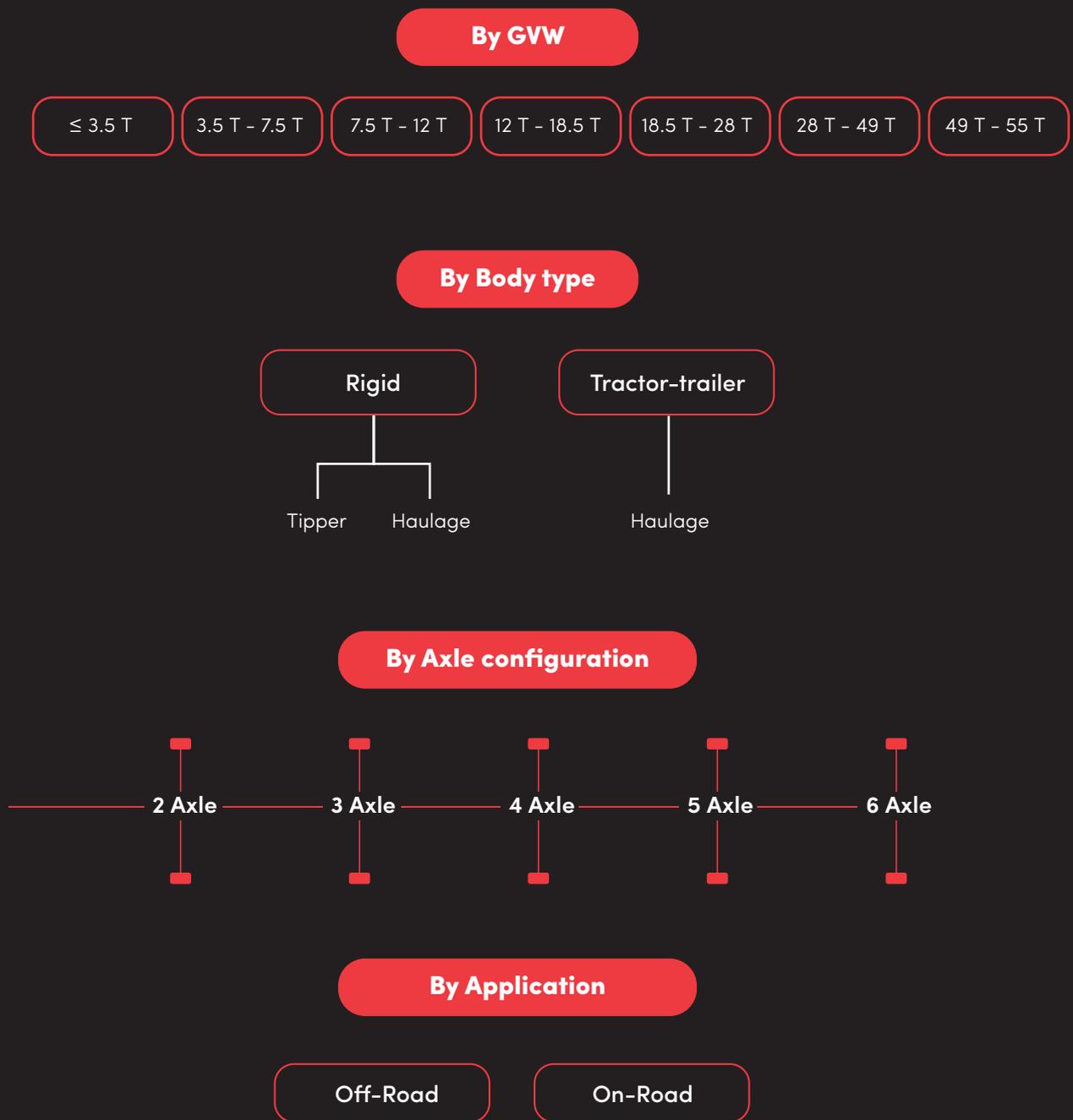
(2) On Expressways, average speed could be as high as 30-60 kmph. But due to congestion and smaller lanes, the speed of trucks is affected.

### Classification by truck structure and weight

The Indian trucking industry can be classified based on the following as represented in figure 4:

1. Truck weight and carrying capacity
2. Truck structure or body-type ('Rigid' trucks with integrated load body vs 'Tractor-Trailer' trucks)
3. Axle Configuration (total number of axles X by total number of axles with drive)
4. Primary Application ('Tippers' for dumping the load by tilting the load body vs 'Haulage' used to simply transport the load)

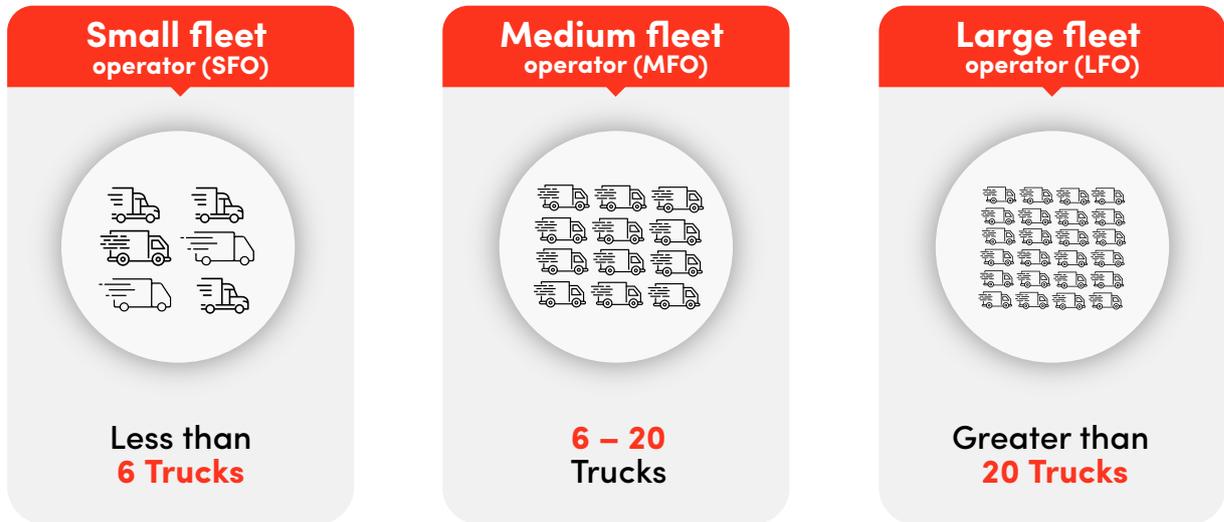
Figure 4: Broad classification of MHDT



## Classification of truck fleet operators by size

India's fleet sizes and definitions are highly distinctive and differ between various sources. [Figure 5](#) shows the most widely used definition.

**Figure 5: Ownership of fleet operators<sup>6</sup>**

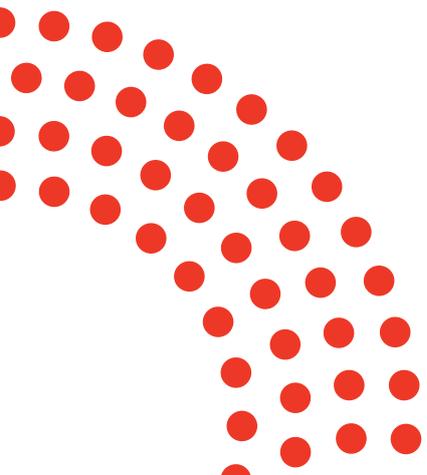
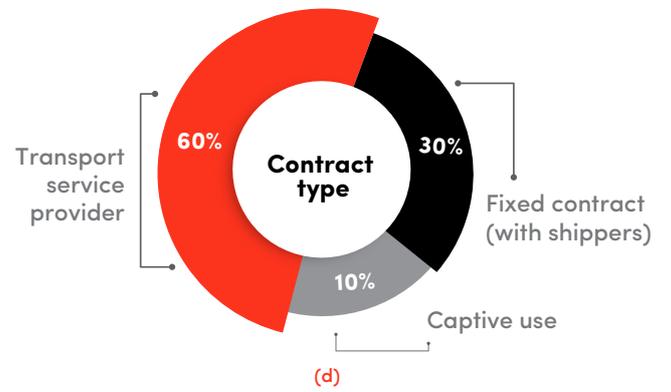
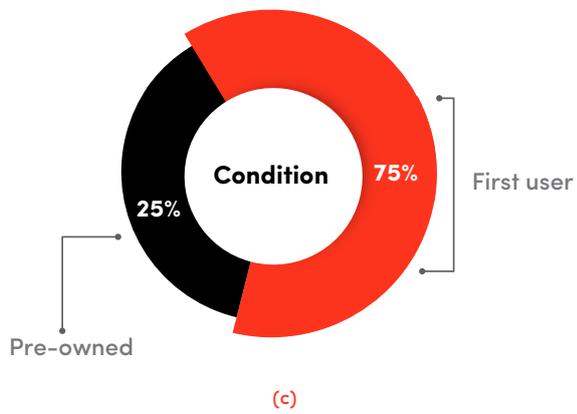
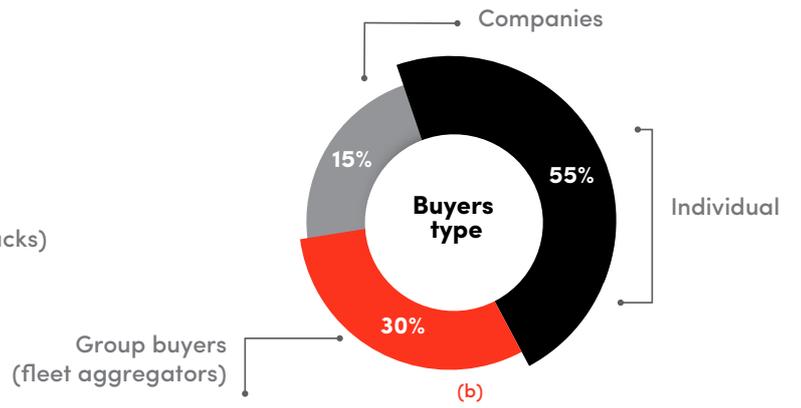
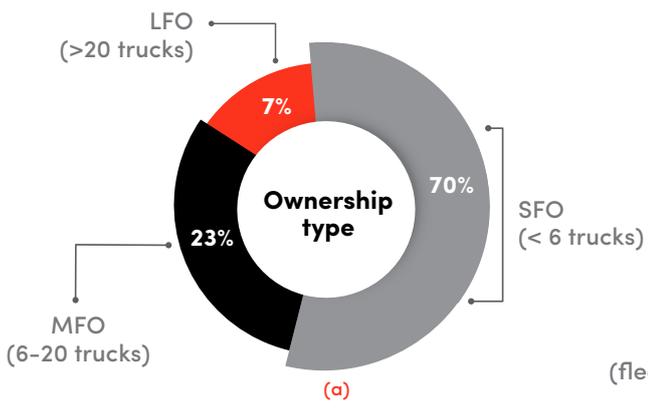


A few notable features of the Indian fleet landscape are:

- (a) India is dominated by SFO. Nearly 70% of the buyers own no more than six trucks and occupy about 30% of the on-road fleet. Similarly, 23% of buyers who own six to twenty trucks make up 38% of the on-road fleet.
- (b) Within the market, fleet trade is skewed towards individual buyers, with more than half of these buyers purchasing fleets for personal use.
- (c) Most truck owners have a small fleet size involving the trucks in their first lives between eight to ten years, post which they are usually re-sold. These trucks run primarily for 15 years before getting scrapped. Currently, the Government of India (GoI) is working on limiting the age of trucks to a maximum of 15 years, primarily to control pollution and reducing road accidents. There is also a second use of trucks but at the moment it is only limited to a few applications, such as in-port container movement, raw material transport from quarry to road hub etc.
- (d) In addition to preferring new-age trucks, several truck operators look for versatility in trucks that allows a switch between various applications and adapt to market demand. Only a fraction of these operators has fixed contracts.

<sup>6</sup> Road turns rough for small fleet operators, [CRISIL](#), Nov 2018

Figure 6: Indian fleet characteristics



The truck operators are unable to capture the economies of scale because of the fragmented nature of the industry. A majority of them have a small operation and thus, lack the necessary human resource and other facilities to deal with the consignor/ consignee directly. The existing structure also makes it difficult to introduce new ideas to achieve road safety objectives, technology upgradation, professionalisation of management etc, as represented below.

**Figure 7: Issues faced by truck operators in India**



### **Diesel theft**

On an average, 10% of diesel is stolen per trip



### **Driver stoppage**

Every 50-70 km driver stop to cool down trucks, check wear and tear etc



### **Rising fuel prices**

In last one year, diesel prices have gone up by 50%



### **Unorganised market**

Unorganised cabin & load body-building, which are mostly cash transactions



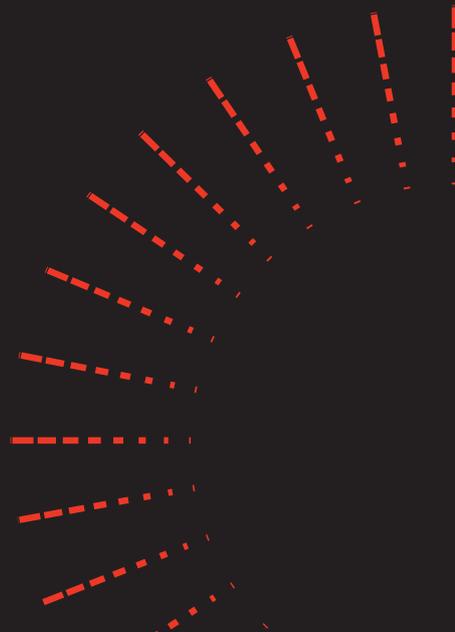
### **Red-tapism**

Digitisation of registration, passing and permit process can be part of e-Truck policy



### **Overloading**

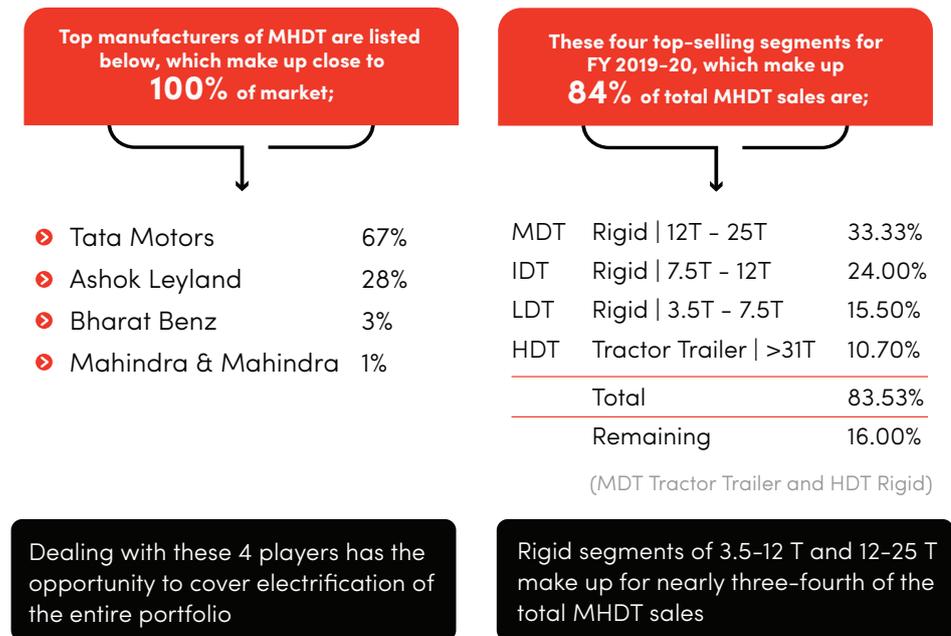
25-30% MHDT have 50 to 70% overloading



# Original equipment manufacturers (OEM)

Apart from being the overall market leaders, Tata Motors and Ashok Leyland outsell all other manufacturers in each vehicle segment as represented in Figure 8. VEVC-Eicher and SML Isuzu are mostly present in light and intermediate truck segments. Mahindra & Mahindra and Bharat Benz sales are scattered across all segments. Along with this, looking at the overall segment sales for the MHDT market, the intermediate truck segment has traditionally been the largest seller.

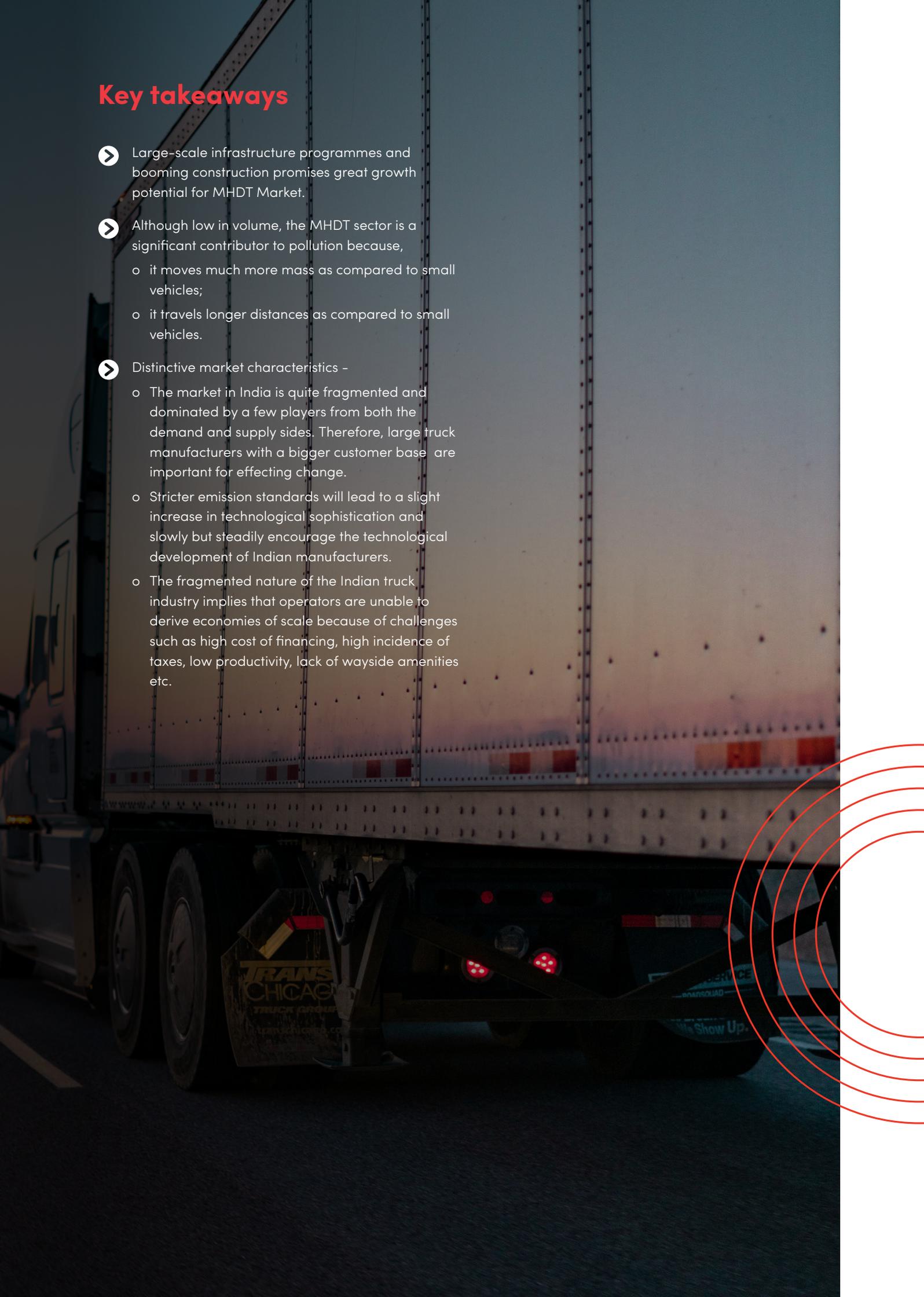
**Figure 8: Top-level profiling of manufacturers<sup>7</sup>**



<sup>7</sup> Market Analysis of Heavy-Duty Vehicles in India for Fiscal Years 2019-20 AND 2020-21, ICCT Analysis

## Key takeaways

- Large-scale infrastructure programmes and booming construction promises great growth potential for MHDT Market.
- Although low in volume, the MHDT sector is a significant contributor to pollution because,
  - it moves much more mass as compared to small vehicles;
  - it travels longer distances as compared to small vehicles.
- Distinctive market characteristics -
  - The market in India is quite fragmented and dominated by a few players from both the demand and supply sides. Therefore, large truck manufacturers with a bigger customer base are important for effecting change.
  - Stricter emission standards will lead to a slight increase in technological sophistication and slowly but steadily encourage the technological development of Indian manufacturers.
  - The fragmented nature of the Indian truck industry implies that operators are unable to derive economies of scale because of challenges such as high cost of financing, high incidence of taxes, low productivity, lack of wayside amenities etc.



# Need for electrification of MHDTs in India



THE TRANSPORT SECTOR IS RESPONSIBLE FOR

**28%**

OF GLOBAL ENERGY DEMAND AND

**23%**

OF TOTAL ENERGY-RELATED CO<sub>2</sub> EMISSIONS

Within the broad framework of the Indian transport sector, MHDT have been explored in the previous chapter. Chapter 2 will discuss the need for electrification of MHDT in India. Besides this, the chapter will also summarise the present status of any alternatives for power trains, essential for stimulating the electrification of trucking in India.

## Emissions from MHDT segment

The transport sector is responsible for 28% of global energy demand and 23% of total energy-related CO<sub>2</sub> emissions (IPCC, 2019). The trucks emit about 45% of the total on-road transport sector emissions, even though only 2% of on-road fleet are trucks, as depicted in [figure 9](#). It is because freight transport moves high mass and travels more distance, as discussed

in Chapter 1. Therefore, creating an impact without decarbonising MHDT is largely impossible.

**Figure 9: CO<sub>2</sub> emissions from the MHDT segment in India**

**MHDT sector is energy intensive and pollutes disproportionately**



Indian MHDT market operates inefficiently than global MHDT market, considering MHDT utilization, ownership and highlighted issues

The rising demand for MHDT in India has supported the 'country's rapid economic growth over the past decade. However, driving growth in freight activity has also led to increased oil consumption and carbon emissions, as shown in figure 9. The emissions are forecasted to double by 2040, resulting in worsening impact of air pollution along with rising urbanisation.

**Table 1: Projected growth of MHDTs and its emissions in India<sup>8</sup>**

We expect the annual sales of MHDTs to grow from 368 thousand units in 2021 to ~800 thousand units in 2040.	GHG emissions from MHDT are projected to increase by 100% by 2040 from 700 to 1,500 million T
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Projected growth of emissions from MHDT, increasing fuel costs, the imminent withdrawal of concessions for diesel in key industry segments and increasingly stricter emission norms might be an encouraging factor for companies in considering the transition to electrify MHDT segment. The result of this switch may lead to an accelerated adoption scenario, resulting in substantial CO<sub>2</sub> emission reduction. Hence, it will help India achieve three of its national priorities, namely air quality, energy security and industrial competitiveness, in addition to supporting GHG emission reductions.

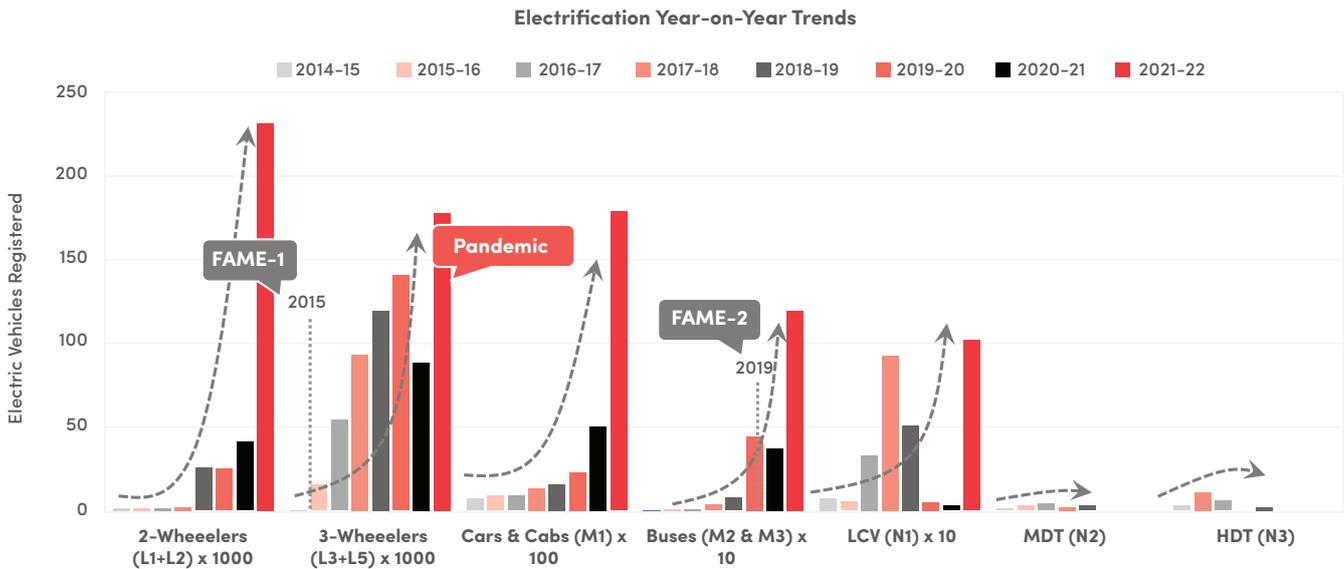
8 Industry Assessment and Roadmap for ZE-MHDT, 2021, CALSTART

# Current status of vehicle electrification

Evidently, all EV segments except MDT & HDT registered strong growth in the last five years (Figure 10).

The absence of distinct state-level policies and incentives (financial and non-financial) have contributed to sluggish growth in MHDT segment. Many states in India have EV policies, but most are currently silent for the MHDT segment.

**Figure 10: Electric vehicle adoption trends from 2014-15 to 2021-22<sup>9</sup>**



In terms of demand incentivisation, there have been a couple of iterations by the government on vehicle subsidies. FAME 1 (Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles) scheme was rolled out by the Ministry of Heavy Industries and Public Enterprises (MoHIPE) in 2015 and continued until 2019. It was immediately followed by FAME 2, originally scheduled to operate till 2021 but extended further due to the pandemic leading to low fund utilisation. The FAME 2 scheme, incentivising the purchase of vehicles in 2-wheeler, 3-wheeler, car and public transport bus segments, has been an impetus for growth of EVs as shown in Figure 10. However, the private buses and commercial goods carrier segments have no provision in this scheme. Thus, adequate provisioning for MHDT segment in the regulatory framework has great potential to spur growth of this segment.

## Competing alternatives to electric trucks

With rising diesel/petrol prices, it was anticipated that the case for adopting e-trucks would become favourable. However, obstacles arising from robust competing alternatives might cause disruptions which will have to be monitored.

The MHDT segment contributes to huge amount of tailpipe emissions (CO<sub>2</sub> and NO<sub>x</sub>) because of its high annual fuel consumption and the tonnage of goods moved through trucks.<sup>10</sup> In addition, engines sometimes run rich air-fuel mixtures due to underpowered ICE, typical with this segment in India, leading to particulate matter emissions through smoke and soot. In regions of high fuel concentrations, soot can easily form especially at

<sup>9</sup> pManifold analysis on data from [Vahan Dashboard](#) by MoRTH (Govt. of India) till May '22

<sup>10</sup> [Impact of biofuels on air pollutant emissions from road vehicles \(MON-RPT-033-DTS-2008-01737\), 2008, TNO](#)

high loads and speeds. This shifts the perception in favour of alternate fuels like biofuel, hydrogen internal combustion engines (H2-ICEs), hydrogen fuel-cell electric vehicles (FCEVs), CNG/LNG. These fuels are also considered as alternatives because of its low operational expenditure alongside ability to abate emissions.

In contrast, [Table 2](#) depicts a list of advantages and limitations associated with the competing alternatives of zero emission technologies.

**Table 2: Comparative analysis of zero emission technologies in transport sector<sup>11</sup>**

		Biofuel	Hydrogen internal combustion engines (H2-ICE)	Hydrogen (H2) fuel cell	Battery electric vehicle (BEV)	CNG/LNG
<b>Technology maturity</b>		Propulsion through IC engine, powered by ethanol, biodiesel, etc	Propulsion through IC engine, powered by hydrogen combustion	Propulsion through fuel cell, battery and electric motor, powered by hydrogen	Propulsion through battery and electric motor	Propulsion through IC engine powered by CNG/LNG
<b>Emissions</b>	<b>CO2 intensity</b>	CO2 intensity depends on source of biomass/carbon	Zero/minimal CO2 if using green/blue H2	Zero/minimal CO2 if using green/blue H2	CO2 intensity depends on grid mix; zero CO2 if using renewable power	Zero/minimal CO2
	<b>Air quality</b>	NOx and particulate-matter emissions similar to diesel	No significant NOx emissions with SCR aftertreatment	Zero emissions	Zero emissions	More polluting in CO and HC. As methane is 28-36 times more potent GHG compared to CO2
<b>Functional challenges</b>	<b>Fuel cost</b>	₹₹₹₹₹	₹₹₹₹	₹₹₹₹	₹₹₹	₹
	<b>Efficiency (Tank-to-wheel)</b>					
	<b>Vehicle cost</b>	Very similar to conventional IC engines	H2 engine with similar CAPEX as diesel ICE, but H2 tank required	High CAPEX for fuel cells and batteries but more scalable than BEV	High CAPEX if large batteries & chargers required (medium for smaller/lighter segments)	With slight changes from today's combustion engines
	<b>Space requirement &amp; Payload capacity reduction</b>	Reference because it is very similar to diesel	Engine with same size as conventional IC engines, but H2 tank needed	Less space needed than ICE, but H2 tank needed	Higher weight than combustion engine due to batteries. Payload constraints subject to use case	Reference because it is very similar to diesel
	<b>Uptime/Refueling</b>	<15 minutes, depending on tank size	<15-30 minutes, depending on tank size	<15-30 minutes, depending on tank size	3+ hour, depending on ability for fast charging	<15 minutes, depending on tank size
	<b>Infrastructure cost</b>	Can use existing infrastructure	H2 distribution and refueling infrastructure required	H2 distribution and refueling infrastructure required	Charging infrastructure and grid upgrades required	CNG distribution and refueling infrastructure required
<b>Variation across categories</b>		<b>High performance</b>	<b>Medium-high</b>	<b>Medium-low</b>	<b>Low performance</b>	



## Battery-electric vehicles and hydrogen fuel cells are **potential alternatives to zero emission trucks** that can help achieve carbon-neutrality by 2070.

Alternate fuels like CNG can help reduce operating costs (which have spiked due to rising diesel prices), but emits methane which is 28–36 times more potent than CO2 as a GHG gas. Even a tiny leakage during operation can undo the CO2 emission reduction it brings about.<sup>12</sup> This makes the battery and hydrogen fuel cell technology the potential alternatives towards achieving the net zero GHG emission target by 2070 as pledged at COP26.<sup>13</sup> In addition to this, the battery-electric vehicles are favourable for MHDOT segment as the ‘hydrogen fuel cell’ technology is still in a nascent stage of development. But the benefits of electric trucks will only increase as renewable energy becomes increasingly available to power vehicles.

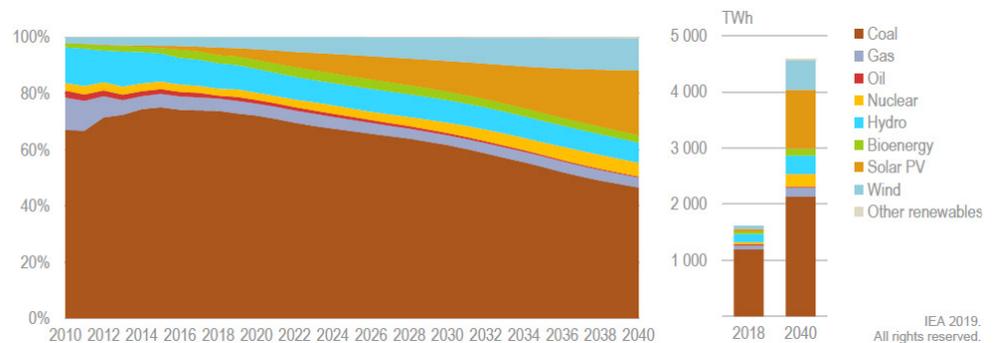
<sup>11</sup> pManifold analysis of data from [MDPI and Stakeholder Primary Consultation](#)  
<sup>12</sup> US Environment Protection Agency (EPA) – Green-House Gas Potential  
<sup>13</sup> Net-Zero by 2070 Pledge

# Electricity generation in India

India generated nearly 35% of grid capacity from non-emitting sources in 2021<sup>14</sup>. Even though coal remains the primary source of electricity generation, its share is declining over time, allowing for a reduction in emissions from the power sector, as shown in [Figure 11](#). In addition, the share of renewables is multiplying, thereby reducing the carbon footprint from the energy usage for charging e-trucks.

India possesses a substantial amount of untapped potential for solar energy. It is estimated that India's landmass receives over 5,000 trillion kWh of energy every year, with most of the country receiving between 4 and 7 kWh per square meter daily. It is possible to successfully harness the power of solar photovoltaics, which provides India with enormous scalability.<sup>15</sup> The draft electricity rules (Promoting renewable energy through green energy open access), 2021, also support the need for increased scalability of solar power. This policy now enables any consumer above 100 kW hour load, including residential societies, commercial complexes, or charging stations, to source green power from any source other than the local distribution supplier.<sup>16</sup>

**Figure 11: Electricity generation by source in India, historical and projected<sup>17</sup>**



Further, it can be inferred from the research that aggressive pollution control measures are easier to deploy in fixed power generation units than moving ICE vehicles. It follows that the electrification of the MHD market is essential to any programme aiming to reduce emissions from motor vehicles.

<sup>14</sup> Central Electricity Authority dashboard

<sup>15</sup> <https://mnre.gov.in/solar/current-status/#:-:text=India%20is%20endowed%20with%20vast,providing%20huge%20scalability%20in%20India.>

<sup>16</sup> <https://economictimes.indiatimes.com/industry/renewables/view-green-energy-open-access-rules-2022-is-a-good-start/articleshow/92173255.cms>

<sup>17</sup> Energy Policy review, India 2020, IEA

## Key takeaways

- There is favourable case for zero emission trucks due to high tailpipe emissions from MHDTs. However, electrification of MHDTs is still at a nascent stage as compared to other segments.
- Fuels such as CNG/LNG, biofuels, hydrogen, etc. will compete and determine the pace of adoption of EVs.
- Total emissions from e-MHDT will reduce with an increased usage of renewable energy in the grid.



# Examining trucking applications



**OUT OF THE 13 IDENTIFIED APPLICATIONS, PARCEL/FMCG/MARKET LOAD HAS LARGEST ON-ROAD TRUCK FLEET SHARE**

**45%**

**FOLLOWED BY PERISHABLE GOODS**

**18%**

**AND MILK/EDIBLE OIL TANKER**

**9%**

---

To set the stage for a discussion on MHDT use cases in India, this chapter approaches the profiles of several such use-cases along with their schematic classification.

## Parameterisation of MHDT use cases

Freight transport is extensively fragmented. It can be characterised in multiple ways, such as from the functional sense (from niche monopolies to severe competition), service sense (from single driver-owner to large professional 'carriers' fleets), operational dimension (across the country or specific routes or even local operation), and so on.

Primarily, freight transport can be distinguished based on the type of goods and distance, as depicted in Figure 13.

The selection of vehicles and storage is generally based on the following, as shown in [figure 12](#).

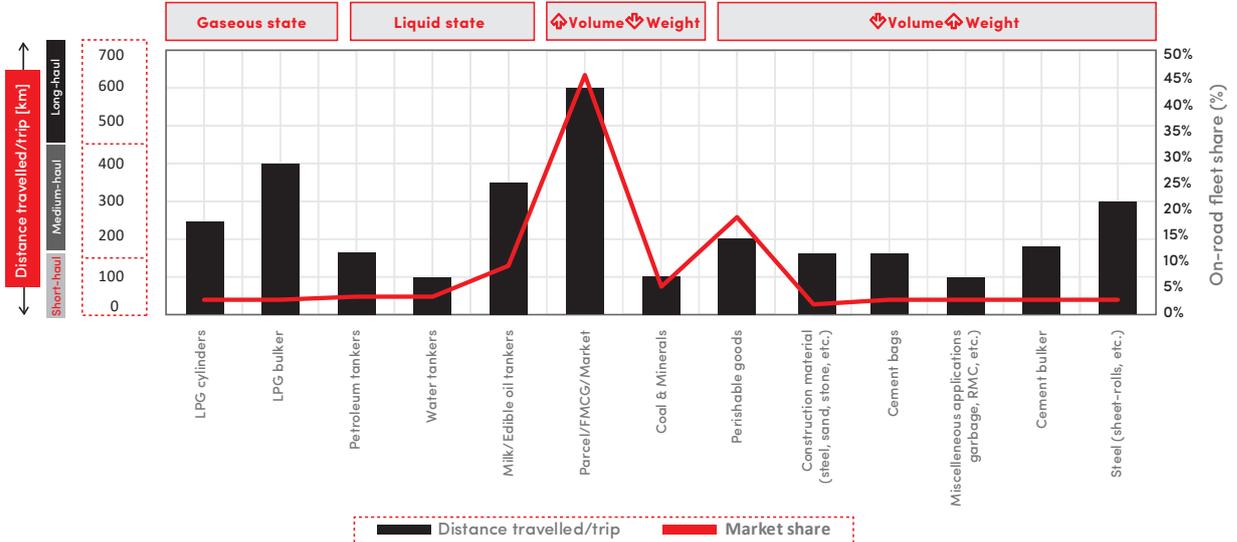
**Figure 12: Primary characteristics of freight transport**



## Segmentation of MHDT use cases

Based on the type of goods and distance that trucks typically travel, the study while examining a wide range of applications has broadly been categorised into 13 use-cases.

**Figure 13: Typical MHDT use cases in India**



The loading capacity of a road freight vehicle is limited by weight or volume, and the density of the load helps determine the goods type for a particular vehicle. This is broadly classified as:

- Gaseous state
- Liquid state
- High volume and low weight
- Low volume and high weight

Apart from this, freight movement can be well defined in terms of distance, payload and time-sensitiveness of delivery.

- **Short haul (0-150 kms):** movement of goods terminating within city boundaries
- **Medium haul (150-450 kms):** movement of goods within a region, state or metropolitan area
- **Long haul (>450 kms):** movement of goods across countries or states

In addition to the above classification of use cases, each application has definite and quantifiable parameters for electrification. Out of the broadly categorised 13 application, parcel/FMCG/market load has largest on-road truck fleet share (45%) followed by perishable goods (18%) and milk/edible oil taker (9%) as shown in [Figure 13](#).

## Profile of typical truck use cases in India.

### Parcel/FMCG/Market



- ✧ Carries regular/irregular shape of goods packages
  - ✧ Performs long-haul trip
  - ✧ Mixed density payload
  - ✧ Moderate overloading propensity
  - ✧ Medium speed of 40-60 kmph
  - ✧ High Corporate and government Influence
  - ✧ Contributes 15% in terms of CO2 share
  - ✧ Medium energy consumption from 0.7 kWh/km to 1.3 kWh/km
- 

### Perishable goods



- ✧ Deteriorates over a short time
  - ✧ Mix payload, time sensitive transportation
  - ✧ Lower overloading propensity
  - ✧ Perishable & fragile
  - ✧ High speed of 50-60 kmph
  - ✧ Traditionally unorganised market with low corporate or government influence.
  - ✧ Contributes 2% in terms of CO2 share
  - ✧ Medium energy consumption from 0.6 kWh/km to 1 kWh/km
- 

### Water tankers



- ✧ Permanently mounted tank for transporting water
  - ✧ More overloading propensity
  - ✧ Low speed of 20-35 kmph
  - ✧ Low corporate / government influence
  - ✧ Contributes 4% in terms of CO2 share
  - ✧ Medium energy consumption from 0.5 kWh/km to 0.9 kWh/km
- 

### Petroleum tankers



- ✧ Designed specifically for transport petroleum products in bulk
  - ✧ Highly regulated, dangerous and hence no overloading
  - ✧ Unloaded trips are common on the return
  - ✧ Medium speed of 45-55 kmph
  - ✧ High corporate and government influence
  - ✧ Contributes 4% in terms of CO2 share
  - ✧ High energy consumption from 1.2 kWh/km to 1.5 kWh/km
- 

### Milk/Edible oil tankers



- ✧ Mobile bulk container used to transport wholesale
  - ✧ Highly regulated and hence no overloading
  - ✧ Medium speed of 45-55 kmph
  - ✧ Medium corporate and government influence
  - ✧ Contribute 1.3% in terms of CO2 share
  - ✧ Medium energy consumption from 0.7 kWh/km to 1 kWh/km
-

### LPG cylinders & Cement bagsbags



- ✘ Transports goods from distributor to end-user (short and medium haul trips)
- ✘ More overloading propensity
- ✘ Medium speed of 45-60 kmph
- ✘ High corporate influence (Cement bags) and high government influence (LPG cylinders)
- ✘ Contributes 4% in terms of CO2 share
- ✘ Medium energy consumption from 0.6 kWh/km to 1.5 kWh/km

### Construction material (steel, sand, stone, etc.)



- ✘ Only used between mineral/quarry to bulk transportation centres
- ✘ Short haul trips
- ✘ Low propensity of overloading
- ✘ Low speed of 20-30 kmph
- ✘ Low corporate and government influence
- ✘ Contributes 3.5% in terms of CO2 share
- ✘ Medium energy consumption from 0.8 kWh/km to 1.3 kWh/km

### Steel (sheet-rolls, etc.)



- ✘ Generally medium to long haul trips
- ✘ Carries steel rolls, plates, sections and finished products (less volume, more weight)
- ✘ More overloading propensity
- ✘ Low speed of 20-30 kmph
- ✘ Medium corporate and government influence
- ✘ Contributes 11% in terms of CO2 share
- ✘ High energy consumption from 1.2 kWh/km to 1.75 kWh/km

### LPG bulker & Cement bulker



- ✘ Transports goods from factory outlet to distributors (medium and long-haul trips)
- ✘ No overloading
- ✘ Carry bulk goods
- ✘ Low speed of 35-45 kmph
- ✘ Medium corporate influence (cement bulker) and high government influence (LPG bulker)
- ✘ Contributes 6% in terms of CO2 share
- ✘ High energy consumption from 0.8 kWh/km to 1.3 kWh/km

### Coal & Minerals



- ✘ Only used between mineral/quarry to bulk transportation centres
- ✘ Short haul trips
- ✘ Low propensity of overloading
- ✘ Low speed of 20-25 kmph
- ✘ Medium corporate and government influence
- ✘ Contributes 3% in terms of CO2 share
- ✘ High energy consumption from 1 kWh/km to 1.3 kWh/km

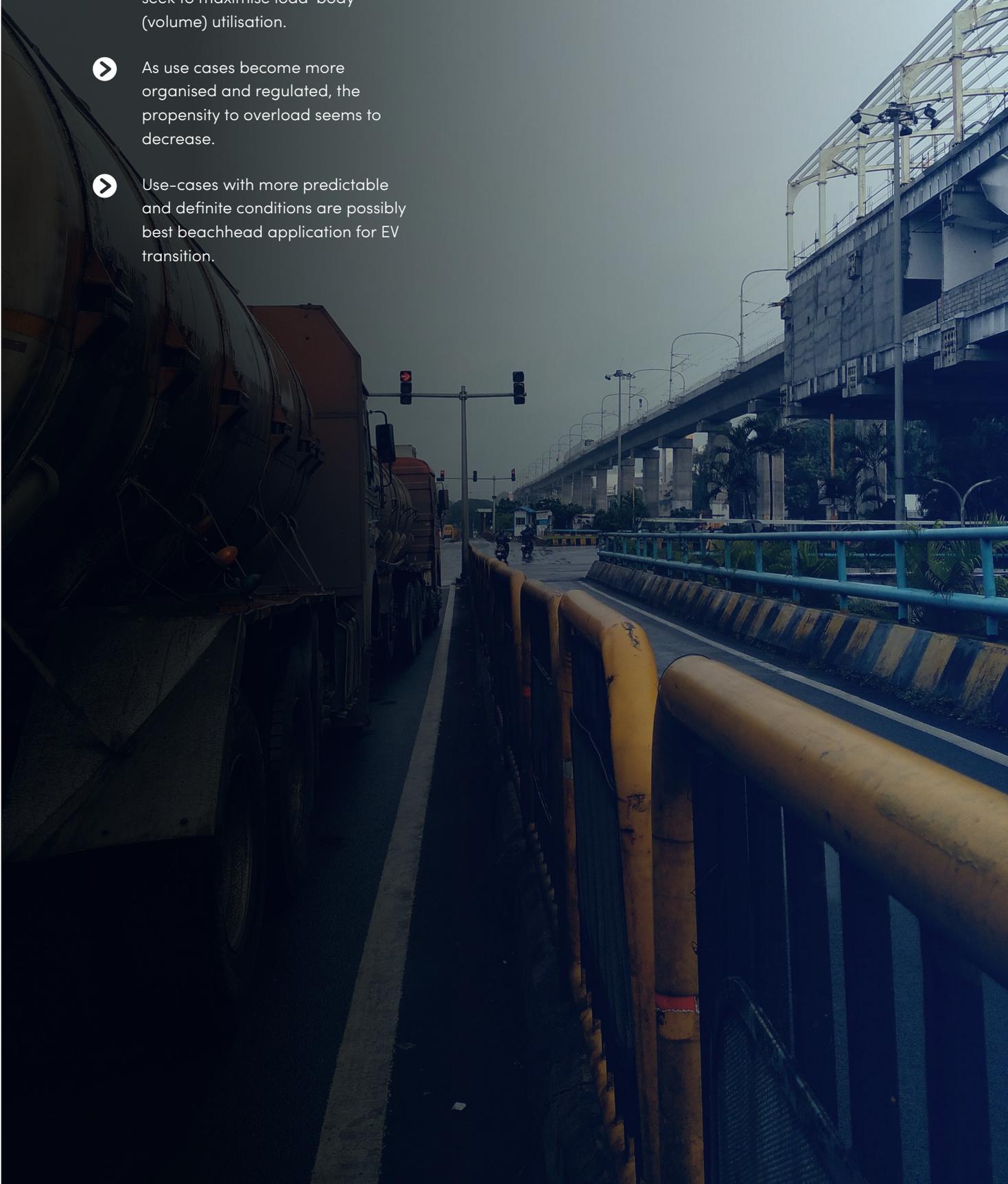
### Miscellaneous applications (garbage, RMC, etc.)



- ✘ Construction material/waste handling
- ✘ Generally short haul trips
- ✘ Low propensity of overloading
- ✘ Low speed of 20-30 kmph
- ✘ Low corporate and government influence
- ✘ Contributes 3.5% in terms of CO2 share
- ✘ High energy consumption from 0.8 kWh/km to 1.3 kWh/km

## Key takeaways

- The type of goods (weight & volume) & distance travelled are the two most important factors that determine the truck usage.
- Overloading seems to increase with density of payload, as operators seek to maximise load-body (volume) utilisation.
- As use cases become more organised and regulated, the propensity to overload seems to decrease.
- Use-cases with more predictable and definite conditions are possibly best beachhead application for EV transition.





# Policy and business actions in India

**The existing policy regime for ZEVs lacks focus on ZE-MHDTs. A conscious support from businesses and adequate policy push will significantly drive the large-scale deployment of electric MHDT in India.**

The existing policy and the regulatory ecosystem in the country will be examined, along with specific pre-set policies, targets and recent interventions. An implication of the regulatory framework is also reviewed through potential challenges and the enablers necessary for adoption of electric MHDT.

## **Policies and targets for MHDT electrification**

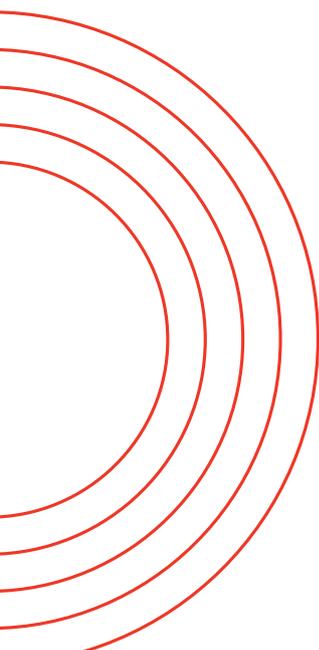
India has a portfolio of policies and supportive market trends that can accelerate the transition to effective, cost-efficient, clean and safe freight movement. [Table 3](#) provides a summary of the nationwide policies and targets for freight electrification till date.



**Table 3: Nation-wide policies and targets towards freight electrification**

1	<p><b>National electric mobility mission plan (NEMMP)</b></p>	2	<p><b>Faster adoption and manufacturing of electric vehicles (FAME I)</b></p>
<p>National mission provides the vision and roadmap for faster adoption and manufacturing of EVs.</p> <p>This policy was launched in 2013.</p>		<p>The scheme was launched by the Department of heavy industry (DHI) in 2015</p> <p>Demand incentives in the scheme are provided for LCV</p>	
3	<p><b>EV charging station policy by ministry of power</b></p>	4	<p><b>Faster adoption and manufacturing of electric vehicles (FAME II)</b></p>
<p>In 2018, the Ministry of Power (MoP) issued a notification stating that charging EVs is considered a service and not a sale of electricity</p> <p>MoP also released guidelines for charging infrastructure for long-range heavy-duty vehicles</p>		<p>FAME II offers incentives for e-Buses, 3W, 4W to be used for commercial purposes</p>	
5	<p><b>Bharat stage (BS) emission norms</b></p>	6	<p><b>National logistics policy</b></p>
<p>Bharat Stage emission norms are emissions standards set by the GOI to reduce criteria pollutant emissions from motor vehicles and improve vehicle efficiency. BS VI has been effective since April 2020.</p>		<p>Goal of the National logistics policy is to enhance the economic growth of India by making the logistics sector more efficient, seamless, and integrated. It also aims to drive down logistics costs as a share of GDP. The policy was launched in Sept, 2022.</p>	

The current status of policy & schemes received for electrification in MHDT segment has been summarised in [Table 4](#).



**Table 4: Policy and regulatory ecosystem for zero emission MHDT**

Category	Illustrative indicators	Generic ZEV framework (3-wheelers, Buses, etc.)	ZE-MHDT focus
<b>Government entities</b>			
Policy	Central policy	●	●
	State policy	14 notified state policies / 28 states	●
Regulatory	Regulations and standards governing ICE emissions	●	●
	Regulations and standards specific to electric vehicles	●	●
Willingness for budget provision	Incentive schemes - e.g., FAME 2	●	●
Pilots	Implemented / in-pipeline e.g., NHforEV, e-City buses, etc.	●	●
Awareness campaigns	Communication for EV awareness and usage guidelines	●	●
Capacity building	Product engineering, marketing and service	●	●
<b>Industry association</b>			
Demand aggregation	Focus groups within association and between associations	●	●
Standardisation	Requirement harmonisation, modular batteries, etc.	●	●
Capacity building	Product engineering, marketing and service	●	●
<b>Think-tanks and policy advocates</b>			
Policy advocacy	Policy recommendations with substantive analysis	●	●
Awareness campaigns	Communication for EV awareness and use guidelines	●	●
<b>Funding institution</b>			
Willingness for funding	Pilots and initiatives financed	●	●
Capacity building	Product engineering, marketing and service	●	●
<b>Overall</b>		●	●

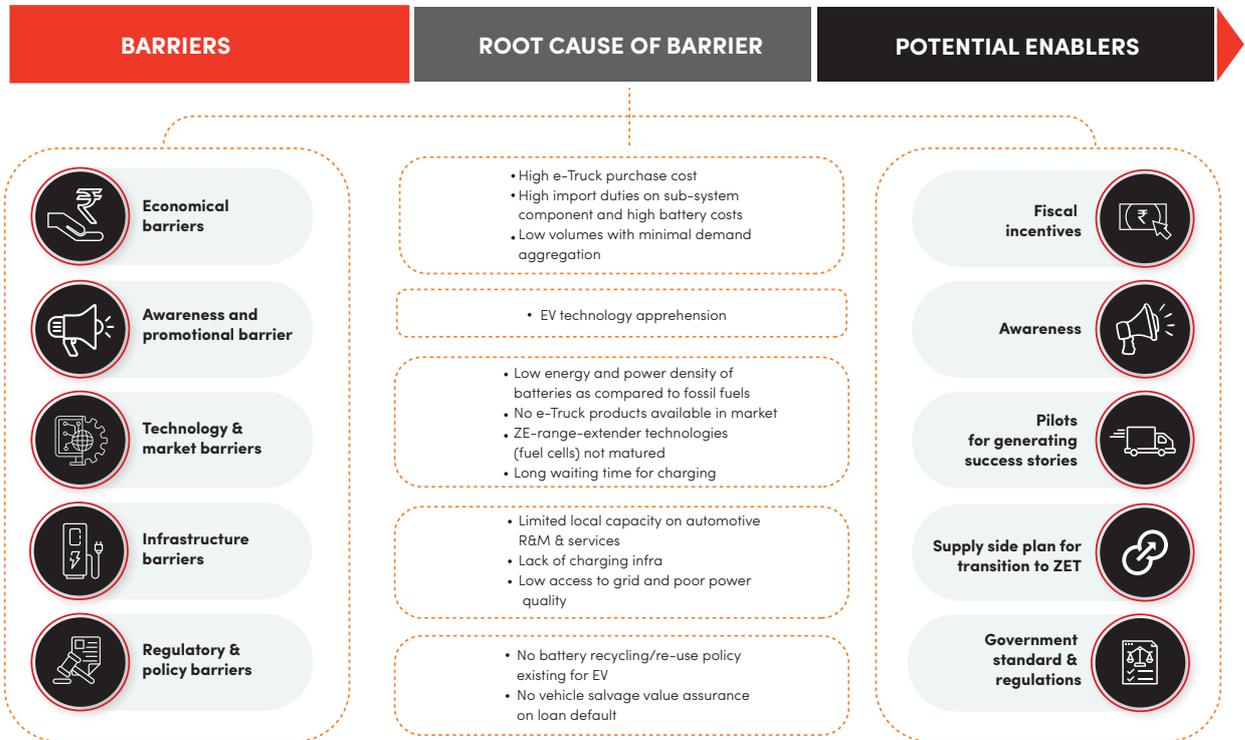
- Green - High regulatory support
- Yellow - Limited/Moderate regulatory support
- Red - No regulatory support

There is a lack of electric MHDT models in the market, mainly because of low demand and inadequate policy push. If MHDTs were included in the policy and regulatory framework by the decision makers, as described in Table 4, OEMs would be encouraged to spend more on R&D. This is expected to boost the introduction of electric MHDT models in the Indian market. Therefore, electrification of MHDT could be facilitated by the right policy push, potentially through its inclusion in FAME II or subsequent revision of the policy.

# Levers of transformation

Indian stakeholders need to shift toward a new freight paradigm that is more cost-effective, clean and efficient. The study has identified potential barriers and their root cause while taking stock of the entire value chain of e-MHDT in the process (from vehicle production to vehicle disposal).

**Figure 14: Identified barriers and potential enablers towards MHDT electrification**



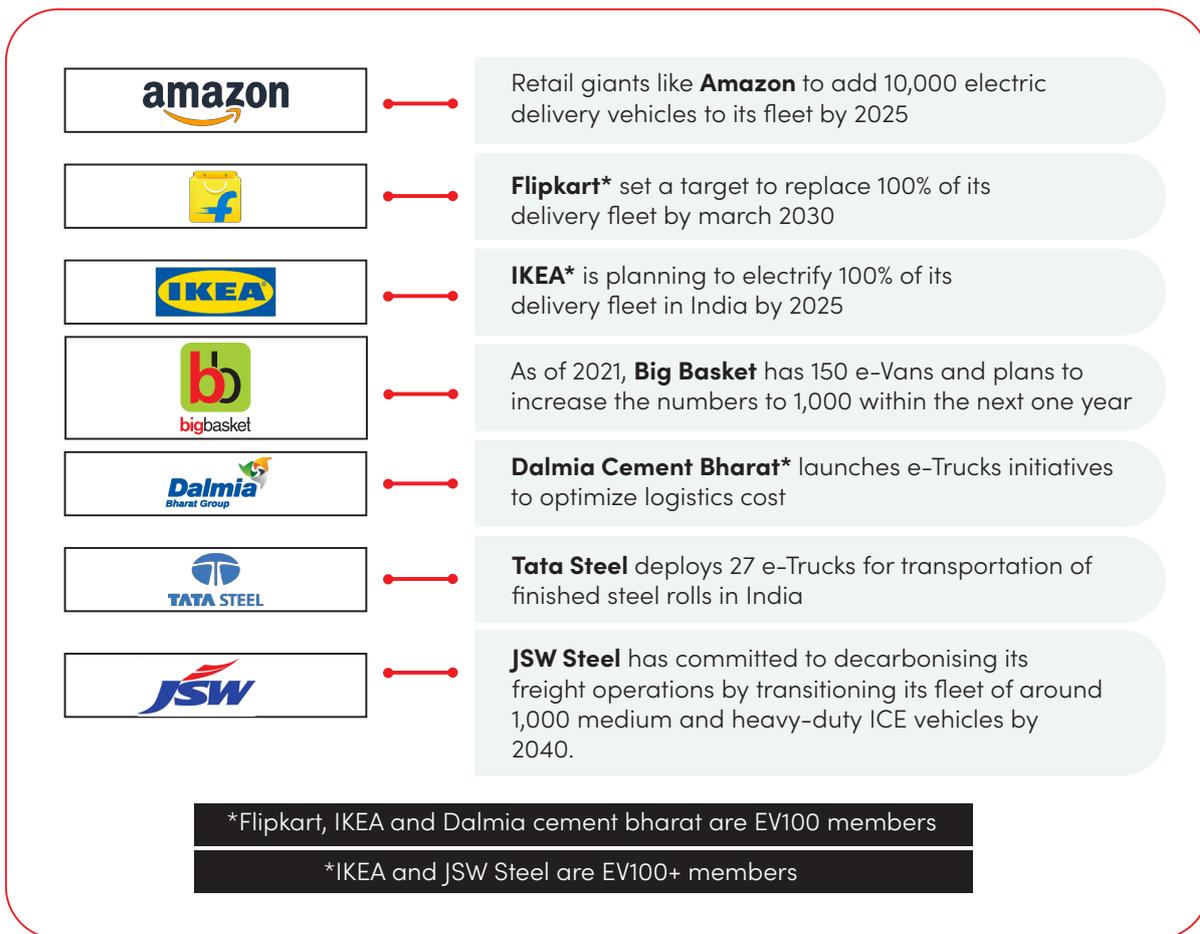
Scaled-up deployment of e-MHDTs can be stimulated by clear demand signals from businesses. This has been elaborated in the following section.

## Business initiative towards accelerated MHDT electrification

Early adoption of electric medium and heavy freight trucking is anticipated to be boosted by business adoption in demand and supply side companies, identical to the electric transition that is unfolding in the passenger segment.

Some prominent demand side companies aiming to support the electrification of MHDT are represented in [Figure 15](#).

Figure 15: Demand side business action



India has 1,640 operational public charging stations, out of which only 2% are fast charging stations. To increase the deployment of public charging stations across India, the Department of Heavy Industries has sanctioned 2,877 public charging stations in 68 cities across 25 states/UTs<sup>18</sup> as a part of the FAME II scheme. Capacity addition to the infrastructure is, thus, believed to instil confidence and encourage EV adoption among the buyers.

The automotive OEMs are slowly taking cognisance of the business case for the e-trucks in MHDT segment. BYD and TATA motors have launched few models in the MHDT segment and companies like Infraprime logistics technologies, Daimler, Olectra, etc. have planned to commercially launch e-trucks models in the upcoming years. There are many new age companies like EVage, ElectronEV, Kalyani Powertrain, and others that are foraying into the segment with fit-for-purpose platforms and retrofitting options.

# Global examples for building a supportive regulatory e-MHDT ecosystem<sup>19</sup>

A few examples are represented below to spotlight the various pathways for accelerating use of e-MHDT.

CALIFORNIA, USA

## Advanced Clean trucks rule and PG&E's EV fleet program

- California recently adopted<sup>20</sup> the Advanced Clean Trucks (ACT) rule mandating the truck OEMs to have a proportion of their annual sales through electric trucks from 2024
- This mandate has been envisioned to abate 17T (cumulative) CO<sub>2</sub> emissions incurring net cumulative benefits of more than INR 80,000 crore. Additionally, this will benefit the state through 5 lakh electric trucks adoption by 2040
- Many private sector organisations are deploying decarbonisation programmes in California. A notable example is Pacific Gas and Electric (PG&E), an electricity utility and distribution company. PG&E's EV fleet programme sets up charging infrastructure for MHDT, and establishes EV tariffs, especially for trucks, to help spur the adoption of EVs in the freight segment

OSLO, NORWAY

## Electric trucks – The Norway experience

- Pilot projects were undertaken to identify and test the feasibility and performance of 21 freight EVs for a period between 2016-2019
- The results favoured the freight EVs because of the associated low operational costs and pleasant driving experiences. It was also found to be four-five times less energy intensive than the ICE vehicles

<sup>19</sup> [Fast Tracking Freight in India, RMI, 2021](#)

<sup>20</sup> [Advanced Clean Trucks rule guideline](#)



## DELHI, INDIA

### **Deliver Electric Delhi**

- The Delhi government approved its EV policy in 2019. It aims to make 25% of new vehicle sales electric by 2024. To support the electrification of the freight segment, a coalition of 36 e-commerce companies & fleet aggregators announced the formation of a working group to launch a first-of-a-kind pilot - Deliver Electric Delhi - to electrify goods-carrier vehicles in Delhi

## SHENZHEN, CHINA

### **EV Policy in Shenzhen**

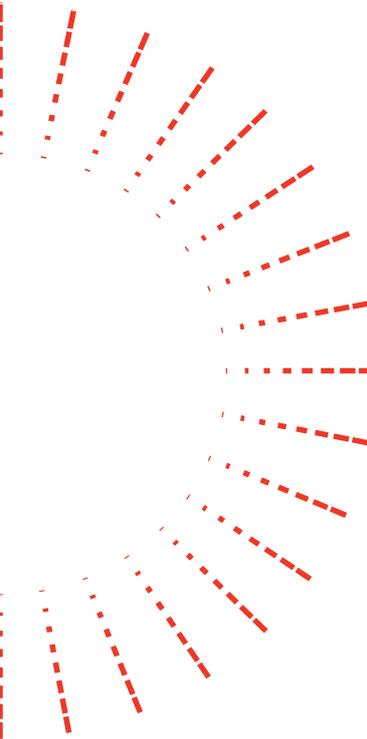
- Fiscal and non-fiscal incentives and other policy measures in Shenzhen include:
  - Upfront purchase incentives were offered by national and city government for Electric Logistics Vehicles (ELVs), helping achieve a purchase cost parity with ICE vehicles
  - Special road privilege limits the movement of ICE vehicles in the city areas & roads that were declared as green zones
  - EV charging subsidies are provided to charging companies
  - Mandates and targets were set by provincial and city administration. For example, around 30% of the parking space was provided for EV charging and installing EV chargers in all new commercial buildings

## Key takeaways

- Industry, consumer, manufacturer and regulator need to act together for building a roadmap in favour of net zero targets.
- Policy actions must encourage and facilitate businesses to consciously play their part in decarbonisation of MHDs. The policy enablers are also identified to promote this need for amendments in policies that push the businesses towards transition.
- Potential barriers to the transition vis-a-vis policy actions should be carefully addressed to avoid gaps in implementation.



# Conclusion



The transportation sector is responsible for nearly 14% of 'India's total GHG emissions and is growing exponentially.<sup>21</sup> Out of this, road transport accounts for over 90% of transport emissions in the country. Therefore, to reach carbon neutrality by 2070<sup>22</sup>, India needs to stimulate actions towards decarbonisation of road transport at a rapid rate. Electrification is a prominent strategy for undertaking decarbonisation, considering that India is already targeting electricity generation from renewable sources for a cleaner grid.

Substantial reduction could then be observed in both tailpipe and lifecycle vehicular emissions. This would further imply a maximisation of economic savings at the national level. Even though the efforts for electric transition in the passenger segment have been expansive, limited focus has been put in the MHDT segment. In India, MHDT comprises only 2% of the total vehicle population but contributes over 45% to the overall vehicular road transport emissions, which is disproportionately high compared to their share of the total vehicle population. Electrification is thus unparalleled against any initiative taken towards the elimination of vehicular emissions.

Evidently, three major drivers can support the e-MHDT market in India, as identified from consultations. The first driver is the total cost of ownership (TCO) for price sensitive markets like India. However, customers are becoming more educated about TCO like reliability and repair costs. This sort of thinking will shape the future. The second driver is the availability of robust infrastructure and support services (for example, charging, spare parts etc.). Thirdly, adoption will be enabled by the regulatory environment, which includes:

- Country-level emission regulations (for example, potential carbon dioxide fleet targets);
- Local access policies (for example, emission-free zones); and
- Simple import regulations (for example, low customs duties, declining state regulation) which will substantially ease market entry for foreign manufacturers.

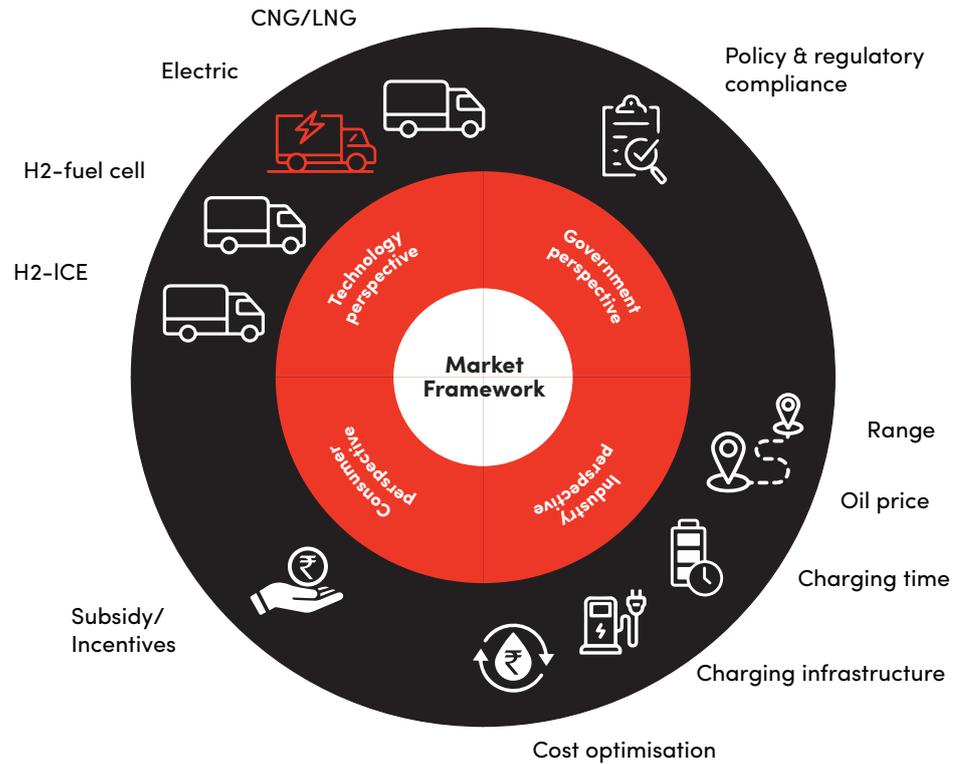
<sup>21</sup> [Decarbonising the Indian transport sector pathways and policies, 2020](#)

<sup>22</sup> [COP 26, Pledge](#)

Consultations with demand side operators of different use cases helped build an understanding of certain unique aspects of trucking in India.

Targeted action from government, innovators, consumer and industry can accelerate the transition to e-MHDTs, as shown in figure 16. Moreover, we anticipate that the actions must involve vehicle funding, infrastructure deployment and a regulatory framework. Active involvement of and coordination between all stakeholders will additionally aid the implementation of transition strategies in the MHDT segment.

**Figure 16: Integrated approach for MHDT electrification**



Hence, the early market outlook for medium and heavy-duty electric vehicle transition investigates the opportunity for MHDT electrification, its inherent advantages and identifies use-cases where the switchover to EVs can happen first with business support & influence. Furthermore, it provides a comprehensive review of the intricacies of India’s MHDT business laws, targets, existing interventions and underlying electrification challenges, while stating on the urgency for decarbonising MHDT.

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# Abbreviations

<b>ACT</b>	Advanced Clean Trucks
<b>ARAI</b>	Automotive Research Association of India
<b>BEV</b>	Battery Electric Vehicle
<b>BS</b>	Bharat Stage
<b>CAFE</b>	Corporate Average Fuel Economy
<b>CNG</b>	Compressed Natural Gas
<b>COP26</b>	Conference of Parties
<b>DHI</b>	Department of Heavy Industry
<b>EU</b>	European Union
<b>EV</b>	Electric Vehicle
<b>FAME</b>	Faster Adoption and Manufacturing of Hybrid and Electric Vehicles
<b>FCEV</b>	Fuel Cell Electric Vehicles
<b>FMCG</b>	Fast-Moving Consumer Goods
<b>GDP</b>	Gross Domestic Product
<b>GHG</b>	Green House Gas
<b>GOI</b>	Government of India
<b>GVW</b>	Gross Vehicle Weight
<b>HDT</b>	Heavy-duty Trucks
<b>HGV</b>	Heavy Goods Vehicle
<b>ICE</b>	Internal Combustion Engine
<b>IDT</b>	Intermediate-duty Truck
<b>IEA</b>	International Energy Agency
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>LCV</b>	Light Commercial Vehicle
<b>LDT</b>	Light-duty Truck
<b>LNG</b>	Liquefied Natural Gas
<b>LPI</b>	Logistics Performance Index
<b>LPG</b>	Liquefied Petroleum Gas
<b>LGV</b>	Light Goods Vehicle
<b>MDT</b>	Medium-duty Trucks
<b>MoRTH</b>	Ministry of Road Transport and Highways
<b>MoHIPE</b>	Ministry of Heavy Industries and Public Enterprises
<b>MoP</b>	Ministry of Power
<b>MGV</b>	Medium Goods Vehicle
<b>MHDT</b>	Medium and Heavy-duty Trucks
<b>MHDV</b>	Medium and Heavy-duty Vehicles
<b>MHI</b>	Ministry of Heavy Industries
<b>NBFC</b>	Non-Banking Financial Company
<b>NEMMP</b>	National Electric Mobility Mission Plan
<b>OEM</b>	Original Equipment Manufacturer
<b>OPEX</b>	Operating expenses
<b>RTO</b>	Road Transport Office
<b>SFO</b>	Small Fleet Operator
<b>T</b>	metric tons
<b>TCO</b>	Total Cost of Ownership
<b>USA</b>	United States of America
<b>ZE-MHDT</b>	Zero emission medium and heavy-duty trucks
<b>ZEV</b>	Zero emission vehicles

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बेटी बचाओ

डाक

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SAFE DRIVE

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SAFE DRIVE

# Annexure I

## Stakeholder mapping in MHDT



### DEMAND CREATORS

1. **Logistic companies** are organised players with large fleets of trucks transporting goods for specific applications only.
2. **Fleet operators** usually comprise individual (driver-owner), small and medium fleets of trucks, providing services to a variety of applications.
3. **Captive fleets**<sup>23</sup> are typically specialised trucks like petroleum/milk/edible oil tankers, coal handling trucks, LPG bulkers, ready concrete mix trucks etc., branded with corporate logos and exclusively hired for a specific purpose and customer.
4. **Truck owners and drivers** are the ones often interacting directly with the customers. They sometimes get business through their personal influence and credibility, although they do not create demand directly.
5. **Other demand aggregators** include goods manufacturers, construction contractors, e-commerce corporates, booking agents, fleet operators sharing their high demand with individual truck owners and even the logistic companies when their own fleet can't cater to the demand.



### SUPPLY SIDE

- a. **OEMs** are Indian and multi-national truck manufacturers who typically manufacture or source all the parts and assemble the truck ready for sale.
- b. **Truck body builders** purchase trucks with half-built cabins from OEMs. They then get the cabin and load body customised from a third party.
- c. **Truck subsystem and component suppliers** provide the design, development and manufacturing facility for major components (like gearboxes) for in-house OEMs. However, other sub-systems like suspension systems, steering systems, brakes etc., are sourced from local suppliers.
- d. **Fuel suppliers** are one of the prime influencers of policy and regulation in the ICE trucks segment. Implementation of any emission norms for ICE-powered vehicles depends heavily on the adequate supply of appropriate fuel across the nation.

<sup>23</sup> A captive fleet is a third scheme organization, a shipping company that is a subsidiary of a larger entity that moves its own cargo in a continuous stream.



## SUPPORT SERVICES

- a. Financing:** Apart from banks, non-banking finance companies (NBFCs) also finance the purchase of trucks. At present, this is the dominant mode of finance for the trucking sector though the interest rates charged by the NBFCs are higher than those charged by commercial banks.
- b. Insurance:** Most truck buyers have been insuring their trucks for the mandatory third-party liability only. But many individual truck buyers have been opting for comprehensive coverage, and this preference is now on the rise in larger fleets as well.
- c. Maintenance and repairs:** Many road-side repair workshops provide support services.
- d. IT services and other associations:** Truck tracking systems are fast catching up, particularly with the advent of e-commerce and digital retail chains. Other support functions like maintenance and payments are also getting digitised rapidly, particularly for large fleets.



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## GOVERNMENT AND REGULATORY BODIES:

Ministry of Road Transport and Highways (MoRTH) is mainly responsible for regulations and policies for the trucking industry. There are other departments like the Ministry of Power (MoP) for truck CAFE norms and the Ministry of Heavy Industries (MHI) for the EV subsidy framework, which are also major stakeholders. Most regulations are drafted by the Automotive Research Association of India (ARAI) and enforced by Regional Transport Offices (RTO).



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The Climate Change Organisation (The Climate Group) with Company Registration Number: 4964424 and Charity Registration Number: 1102909  
The Climate Group, Inc. is a U.S. registered 501(c)3 with EIN 43-2073566  
M/s TCCO India Projects Private Limited with Corporate Identity Number U74999DL2018PTC334187

