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Enabling a Just Transition for India's Truck Driving Partners Amid the Adoption of Zero Emission Trucks

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Citation

Jaideep Saraswat, Nikhil Mall, Varun B.R., Tushar Katiyar and Bhagyasri Kala. 2024. Enabling a Just Transition for India's Truck Driving Partners Amid the Adoption of Zero Emission Trucks. Vasudha Foundation

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EV Charging

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Abbreviation	Definitions
ADAS	Advanced Driver-Assistance Systems
BETs	Battery Electric Trucks
BEVs	Battery Electric Vehicles
ELDs	Electronic Logging Devices
GPS	Global Positioning System
HDT	Heavy Duty Trucks
HMDTs	Heavy and Medium-Duty Trucks
HoS	Hours of Service
HoW	Hours of Work
ICE	Internal Combustion Engine

Abbreviation	Definitions
ILO	International Labour Organization
MDT	Medium Duty Trucks
NDC	Nationally Determined Contributions
OEM	Original Equipment Manufacturer
OSH Code	Occupational Safety and Health Code
PMJAY	Pradhan Mantri Jan Arogya Yojana
PMJJBY	Pradhan Mantri Jeevan Jyoti Bima Yojana
PMSBY	Pradhan Mantri Suraksha Bima Yojana
PMSYMY	Pradhan Mantri Shram Yogi Mandhan Yojana
TNC	Transportation Network Company
ZET	Zero Emission Trucks

Executive Summary

The trucking sector plays a critical role in bolstering India's economy, with 70% of freight transport share overall and the logistics sector at large contributing to around 14% of the nation's GDP[1]. Currently, India is home to the world's fourth-largest truck market, with about 4 million trucks on the roads and projections suggest that the domestic freight demand will escalate from 2.2 trillion tonne-km in 2022 to 9.6 trillion tonne-km by 2050, necessitating rapid expansion of the sector[1]. This growth is driven by rising per capita income and the expansion of e-commerce and quick commerce, among other factors. However, for India to sustain its growth aspirations while staying on track with its Nationally Determined Contributions (NDC) and Net-Zero targets, it must prioritise the adoption of sustainable practices in the trucking sector like adoption of Zero Emission Trucks (ZETs).

While advocating for the transition of the trucking sector to ZETs, it is equally important to address a critical aspect: the truck driving partners who form the backbone of the industry. These driving partners face significant challenges, including difficult working conditions, long driving hours, and a lack of social recognition. This report outlines the essential measures required to ensure a Just Transition for truck driving partners as the sector progresses towards decarbonization.

A primary survey of truck driving partners by Vasudha Foundation highlighted crucial insights underscoring the need for a Just Transition. The survey showed that a large proportion of ZET driving partners are relatively young, with most under 38 years old, and 87% having at least a high school education. This contrasts sharply with Internal Combustion Engine (ICE) truck driving partners, where over 50% are either illiterate or have only completed primary school Eduction. Furthermore, about 37% of ZET driving partners benefit from employer-provided health insurance, and all hold permanent positions, marking a significant improvement compared to the 20% of ICE driving partners having access to health insurance or government programs. Encouragingly, 89% of ICE truck driving partners expressed a willingness to undergo training for ZETs.

Deriving from the key insights of the survey, a Just Transition Framework for truck driving partners was designed to minimize the negative impacts of ZET transition while maximizing opportunities, and ensuring that truck driving partners not only adapt to the technological changes but also experience improved livelihoods, working conditions, and socio-economic stability. The framework identified key shifts and their respective areas of impact on driving partners and provides targeted support measures, ensuring that the transition is both inclusive and beneficial.

The framework emphasises the importance of personal safety, health and wellness, social acceptance and gender equity. By focusing on the availability of opportunity, it aims to provide access to new job prospects and training. Additionally, it underscores the necessity of improving work conditions, thus enhancing job satisfaction and safety. Finally, strong policy support is essential for establishing fair regulations and incentives that promote a sustainable and inclusive workforce, ensuring that it creates equitable access to resources and opportunities presented by the ZET Transition.

In conclusion, a collaborative effort from the government, industry players, and fleet operators is essential to ensure a Just ZET Transition. This shift must prioritise the well-being of truck driving partners while delivering environmental benefits.

1 https://www.niti.gov.in/sites/default/files/2023-02/ZETReport09092022.pdf

01 Introduction

The trucking industry plays a fundamental role in India's economy, forming the backbone of logistics and goods transportation across the nation. Over 70 percent[2] of the domestic freight is catered to by road via trucks. Concomitantly, India is home to the world's fourth-largest truck market, with about 4 million trucks on the roads and a market that adds approximately 0.3 million new trucks annually[3].

As of 2022, the trucking sector catered to 2.2 trillion tonne-kilometres (tonne-km)[1]. By 2050, this demand is expected to increase by more than four times to 9.6 trillion tonne-km[3]. To ensure continued sufficiency in freight transport capacity, the trucking sector must correspondingly expand. Traditionally, this would involve increasing the number of trucks on the road. However, in light of climate change mitigation efforts and the high emissions associated with trucks, the sector must also implement decarbonization strategies.

Road transport is responsible for 90% of overall transport sector emissions which is deemed the third-highest emission-intensive sector in India. Within road transport, Heavy and Medium-Duty Trucks (HMDTs) account for 38%[4] of emissions despite representing only 2% of the vehicle population[5]. Thus, decarbonisation of the trucking sector emerges as a priority. Battery electric trucks (BETs), and Hydrogen Fuel-Cell trucks stand as viable alternatives to replace ICE trucks, with the former possessing a relatively higher level of technology readiness. For the trucking industry in India to continue expanding sustainably and mitigate emissions, a shift toward ZETs is essential.

At the forefront of driving India's freight are the truck driving partners, who play a critical role in moving India's economy. Typically, the life of truck driving partners is characterised by difficult working conditions in harsh environments. Figure 1 illustrates the factors that deem truck driving a tough and increasingly unattractive profession. The unorganised nature of the trucking sector renders truck-driving partners among the most vulnerable sections of India's workforce.

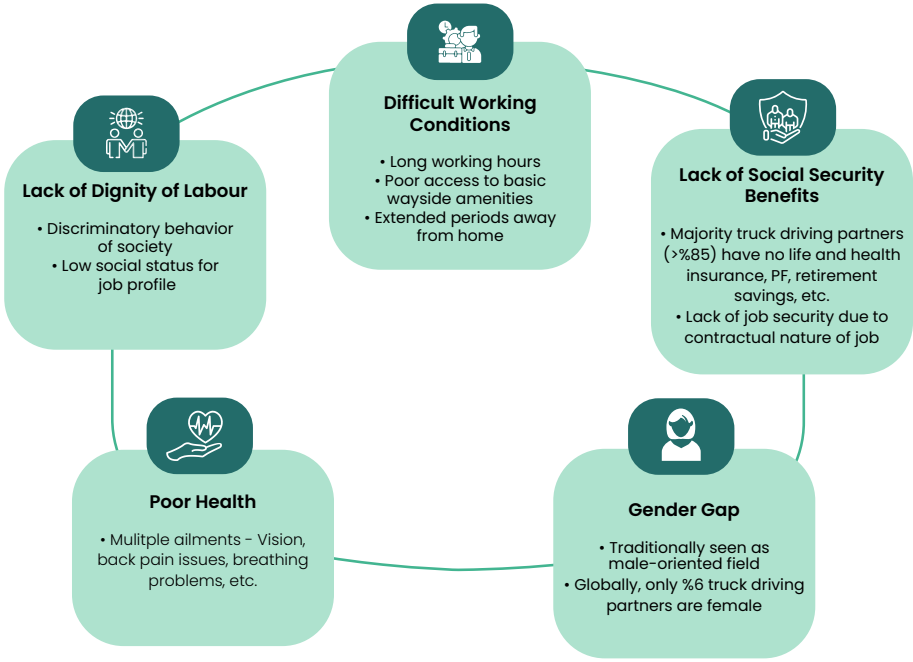


Figure 1: Challenges Faced by Truck Driving Partners in India[6]

2 https://www.climatepolicyinitiative.org/publication/just-transition-to-zero-emission-trucking-in-india/#:~:text=The%20report%20emphasizes%20the%20need,jobs%E2%80%94are%20not%20left%20behind.
3 https://vahan.parivahan.gov.in/vahan4dashboard/vahan/view/reportview.xhtml
4 https://www.researchgate.net/publication/350596826_Emissions_inventory_for_road_transport_in_India_in_2020_Framework_and_post_facto_policy_impact_assessment
5 https://www.theclimategroup.org/our-work/publications/early-market-outlook-report-electrification-medium-and-heavy-duty-trucks
6 https://logistics.gov.in/media/3ilbbqsu/deep-ppt.pdf

In the context of an imminent ZET Transition, it is necessary to ensure that the truck driving partners are provided with the necessary support. Further, with the projected increase in demand for trucks and, consequently, for driving partners, there is a need to improve their working and living conditions and redeem the trucking sector as an attractive profession. This report aims to unfurl the ZET transition, build appreciation for the key aspects of change concerning truck driving partners, understand the opportunities provided by the transition to improve employment conditions, and provide recommendations to ensure corresponding support.

Need to Transition to ZETs

Almost 70 percent of India's freight transport demand is met by the road transport sector via trucks[1]. Given the trucking industry's pivotal role in domestic freight movement, it is evident that it will play a vital role in realising India's ambitions of becoming one of the top three largest economies by 2025 and achieving a GDP of $5 trillion[7], with aspirations of becoming a developed country by 2047[8]. Concomitantly, it is projected that the number of trucks in India will quadruple by 2050[1].

ZETs refer to vehicles that do not emit exhaust gas or other pollutants from the onboard source of power, including under all operational modes and conditions. Beyond efficiency improvements and technological advancements such as telematics and intelligent routing, these vehicles have the potential to significantly reduce greenhouse gas emissions and improve air quality. Further, ZETs are critical from the perspective of securing energy security. India's oil import dependency is escalating and stands at around 89% as of FY 22-23[9].
Thus, from a carbon mitigation and energy security standpoint, ZET transition is imperative in the trucking sector. Moreover, transitioning to ZETs yields co-benefits beyond environmental considerations. It promises significant health benefits for both the general public and truck driving partners by reducing air pollution—a pressing issue in India, where ICE trucks are major contributors to harmful pollutants.

Importance of Just Transition in the Shift to ZETs

A Just Transition represents a comprehensive approach to navigating societal and economic shifts towards sustainability, particularly in industries heavily reliant on fossil fuels. It aims to minimize the negative impacts on workers, communities, and vulnerable populations while maximizing the positive outcomes of transitioning to a low-carbon economy. A Just Transition approach as the trucking sector shifts to ZETs must consider the operational viability of trucking organisations and the livelihoods of truck driving partners. It will resonate positively across the sector, assuring smaller organisations, their workforce, and associated communities that their conditions and concerns are taken into account. The goal is to foster an inclusive environment where the transition does not negatively impact these stakeholders, but rather uplifts and integrates them into the new green economy. Thus, there is a need to tailor policies and schemes to adequately support the stakeholders across the trucking value chain in India to undertake a Just ZET Transition.

7 https://pib.gov.in/Pressreleaseshare.aspx?PRID=1549454
8 https://www.investindia.gov.in/team-india-blogs/developed-india-vision-progress-towards-2047
9 https://www.mospi.gov.in/sites/default/files/publication_reports/EnergyStatistics_India_publication_2024N.pdf

02 Status of Trucking Sector in India

Road Freight Demand

The modal split of Indian freight transportation, is skewed towards the road sector, which comprises 70% of the total freight volume, as shown in Figure 2[1]. In contrast, rail, water, and air transportation are only 18%, 6%, and 6%, respectively[1]. This trend indicates India's position as one of the largest markets for road freight demand in the next decade[10].

Rising Demand for Trucks

Currently, the transportation of goods through roads is mainly accomplished by Heavy Duty Trucks (HDT) and Medium Duty Trucks (MDT), which account for 76 % and 21% of the total road freight demand respectively[1].

By 2050, HDTs are projected to dominate road freight transport, handling 83% of the total and transporting approximately 8.4 trillion tonne-kilometers of long-haul goods[1]. Meanwhile, MDTs will continue to play a significant role in short intrastate and regional freight, with a total of 1.2 trillion tonne-kilometers[1]. Figure 3 showcases the market trend of annual MDT and HDT sales from 2000 to 2024. While intermittent fluctuations are present due to exogenous factors like the COVID-19 pandemic, a strong positive trends can be observed.

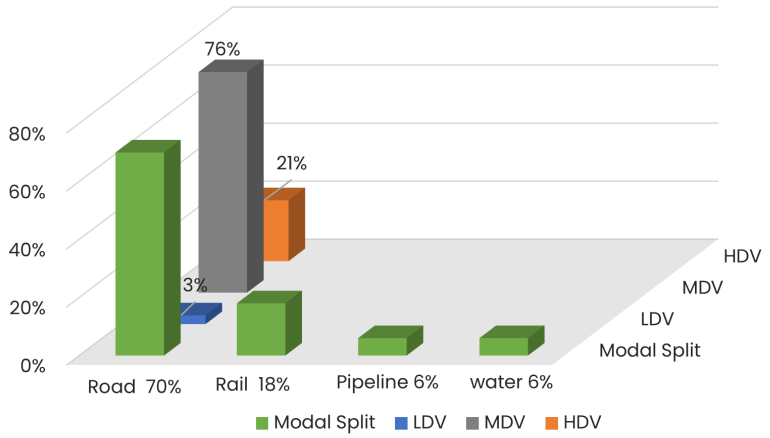


Figure 2: Modal Split for Freight Movement in India in 2022 (% of tonne-km)[1]

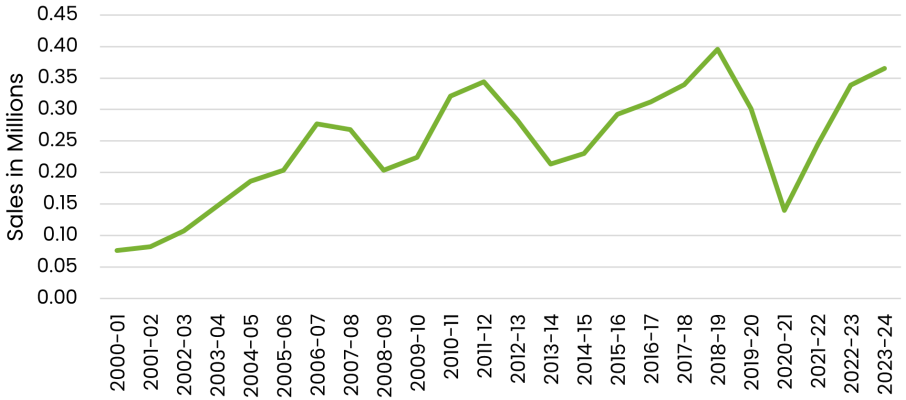


Figure 3: MDT and HDT Sales in India from 2000-24[11]

10 https://www.weforum.org/press/2023/07/world-economic-forum-and-partners-to-develop-first-zero-emissions-road-freight-cluster-in-india
11 https://vahan.parivahan.gov.in/vahan4dashboard/

03 Present Day Truck Driving Profession

The truck driving profession is an essential part of the global supply chain, functioning as the backbone of the freight sector. However, it currently faces numerous challenges, including acute driving partner shortages, difficult working conditions, long working hours, an aging workforce, and a lack of social recognition. These factors combine to create a challenging future for the profession. This section explores the main challenges and trends impacting truck driving partners worldwide, highlighting the urgent need for strategic measures to tackle these critical issues.

Key Challenges

Age Demographics

The truck driving profession is grappling with a significant demographic challenge, characterised by a declining share of young driving partners and an increasing proportion of aging driving partners. Currently, driving partners under 25 comprise less than 12% of the workforce, with figures dropping below 5% in Europe[12]. In contrast, driving partners over 55 account for a third of the total driving partner population in regions like Europe and the United States[12]. This demographic imbalance suggests that the industry is not effectively attracting young talent.

Lack of Social Security Benefits

In many Western countries, truck driving partners receive various social protections, including medical and dental coverage, retirement plans, overtime pay, and bonuses. Table 1 compares the employment benefits available to truck driving partners in different countries. In contrast, in India, most fleet operators are small-to-medium sized businesses, making up around 80% of the country's trucking fleet. These operators often work with thin profit margins, limiting their ability to offer similar benefits. However, truck driving partners from vulnerable or economically disadvantaged backgrounds can access government social security programs, such as:

- Pradhan Mantri Jan Arogya Yojana (PMJAY) for medical insurance,
- Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY) for life insurance,
- Pradhan Mantri Suraksha Bima Yojana (PMSBY) for accident insurance, and
- Pradhan Mantri Shram Yogi Mandhan Yojana (PMSYMY) for old-age security.

Despite these programs, their reach and effectiveness have been limited due to a lack of awareness among truck driving partners.

12 https://www.iru.org/system/files/IRU%20Driver%20Shortage%20Report%202023%20–%20Freight%20–%20Global%20Executive%20summary.pdf

Table 1: Employment Benefits for Truck Driving partners by Country[13]

Country	Employment Benefits	Remarks
United States of America	Employee Stock Ownership Plans, Referral Program, Fuel Discounts, Paid Time off, Life Insurance, and Dental Insurance	▪ Employee benefits provided by the employer. ▪ Widespread insurance schemes with comparatively high coverage, however dependent on providers.
Canada	Paid vacation, Paid Sick Leave, Medical and Dental insurance, short and Long-term Disability Coverage, and Pension Plan	▪ Employee benefits provided by the employer. ▪ Widespread insurance schemes with comparatively high coverage, however dependent on providers.
United Kingdom	Paid vacation, Paid Sick Leave, Medical and Dental insurance, Tuition Reimbursement, and Pension Plan	▪ Employee benefits provided by the employer. ▪ Widespread insurance schemes with comparatively high coverage, however dependent on providers.

Shortage of Truck Driving Partners

A recent study revealed approximately 3 million truck driving partner positions remain unfilled across the countries, representing 7% of total positions[12] . The shortage remains a persistent structural problem, with 55% to 75% of trucking companies facing severe difficulties in hiring qualified driving partners[12]. India, too, is facing a shortage with the truck-to-driving partner ratio dropping to around 55:100 compared to 75:100 a few years ago, according to industry insiders[14]. If these trends continue unaddressed, the trucking profession may face severe operational challenges, necessitating urgent measures to attract and retain driving partners.

13 https://www.researchgate.net/publication/375086870_Mapping_Vulnerabilities_of_Indian_Long-haul_Truck_Driving partners
14 https://timesascent.com/articles/nearly-a-third-have-suffered-age-bias-at-work-randstad/158738

Inadequate Health Conditions

Truck driving partners in India face significant health challenges due to the demanding nature of their work. Long driving hours, irregular schedules, and unhealthy lifestyle habits such as excessive alcohol and tobacco use contribute to various chronic health conditions, including heart disease, diabetes, hypertension, and musculoskeletal disorders[15]. A recent study found that 75.1% of truck driving partners had possible physical health conditions[16]. The high levels of air pollution on Indian roads also lead to polluted truck cabins, increasing the risk of chronic respiratory illnesses. A study found that the average black carbon levels inside truck cabins were at least 10 times higher than those in the outside environment, highlighting the significant impact this can have on the health of truck driving partners[17].

Psychological distress is also common, with nearly 60% experiencing symptoms and a notable prevalence of insomnia linked to job-related stress and security concerns[16]. Additionally, the growing effects of climate change, such as extreme heat, exacerbate heat stress and dehydration issues. Access to healthcare is also a major concern, as medical facilities are limited along national highways, resulting in a lack of health prevention and promotion programs[15]. These factors collectively pose a significant threat to the health and well-being of truck driving partners in India.

Gender Gap

The Indian trucking sector shows a noticeable gender gap, as it is traditionally seen as a male-oriented field. Social expectations and stereotypes often discourage women from joining, while financial difficulties, limited training opportunities, and childcare issues make it harder for them to complete driving partner training. The workplace culture can sometimes be less supportive of women, including unfair evaluations and uncomfortable interactions with colleagues or clients. Challenges like limited access to safe rest areas, and clean restroom facilities add to the difficulties women face. These experiences contribute to concerns about personal safety, making it more difficult for women to feel fully supported in pursuing or advancing a career in the trucking industry.

A direct result of the gender gap is the siginificant underrepresentation of women in the truck driving workforce, accounting for only 6% of driving partners, well below the overall transport industry average of over 10%[12]. Countries like the United States and China report slightly higher female driving partner participation rates, but the overall low percentage highlights a missed opportunity for diversification in the sector.

15 https://pphfglobal.org/wp-content/uploads/2023/01/Report-On-The-Study-Of-_The-Health-And-Well-Being-Of-Truck-Drivers-In-India.pdf
16 https://savelifefoundation.org/wp-content/uploads/2020/02/design-single-page-27th-feb-2020.pdf
17 https://www.nrdc.org/sites/default/files/driving.pdf

04 Understanding Just Transition for Truck Driving Partners

Truck driving partners often encounter highly challenging work conditions. These challenges include extended shifts that can lead to fatigue and limited social welfare benefits such as healthcare, insurance and retirement plans. They face social isolation, removed from their communities due to the nature of their work, which keeps them away from home for extended periods[13]. Many driving partners report spending little time with their families, leading to loneliness and difficulty in maintaining meaningful social ties. This isolation, coupled with negative perceptions of truck driving as a low-status job, discourages communities from considering truck driving partners for marriage.

The most significant long-term challenge truck driving partners face is the lack of upward mobility[20]. Although truck driving offers relatively quick earnings without requiring formal education or advanced skills, it doesn't help driving partners develop specialised qualifications, making it difficult for them to transition into other jobs. As a result, even driving partners with years of experience have little competitive edge over new entrants. This lack of professional growth, along with all the reasons mentioned above has contributed to a shortage of long-haul driving partners. These issues are driving high attrition, while the next generation is opting for less strenuous options like cab driving.

Thus, supporting truck-driving partners to adapt to ZETs is critical for the freight and logistics sector. Ensuring that this transition isn't solely about reducing emissions but also focuses on creating a resilient and just society for all is crucial. It's essential to view this transition as an opportunity to make truck driving a more attractive and lucrative profession, drawing in a new workforce and creating a ripple effect that benefits the entire ecosystem. To achieve this, it is necessary to put people at the centre of this transition. This is particularly important in the trucking sector, where the move from ICE trucks to ZETs must consider the socioeconomic impacts on those directly involved.

Further, the practices ingrained in truck driving partners will significantly shift as the trucking organisations transition to adopting ZETs. Some of the major shifts relevant to the truck driving partners are discussed below.

Operation and Maintenance of ZETs

Truck driving partners will face a learning curve with the operation and maintenance of ZETs, which differ significantly from traditional ICE trucks. Driving partners will need to adapt their driving patterns to manage the vehicle's range and plan for vehicle charging stops. Training will be necessary to understand the technical aspects and maintenance requirements of ZETs.

Moreover, the process of refueling a ZET differs from that of a traditional ICE truck. Driving partners must learn to identify suitable chargers and understand the longer time required for charging. Safe charging practices will be a critical aspect of the training.

Refueling Charges/Energy Tariff

In tandem with learning the method of refueling the ZET, truck driving partners will also be required to understand how the tariffs are calculated. Driving partners will need to learn about technical specifications of charging infrastructure, such as voltage and power, as well as tariff elements like Time-of-Day charging. Adhering to these criteria will support efficient fleet operations.

Changes to Driving Route/Pattern

While the truck driving partners might continue to operate between familiar destinations, the route taken might differ with a ZET. This is owing to the availability and location of the charging/refueling infrastructure. Further, the frequency of rest stops and their location might also shift for the driving partner due to range limitations. Thus, it is necessary to support the driving partner with appropriate telematics to locate the infrastructure, and ensure access to basic amenities such as toilets, and affordable eateries at these charging rest stops. This is critical to ensure adherence to the optimal routes and timely delivery of goods.

Vehicle Breakdown Protocol

Servicing and repair of ZETs requires skilled workforce. In the event that the vehicle breaks down in transit, the driving partner will necessarily be required to access a skilled service expert to diagnose the vehicle issue. In the nascent stages of the ZET ecosystem, breakdown protocols must be defined to ensure timely response for attending to the ZET. This may include incorporating service personnel to be stationed at charging facilities.

Considering all these factors, the transition to ZETs should not only be a technological shift but also lead to a more inclusive trucking sector in India. A Just Transition framework will ensure truck driving partners are supported and integrated into this transition, ultimately contributing to a more resilient and equitable industry.

05 Policy Ecosystem for Truck Driving Partners

As discussed in earlier sections, the trucking industry and its driving partners play a critical role in meeting India's freight transportation needs. Given their significance, it is essential to examine the policy ecosystem for truck driving partners in India.

The International Labour Organisation (ILO), a United Nations agency that addresses labour issues and international labour standards, plays a key role in setting global benchmarks for labor practices. The ILO emphasises the importance of safeguarding and advancing the fundamental principles and rights of road transport workers. These principles are outlined in various ILO conventions and recommendations, which are expected to be upheld by governments, employers, and workers' organisations[18].

Trucking Regulations and Definitions - ILO

One of the ILO's key conventions, Convention No. 153[19], sets limits on working hours and mandates rest periods for road transport workers. It aims to ensure better working conditions, health, and well-being for truck driving partners. Additionally, ILO Recommendation No. 161[20] provides further guidance on implementing these standards. According to the convention, truck driving partners are allowed to drive a maximum of 9 hours per day and 48 hours per week, averaged over a 4-week period. Driving partners are required to take breaks after every 4 hours of driving and 5 hours of work. Off-duty time must be at least 10 hours per day, although this can be reduced to 8 hours twice a week, with an additional 24-hour rest period per week. Yet, ILO recommends limiting driving to a maximum of 8 hours per day and 40 hours per week.

ILO Convention No. 153 also holds both employers and national authorities responsible for monitoring and enforcing these regulations. It outlines the need for proper record-keeping of working hours and rest periods and encourages the adoption of modern supervision tools, such as Tachographs, to replace traditional methods.

Global vs Indian Regulations on Truck Driving Partner Work Conditions

Table 2 compares global and Indian regulations related to the working conditions of truck driving partners. In the Indian context, these regulations are comparable to, or even stricter than, those in many developed countries. While enforcement is gradually improving, there is still significant progress to be made. India can draw lessons from countries like the United States of America, Canada, and those in Europe, where the mandatory use of advanced technologies such as Tachographs and Electronic Logging Devices (ELDs) ensures strict compliance with duty record-keeping requirements[13].

18 https://www.ilo.org/resource/other/guidelines-promotion-decent-work-and-road-safety-transport-sector
19 https://normlex.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_INSTRUMENT_ID:312298
20 https://normlex.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:R161

Table 2: Regulations on Truck Driving Partner Work Conditions[13]

Country	Maximum Hours of Driving	Extendable Driving Hours	Maximum Hours of Work (HoW) per Day	Maximum HoW per Week	Frequency of Rest Stops	Off-duty (continuous hours)
India	8 hours	10 hours (out of 12 on duty)	12 hours	54 hours	30 mins every 5 hours	Not defined
United States of America	11 hours	13 hours (out of 14 on duty)	14 hours	60 hours/7 days, 70 hours/8 days	30 mins every 8 hours	10 hours (2 +7 hours sleeper berth)
Canada	13 hours (with atleast 8 hours off duty)	14 hours	14 hours	70 hours/7 days, 120 hours/15 days	30 mins every 8 hours	10 hours (2 +8 hours sleeper berth)
European Union	9 hours	10 hours	maximum 56 hours/week; extendable to 60 hours/ week with maximum of 48 hours/week in next 3 consecutive weeks (month period)	56 hours/week; 90 hours/2weeks	45 mins after 4.5 hours	daily rest of 11 to 12 hours (3 +9 hours); with an exemption of twice a week with minimum rest 9 hours;plus 45 hours weekly rest (can be reduced to 24 hours every 2 weeks)

Recent Labour Law Development in India

The Government of India has made significant efforts to simplify its traditionally complex labour laws. In recent years, substantial reforms have been undertaken to consolidate these laws, making them easier to navigate. As part of this process, the Motor Transport Workers Act of 1961, which regulated transport sector workers, was repealed, along with 28 other central labour laws.

Now, transport workers such as driving partners, conductors, and mechanics are covered under the Occupational Safety and Health (OSH) Code of 2020[21]. This new framework addresses essential aspects such as working hours, rest periods, wages, and health and safety standards. The OSH Code, 2020, applies to establishments with 10 or more workers and clearly defines the responsibilities of both employers and employees. Table 3 summarises the key provisions of the OSH Code specifically relevant to truck driving partners and their employers. However, as of October 2024, the new labour code is yet to be implemented[22].

21 https://labour.gov.in/whatsnew/occupational-safety-health-and-working-conditions-code-2020-no-37-2020
22 https://www.business-standard.com/industry/news/new-labour-codes-set-for-rollout-as-25-states-finalise-draft-rules-details-124101600376_1.html

Table 3: Key Provisions of Occupational Safety and Health Code India, 2020[21]

Category	Provision/ Regulation	Details
Hours of Work	Maximum Working Hours	The standard working hours are 8 hours per day and 48 hours per week.
	Overtime	Work beyond 8 hours a day or 48 hours a week is considered overtime. Overtime must be compensated at double the ordinary rate of wages and adequate rest.
Off-Duty Periods	Daily Rest	Truck driving partners are entitled to a rest period of at least 30 minutes after 5 hours of continuous work or 4 hours of continuous driving
	Weekly Off	A minimum of 24 consecutive hours of rest should be provided every week.
Rest Periods	Night Rest Periods	Special provisions may be applied for night shifts, ensuring adequate rest periods and intervals for night work.
Exemptions	Exemptions for Emergency Situations	In case of an emergency, exemptions may be made from the standard working hours, provided the driving partner is adequately compensated and allowed rest afterward.
Record Keeping	Maintenance of Registers	Employers are required to maintain records of hours worked, overtime, rest periods, leaves, and wages paid to truck driving partners.
Holiday	Compensatory holiday	If a truck driving partner is required to work on the day of rest subject to the condition that the worker does not work for more than 10 days consecutively without a holiday.
Leaves	Annual Leave with Wages	Truck driving partners are entitled to one day of leave for every 20 days of work performed in the such calendar year.
Health & Safety	Provision of Facilities	Employers must ensure the provision of adequate facilities for rest, drinking water, first aid, and sanitation at truck terminals or loading/unloading sites.
	Medical Examination	Regular medical examinations may be required to ensure the fitness of truck driving partners, especially those involved in long-haul transportation.
Workplace Conditions	Safe Working Environment	Employers must provide a safe working environment, including appropriate safety gear and adherence to road safety regulations.
India	Amenities	Provision of amenities like canteens, shelters, and restrooms at workplaces or along routes where driving partners are stationed.
Social Security	Social Security Fund	The appropriate government shall establish a fund to be known as “social security fund” for the welfare of the unorganised workers.

06 Insights from Truck Driving Partners Survey

Truck driving partners in our country are amongst the most vulnerable sections of our society[23]. A survey conducted by Save Life Foundation[16], which surveyed 1,217 truck driving partners, revealed that over 70% were dissatisfied with the inconsistency of their income, and also felt it was insufficient. Among the respondents, 53% earned between INR 10,000 and 20,000 monthly, and despite varying wage rates across states, most driving partners struggled to make more than INR 30,000 per month. Alarmingly, 93% reported not receiving any social security benefits, while 84% stated they would discourage their relatives from pursuing a career in truck driving.

In this section, we look into key insights derived from a primary truck driving partner survey carrried out by Vasudha Foundation. Aspects surrounding their working conditions, socio-economic status, climate change impacts, and outlook towards newer truck technologies were probed. Driving partners of conventional Internal Combustion Engine (ICE) trucks, as well as Battery Electric Trucks (BET), were surveyed. This exercise helps build context and aids in identifying the key areas that warrant intervention to ensure a Just ZET Transition for truck driving partners in India.

ICE Truck Driving Partners

In order to analyse the specific areas for improving work-life balance, it was necessary to understand key metrics concerning the truck driving partners. A comprehensive primary survey was conducted with truck driving partners across the country, covering a total of 274 participants surveyed between August and September 2024 across the states of Maharashtra, Madhya Pradesh, Uttar Pradesh, Punjab, Rajasthan, and Haryana. A few insights into the life of driving partners derived from the survey exercise are provided below:

Demography

Average Age of Driving Partners

The age of the truck driving partners is as shown in Figure 4. We observe that a majority of them (~60 percent) are below the age of 38 years. The average age of the driving partners is 37 years. This indicates that there are significant numbers of driving years left for the majority of the driving partners who will witness the ZET transition unfolding in front of them.

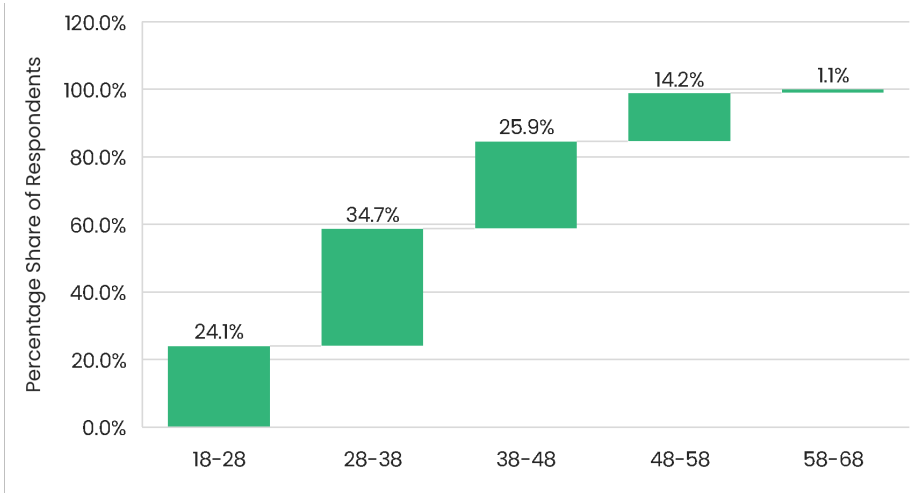


Figure 4: Age Distribution

23 https://indiankanoon.org/doc/51306147/

Level of Education

As observed in Figure 5, majority of the truck driving partners (86.8 percent) have received a minimum of primary school-level education. Around 30.3 percent of the driving partners have completed high school level (10th Standard) education, while a minor 13.1 percent have education exceeding high-school level.

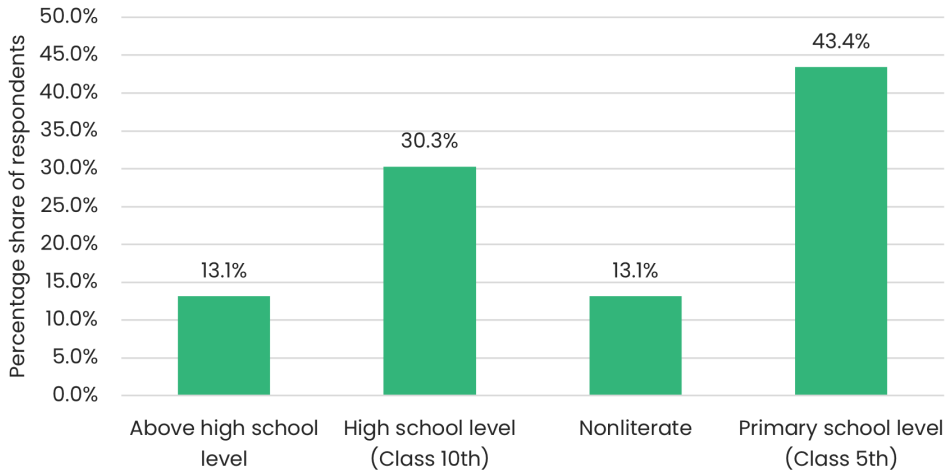


Figure 5: Level of Education

Driving Experience

On average, the truck driving partners have around 15.6 years of experience in the industry. Around 55 percent of the driving partners fall below the average driving experience (15.6 years) as observed in Figure 6.

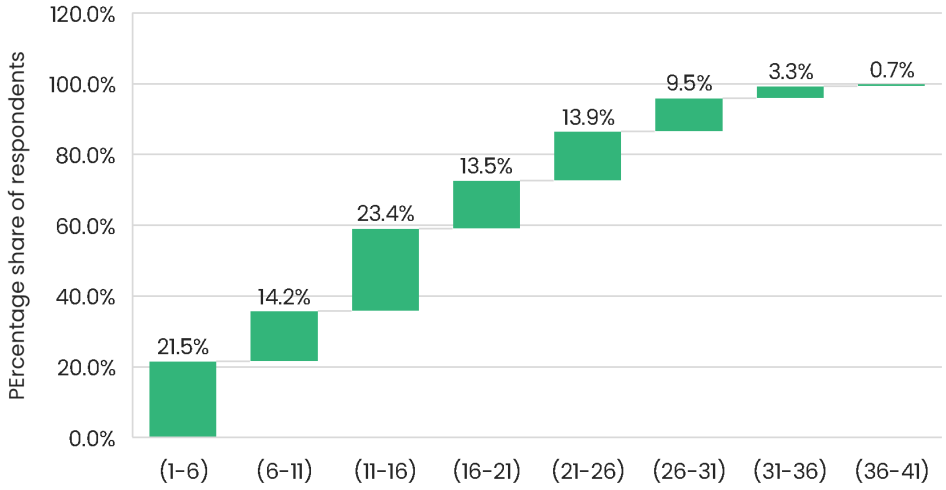


Figure 6: Driving Experience (in years)

Insights into Working Conditions and Socio-economic Status

On analysing the duration of association with their respective trucking organisation, we observe that nearly 64 percent of truck driving partners have been with their current employer for less than seven months, indicating they are relatively new hires. Only around 14 percent have been employed for over a year. This short average tenure points to the high attrition rate within the trucking industry and highlights the need for better employment conditions to enhance financial security and career growth for driving partners

Awareness on Government Health Schemes:

The focus was to gauge uptake of the PMJAY among the driving partners, which was extended to the transport industry for enrolment as beneficiaries. As observed in Figure 7, the majority of the driving partners (~ 80 percent) are either not aware of this scheme or have heard about it but have not applied for the same. As there are multitude of benefits of this scheme, it becomes important to create awareness and provide support to the driving partners to enroll for this scheme.

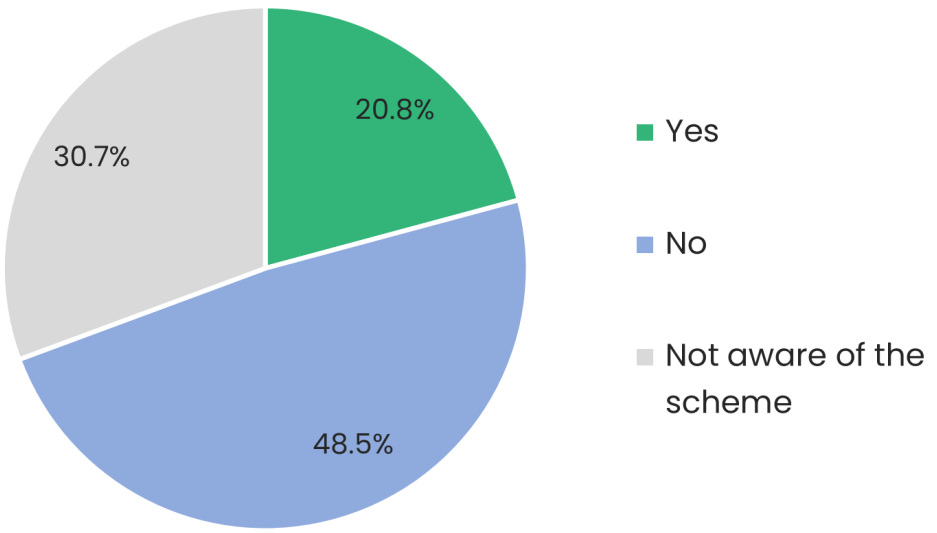


Figure 7: Awareness on PMJAY Scheme

Avail of Private Insurance

As observed in Figure 8, the majority of truck driving partners (78 percent) lack private insurance, leaving them highly vulnerable, as any incident involving them or their families could result in serious hardships. This highlights the urgent need to raise awareness among them about the importance of at least taking advantage of insurance schemes provided by state and central governments.

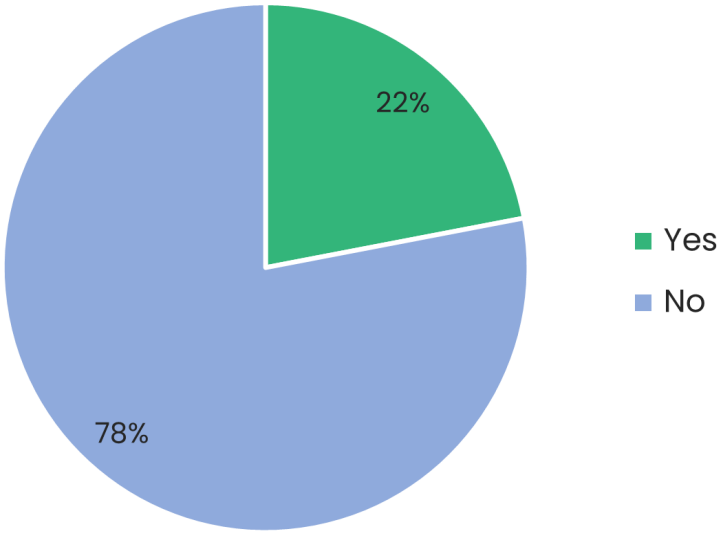


Figure 8: Avail of Private Insurance

Provision of Training in Trucking Industry: On analysing the responses, we observed that 51.8 percent of the truck driving partners received training for maintaining the truck. Further around 69 percent of the truck driving partners also received training for driving the truck. This highlights the importance of providing training for ZETs as well, when the transition takes place.

Frequency of Accidents: Though, the number of truck driving partners that faced accidents is relatively less (around 20 percent), it still emphasises the importance of transitioning to ZETs that come with new technology to avoid these accidents.

Impact of Climate Change: Truck driving partners are broadly aware of climate change and the impacts it has on them. The major areas where they have suffered substantially are the increasing temperatures and extreme heat in summer (~97 percent) as seen in Figure 9.

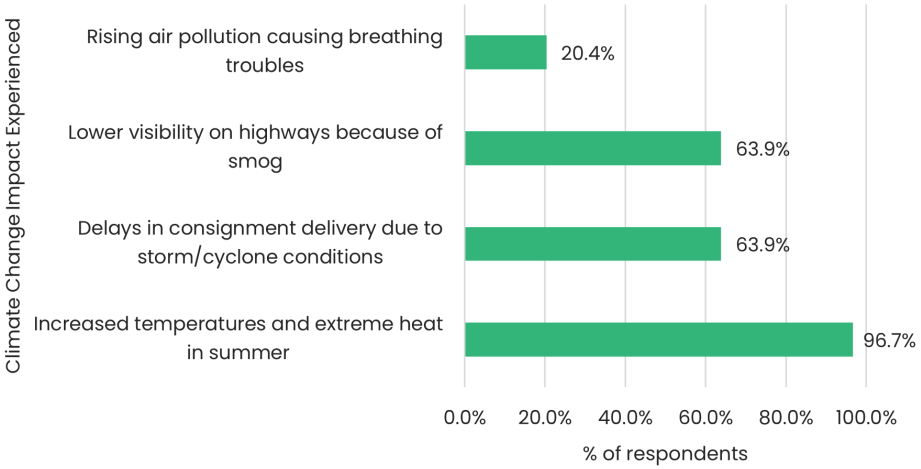


Figure 9: Experiences of Climate Change Impacts

Experience of Driving Automatic Transmission Vehicles: The majority of the truck driving partners (~89 percent) are unfamiliar with operating automatic transmission vehicles. ZETs will be automatic clutch vehicles. Though the effort to drive them is minimal, training must be carried out for them to learn to drive these vehicles.

Outlook towards ZET: Around 67.5 percent of the truck driving partners claim to be unfamiliar with zero-emission/battery-electric/hydrogen trucks. However, when informed about the significance of the ZETs and the imminent transition, more than 89 percent of the partners expressed their willingness and consent to undergo requisite training to adapt to ZETs.

ZET Driving Partners

A detailed primary survey was conducted with 41 driving partners across Punjab, Haryana, and New Delhi to gain a deeper understanding of the socio-economic impacts of fleet electrification. The following sections provide critical insights into the driving partners derived from the survey exercise.

Demography

Age Distribution

The demographic analysis of the ZET driving partners, as shown in the Figure 10 reveals that the majority of driving partners fall within a relatively young age range. Around 90 percent of the driving partners are of the age in between 21-36. A significant number of driving partners belong to the young age group 21-26, which represents about 45% of the total sample.

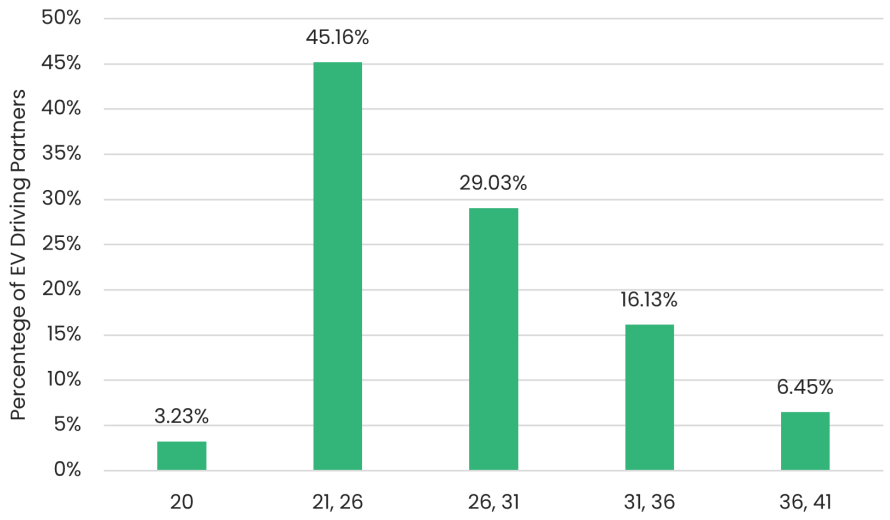


Figure 10: Age Distribution

Level of Education

A majority of the respondents - about 55% have attained education above high school level, as can be observed from Figure 11. About 32% have completed their education up to the high school level (Class 10th). However a small portion of the respondents, around 13%, only have a primary school education up to class 5th . This suggests that a significant portion of the ZET driving partners have a higher level of education, which may play a role in their adaptability to newer technologies like Battery Electric Vehicles (BEVs).

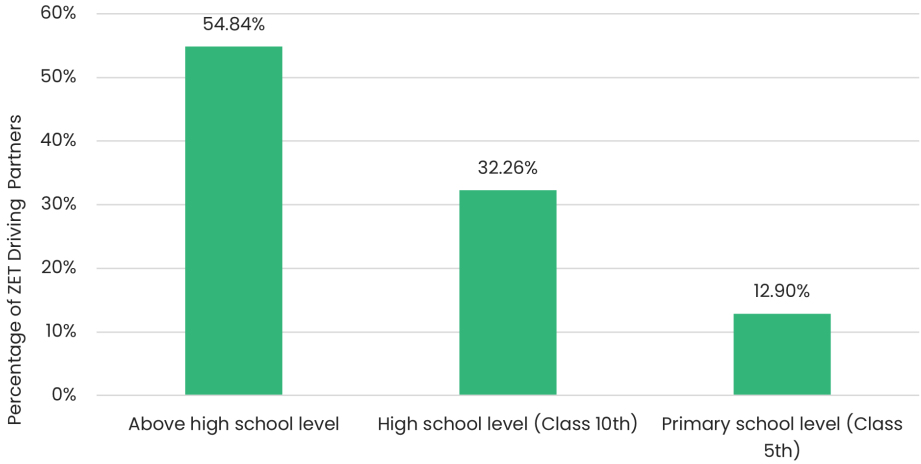


Figure 11: Level of Education

Employment Status

The employment status of the ZET driving partners surveyed indicate that nearly all respondents are employed in a full-time basis at the organisations. Around 96 percent of respondents are on a full-time basis, with the remaining on a contractual basis. If trucking organisations continue to retain ZET driving partners preferably as full-time employees, this will improve job security standards in this sector.

However, we would like to note that this may represent an early trend driven by

leading organizations that are pioneering the transition to ZETs through pilot programs.

Driving Experience

The driving experience of the ZET driving partners is as shown in Figure 12. The surveyed respondents' experience of driving an electric vehicle ranged from 0 to 4 years, with about 45% of them having about 6 months of ZET driving experience. Around 42 percent of respondents had ZET driving experience exceeding 2 years.

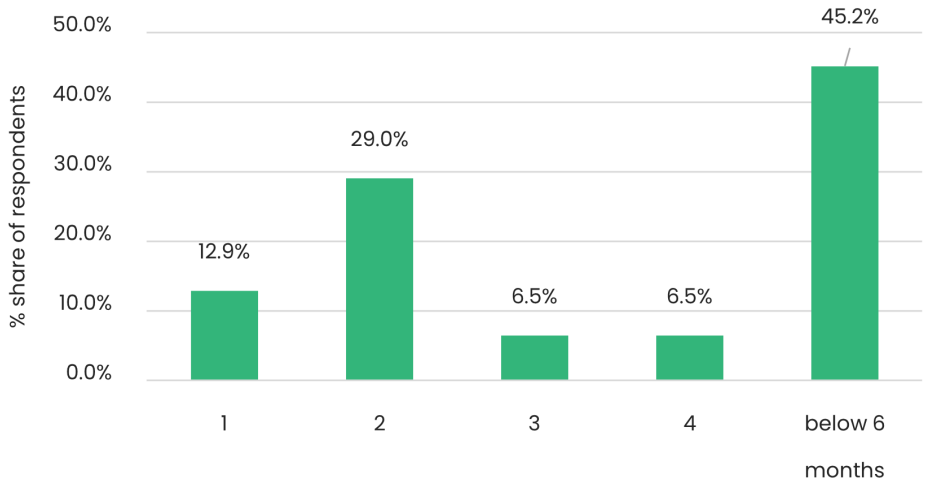


Figure 12: Driving Experience (in years)

Parameters Surrounding Working Conditions

Social Security

More than half of the electric truck driving partners in the survey had no social security benefits at all. 37% had availed health insurance through their employers, while a mere 4% had registered under the ESI scheme. This is a slight improvement on the results of the ICE truck driving partner survey results as shown in Figure 13.

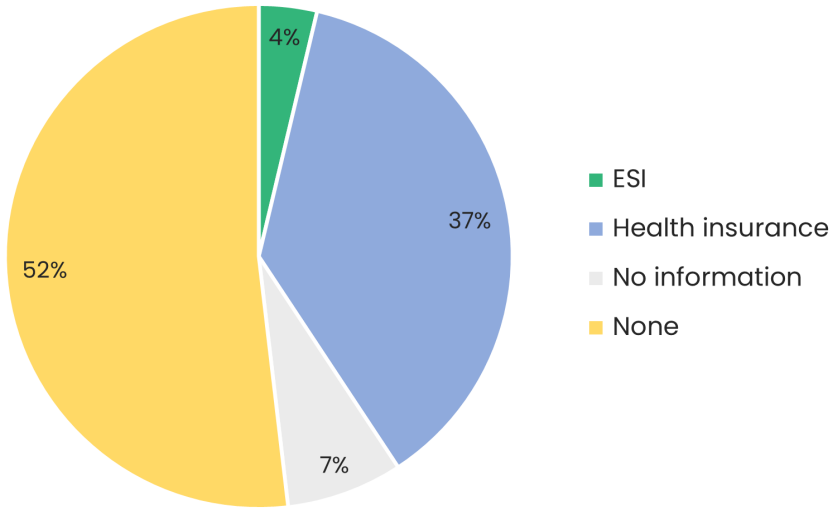


Figure 13: Status of Social Security Benefits

Training

87% of the respondents received some training before shifting to ZETs, as shown in Figure 14.

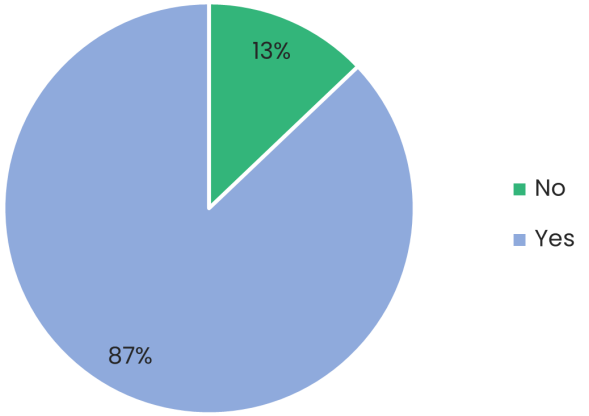


Figure 14: Training on ZETs

As shown in Figure 15, the majority of driving partners, around 87%, received their training from fellow driving partners. Around 1/3rd received it from their employer, with the remaining 15% receiving it from the Original Equipment Manufacturer (OEM).

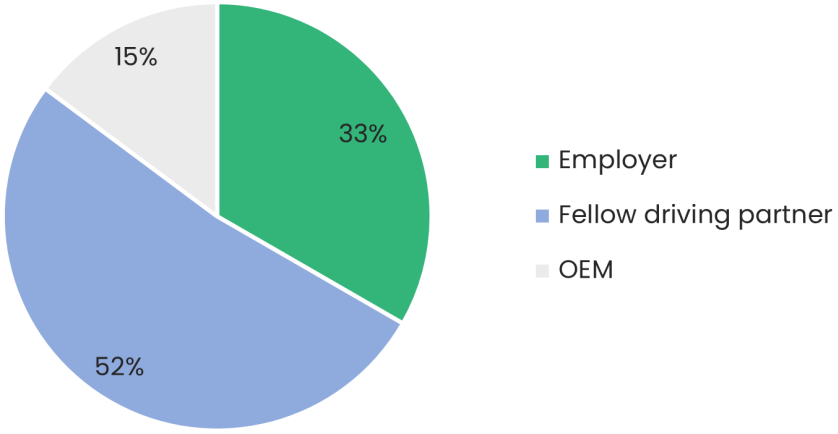


Figure 15: Source of Training

Vehicle Breakdown Protocol

Contrary to ICE trucks, the most common ZET breakdown protocol was towing it back to the warehouse after contacting the team lead at the warehouse, as shown in Figure 16. A separate maintenance team then would repair the truck, with no involvement of the driving partner.

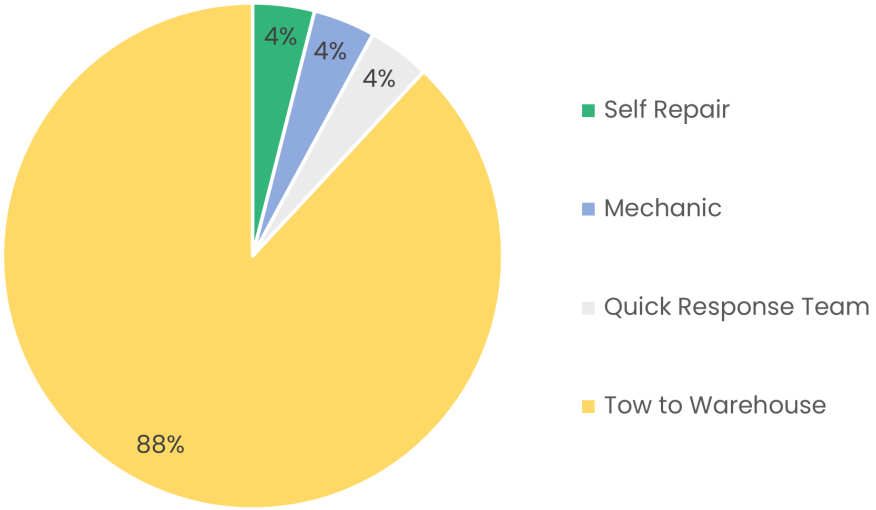


Figure 16: Common Breakdown Response

Climate Change Awareness

90% of the respondents agreed that ZETs are less harmful for the environment than ICE trucks. This is displayed in Figure 17.

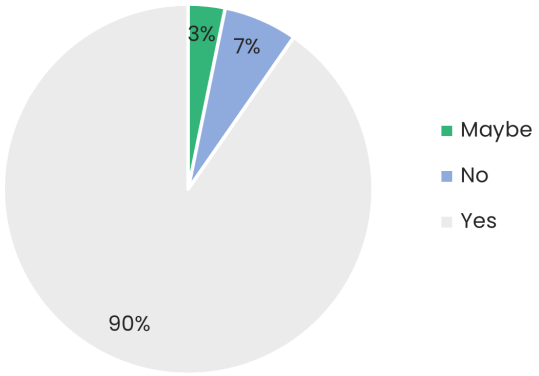


Figure 17: Perception of Environmental Impact

Improved air quality and reduced noise pollution in the cabin were two of the prominent reasons for this. Figure 18 and Figure 19 display that the majority of driving partners felt a difference inside the cabin pertaining to air and noise pollution after driving a ZET.

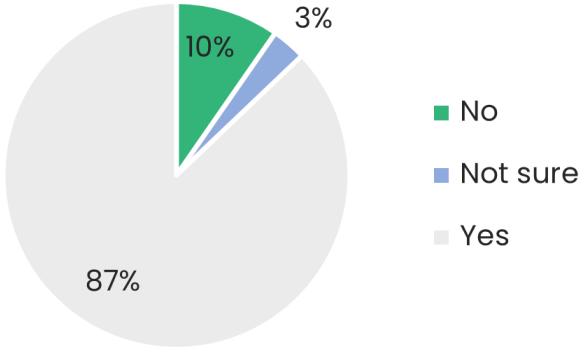


Figure 18: Perceived Improvement in Cabin Air Quality

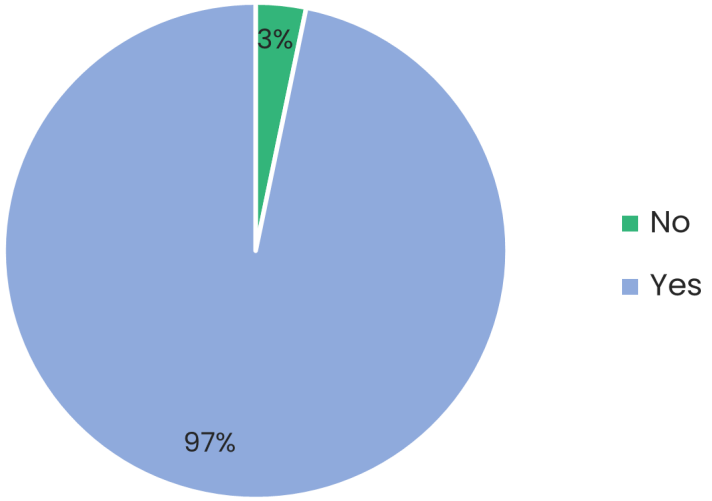
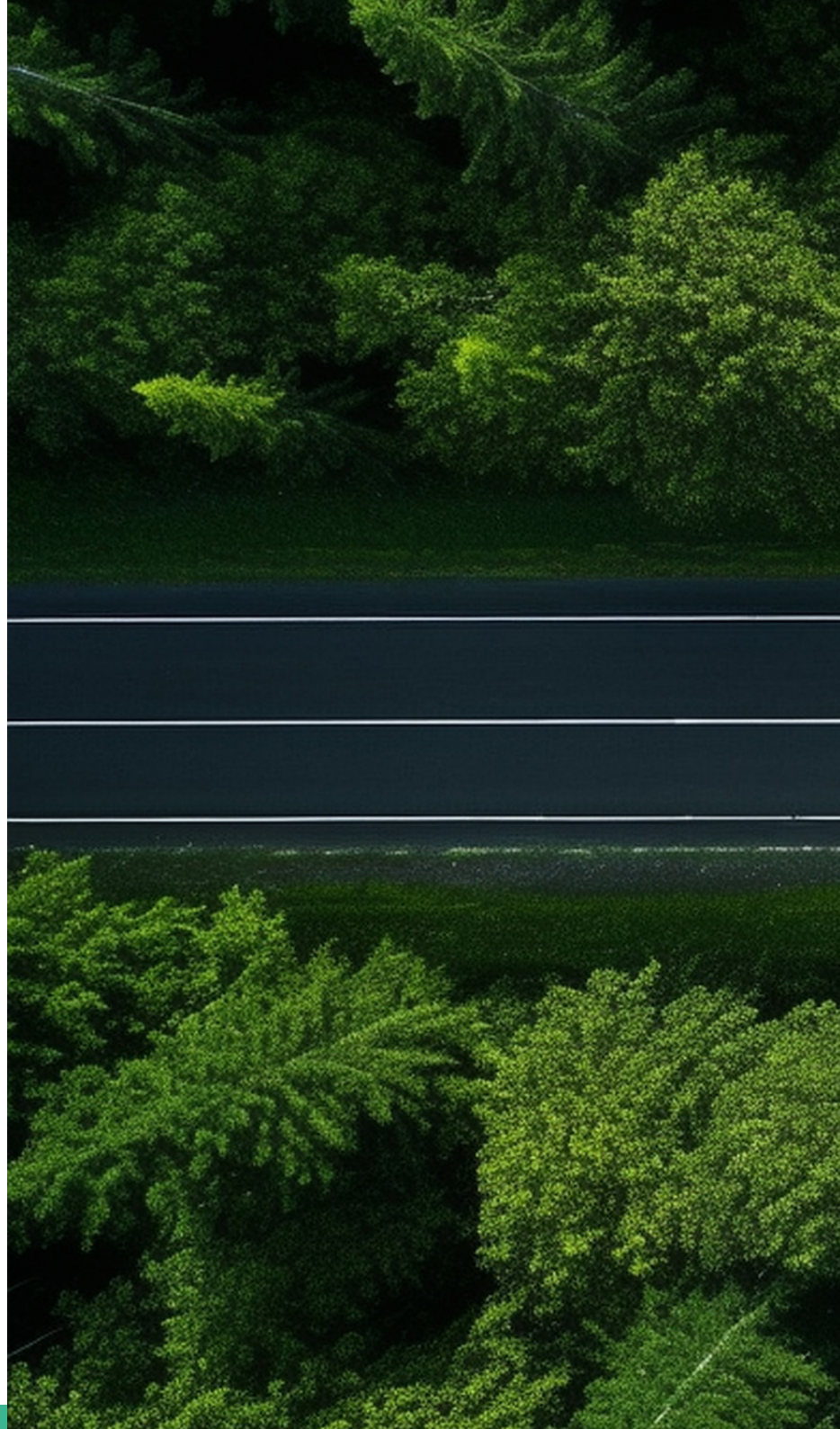


Figure 19: Perceived Improvement in Noise and Vibrations in the Cabin

Key Comparative Insights from Truck Driving Partner Surveys

- **Average age of Truck Driving Partners:** The survey indicates a relatively young demography in the ZET workforce with 45 percent falling below the age of 26 years. This is in contrast to the ICE truck driving partners where only 24 percent fall below the age of 28. This is an encouraging trend for the trucking sector, and is an indicator of ZETs' ability to attract young workforce to the sector.
- **Level of Education:** Cumulatively, the ZET workforce has a higher level of education with 54.84 percent having received above high school level education. In comparison, only 13.1 percent of the ICE truck driving partners have an education level above high school. Thus, the training support to be extended to truck driving partners must be curated to ensure that driving partners with relatively lower levels of education are not excluded.
- **Social Security Benefits:** Around 37 percent of ZET truck driving partners availed health insurance through their employers. This is an encouraging trend compared with ICE truck driving partners where employers do not provide health insurance, and only around 20 percent of them have enrolled in relevant government schemes. A Just ZET Transition will ensure higher social security coverage for truck driving partners, thereby improving the outlook towards the truck driving profession.
- **Outlook towards ZET:** 89 percent of the ICE truck driving partners expressed willingness to undergo training to adapt to ZETs. The benefits of shifting to driving ZETs are already gaining prevalence with 87 percent of truck driving partners claiming improved cabin air quality, and 97 percent claiming reduced vehicular vibrations with increased driving comfort. This insight illustrates stakeholder buy-in from the driving partners.



07 Reinvigorating the Truck Driving Profession Through ZETs

As captured in the earlier sections of the report, trucks are projected to quadruple to support India's growing economy, indicating a requirement for a larger workforce and potential increase in job opportunities. However, insights from primary surveys of truck driving partners convey a high level of dissatisfaction with the profession, attributed to difficult working conditions, and non-lucrative benefits. Further, the future workforce shows little interest in pursuing a career in truck driving. This reiterates the need to revamp the modalities associated with employment in this profession, to attract future workforce in this sector.

The push to transition to ZETs offers a chance to ensure a Just Transition for truck driving partners. It also provides an opportunity to improve the perception of the driving profession by establishing standardized working conditions, social security safeguards, and other key measures. Operating ZETs introduces new practices that can potentially enhance working conditions for driving partners, such as providing adequate breaks during charging stops. Additionally, as the charging/refueling infrastructure for trucks is developed, it can be required to include essential amenities for driving partners, especially at truck terminals, depots, and other key locations.

Furthermore, these improvements in working conditions could encourage more women to join the trucking workforce. The advanced technology of ZETs, with easier steering and maneuvering, further supports this goal. This section briefly explores the diverse opportunities linked to the transition to ZETs.

Improvements to Working Environment

Mode of Operation: ZETs are characterised by clutch-less automatic transmissions, smooth acceleration, and enhanced cabin environment. Truck driving partners typically suffer from chronic body aches due to the physical stress of operating manual transmission ICE trucks for long hours. The ease of operation of ZETs stands as a promising attribute which will improve the working duration of the driving partners.

Mode of Charging: The pattern of refueling vehicles, also influences the number of mandatory rest stops that the driving partner takes in a day. ZETs typically have lower ranges compared to ICE trucks, and the process of charging the ZET mandates the truck driving partner to halt for the concerned duration.

Integrated Charging Infrastructure Facilities: The business models of charging infrastructures are also diversifying[24]. Integration of wayside amenities provides essential facilities for truck driving partners to rest, eat, and use basic facilities that provide a comfortable and safe environment for truck driving partners.

24 https://indiasmartgrid.org/isgf/public/banner_img/1711436308yLYNF0T04vWbHqP320kZaIqTaV8SaqqJqvmP0p58.pdf

Improved Perception Towards Truck Driving Profession

The primary survey of ZET driving partners revealed a positive outlook and the impact it has on their working and social environment. The key tenets of improvement have been captured as follows-

1. 65 percent of the respondents claimed tremendous improvement in their working conditions and overall job satisfaction post switching to ZETs.

   Opportunity with ZET: The improvements to the working environment as detailed in the previous section has a positive impact on the truck driving partners. This can be attributed to the increasing recognition of the ease of operation as shown in Figure 20. Around 42 percent of the respondents prefer operation of ZETs. While a significant number of respondents highlight that there is no observable change in their driving experience, this is attributed primarily to their current intra-city nature of operation.

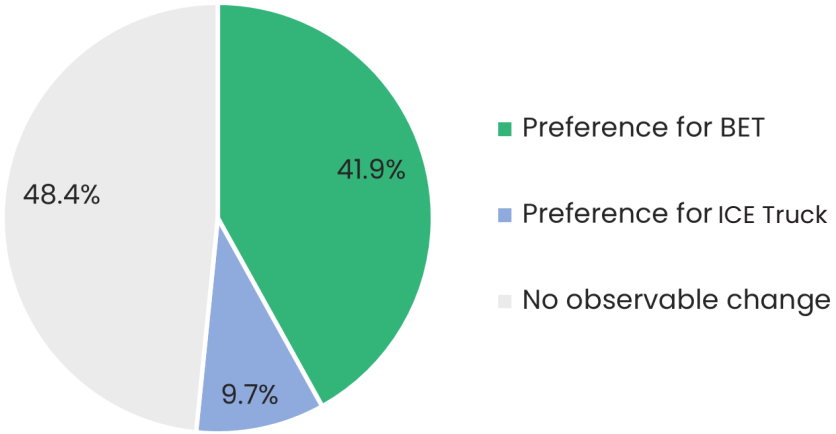


Figure 20: Preference for Truck Based on Performance and Handling

2. Around 50 percent of the respondents also expressed a preference for working hours prevalent under the operation of ZETs.

   Opportunity with ZET: The periodic mandatory breaks required by ZETs to charge the vehicle provides necessary driving breaks which reduce the physical stress of driving partners accrued over long driving durations. As shown in Figure 21, 64.5 percent of respondents reaffirm the increase in breaks experienced via switching to ZETs, and this indicates an encouraging trend as operations continue to scale. Further, with the integration of essential wayside amenities at the charging stations, overall working conditions of the driving profession are set to improve.

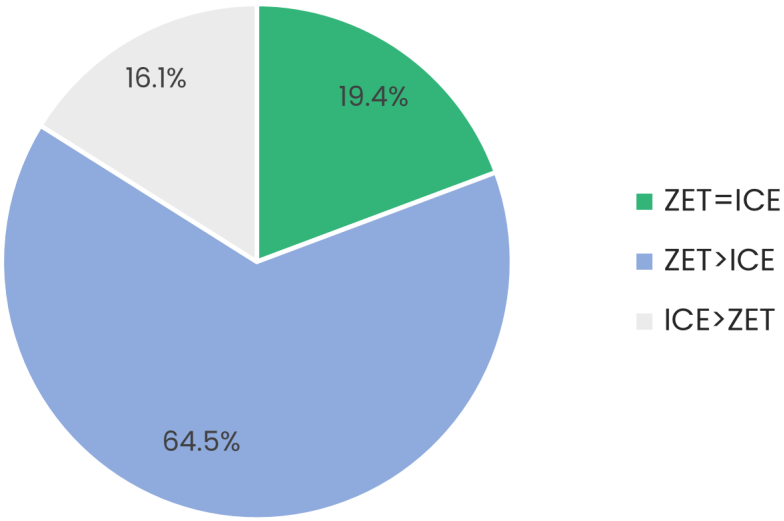


Figure 21: Comparison of Length of Breaks

3. 55 percent of truck driving partners believe that operating ZETs is safer when compared with ICE trucks.

Opportunity with ZET: Enhanced telematics and the technologically advanced handling of ZETs have led to a growing consensus among truck driving partners regarding the safety of these vehicles, as shown in Figure 22. This allays fears concerning road accidents and provides confidence to truck driving partners on-road. Further, this will have positive implications in attracting future workforce to this sector.

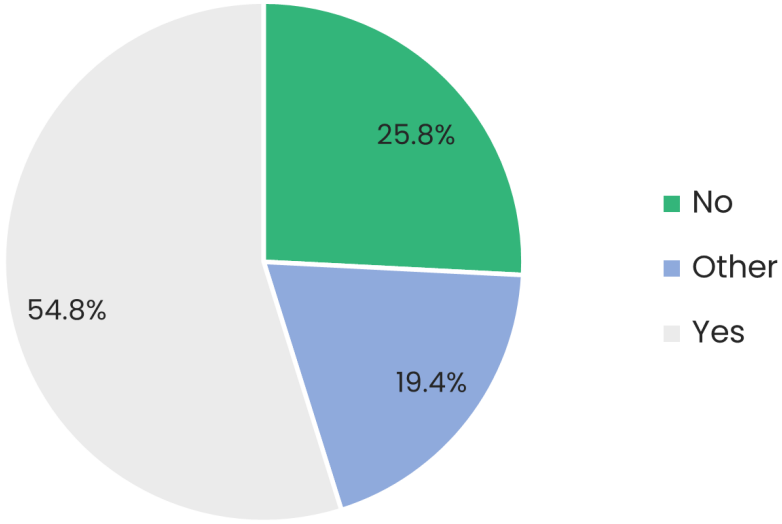
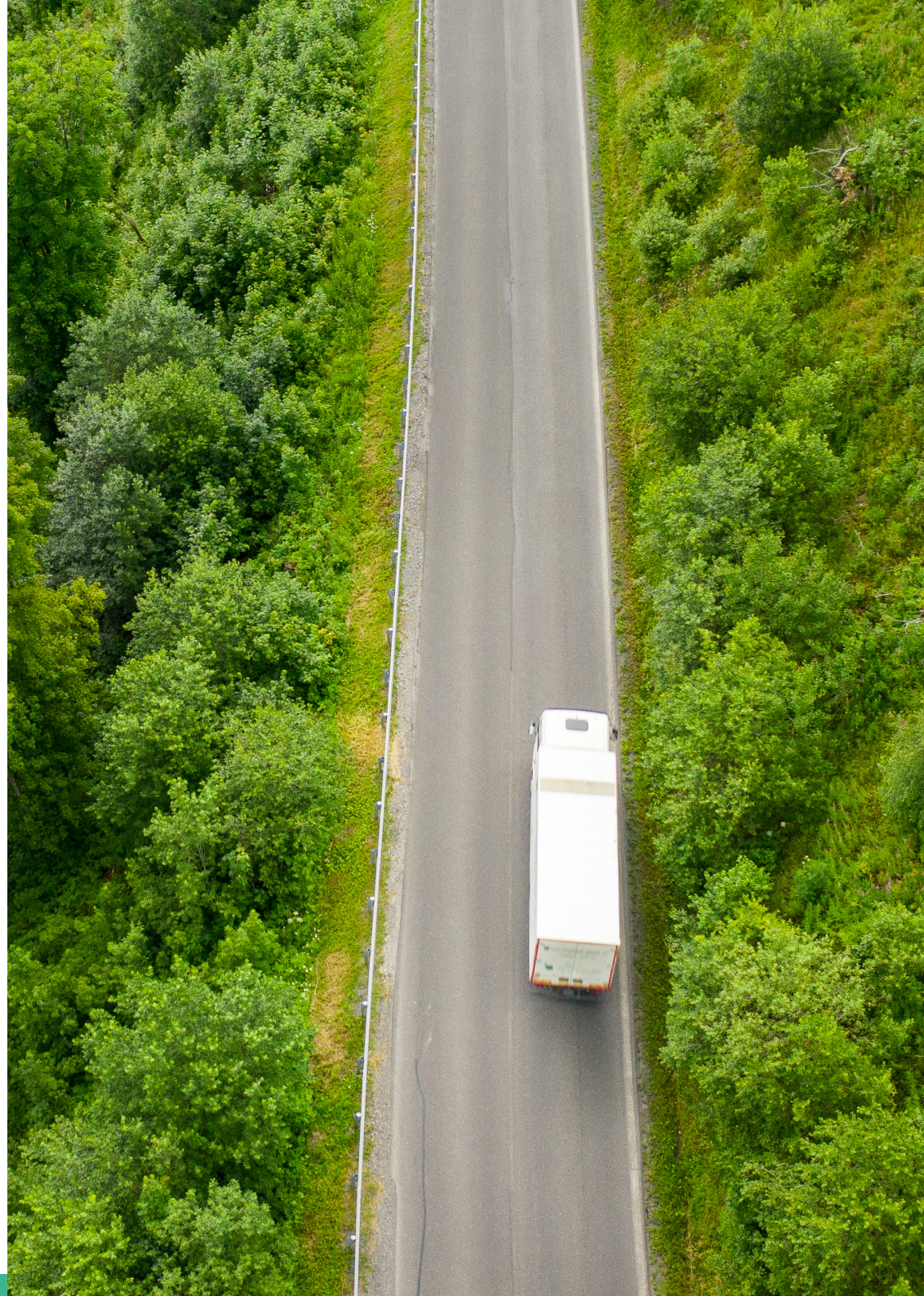


Figure 22: Share of Respondents Deeming Higher Safety in Operating ZETs Compared to ICE Trucks



Opportunities for Gender-Inclusion

The transition from ICE trucks to ZETs presents a unique opportunity to enhance gender inclusion in the workforce of the trucking industry. This transition allows for addressing the longstanding issues that have contributed to the sector's gender imbalance in a more comprehensive manner. By rethinking the work environment, facilities and supporting structures during this technological shift, the trucking industry can make strides towards creating a more inclusive and equitable workforce.

The EV Transition, alongside the need for highly skilled and experienced professionals such as design, software and manufacturing from the ICE trucks industry, is also catalysing the recruitment o of women in semiskilled workforce transport and logistics[25]. ZETs exhibit reduced physical demands and enhanced operational simplicity in comparison to traditional vehicles. A survey suggests that technology is rendering the EV sector more appealing to men and women especially advanced technologies like autonomous trucking and artificial intelligence[26]. Here are some advantages resulting from the ZET transition that support gender inclusion:

Reduced Physical Demands:

The smooth and effortless acceleration of electric drivetrains reduces the physical strain on driving partners compared to traditional trucks, making the job more accessible to those who might find manual gear shifting and heavy vehicle operation challenging, and regenerative braking technology reduces the need for frequent braking, which can ease the physical demands of driving.

Subsequently, a comfortable driving cabin in various weather conditions and reduced noise experience is also improves the work environment, lessens driving partner fatigue and – along with the improved handling and performance – makes for a better place to work[27].

Enhanced Safety Features:

The Advanced Driver-Assistance Systems (ADAS) and autonomous driving features can significantly reduce the stress and complexity of driving, making the profession more appealing to individuals who might be concerned about the high-stress aspects of traditional truck driving.

Additional emergency features such as Panic buttons provide an added layer of security, which can be particularly appealing to new driving partners or those who might be hesitant to enter a traditionally male-dominated field.

Telematics and Fleet Management:

Fleet management systems that provide real-time data and remote diagnostics improve efficiency and safety. With the help of telematics technology and enhanced with GPS driving partners take the shortest and safest routes, which results in increased efficiency and driving partner security. This makes the job more predictable and manageable, which can be attractive to a diverse range of individuals.

Flexible Working Conditions:

The development of widespread charging networks can enable more flexible scheduling of routes and allow extended periods of rest while charging the trucks, making it easier to balance work and life. This flexibility can appeal to a wider demographic, including those who may have family responsibilities.

Advanced Training and Support:

The need for specialised training in handling new technologies provides a level playing field for new driving partners and can lead to more inclusive and supportive training programs. This may help in attracting and retaining women workforce.

25 https://wri-india.org/sites/default/files/Uddheshya-conference-proceedings-20230322.pdf
26 https://www.freightwaves.com/news/women-increasingly-interested-in-driving-careers
27 https://thedriven.io/2022/09/26/sounds-of-silence-how-quiet-are-heavy-duty-electric-trucks/

08 Framework to Ensure a Just Transition for Truck Driving Partners

Framework Structure

The framework is organized under the following headers to comprehensively capture the transition journey:

- **Aspects:** Key areas that will undergo changes
- **Expected Changes:** Specific modifications and new elements that driving partners will experience
- **Impact Assessment:** How these changes will affect driving partners' work and life
- **Support Mechanisms:** Programs and initiatives to help driving partners adapt
- **Responsible Stakeholders:** Organizations and entities responsible for implementing support measures

Core Transition Aspects

Transition to ZETs

The fundamental shift from ICE vehicles to ZETs represents a technological leap that affects core driving operations. This includes adapting to new driving techniques, understanding charging infrastructure, and mastering new vehicle technologies. The transition requires comprehensive training and support systems to ensure driving partners can confidently operate and maintain ZETs while optimizing their routes and schedules around charging requirements.

Health and Wellness

ZETs present an opportunity to significantly improve driving partners' health conditions through reduced exposure to pollution, noise, and physical stress. The transition also presents a unique opportunity to focus on creating a healthier work environment with better amenities, regular health monitoring, and improved rest facilities. This aspect emphasizes the holistic well-being of driving partners, including both physical and mental health considerations.

Personal Safety

Upcoming technological advancements introduces advanced safety features and monitoring systems that enhance driving partner security. This aspect covers both technological safety improvements and infrastructure development to ensure driving partners feel secure during their operations. The framework addresses emergency response protocols, rest area security, and modern communication systems.

Gender Equity

ZET transition provides an opportunity to promote gender diversity in the trucking sector. This aspect focuses on creating an inclusive environment through women-friendly vehicle design, secure infrastructure, and targeted training programs. The framework emphasizes removing barriers to entry for women and establishing support networks to ensure their success in the industry.

Social Acceptance

The modernization of trucking through ZETs and other technological advancements offers an opportunity to elevate the social status of the driving profession. This aspect addresses the improvement of the profession's public image, recognition of driving partners' environmental contributions, and enhancement of job satisfaction and stability. The framework aims to build pride in the profession and foster community respect for driving partners.

Just Transition Framework for Truck Driving Partners

Sr.no	Aspects	Expected Changes	How it will Impact	How to Support	Who will Do it
1A	**Transition to ZETs** **- Operations**[28]	◆ Clutchless driving ◆ Higher Torque and faster acceleration ◆ Advanced features	◆ Need to grasp and adapt to automatic transmission and other advanced technologies ◆ Learn about good driving practices	◆ Tutorial on driving, and related best practices such as battery management, understanding dashboard indicators, maximising regenerative benefits[29] etc ◆ Facilitate hands-on practice on ZETs ◆ Sharing testimonials and best practices from experienced ZET driving partners to help others adapt quickly and efficiently	**OEM:** provide initial training to driving partners **Government body:** Organise large-scale training camps
1B	**Transition to ZETs** **- Maintenance**	◆ Mandatory pre and post-trip inspections to be carried out by the driving partner[30] ◆ Increased collaboration with Technicians ◆ New Support Networks	◆ Familiarize with new support networks ◆ Follow new maintenance protocols and adjust routines required for ZETs	◆ Training sessions on new maintenance protocols and component-specific checklists ◆ Access to detailed maintenance guides and quick reference materials	**OEM:** Develop and provide detailed maintenance training and materials **Fleet operators:** Apprise and facilitate access to training programs offered by Government bodies

28 https://globaldrivetozero.org/site/wp-content/uploads/2020/12/Moving-Zero-Emission-Freight-Toward-Commercialization.pdf
29 https://cdn.lightsproject.com/collateral/volvo-lights-lessons-learned-guidebook.pdf
30 https://www.corfix.com/blog/truck-pre-and-post-trip-inspections/

Sr.no	Aspects	Expected Changes	How it will Impact	How to Support	Who will Do it
1C	**Transition to ZETs** **- BET Charging**	◆ Learning curve: Driving partners will need to familiarize themselves with the operation of EV charging stations, which differ from traditional fuel pumps ◆ Route planning adjustments: Driving partners will need to incorporate charging station locations into their routes, especially for long trips ◆ Time-sensitive charging: Charging during peak hours may be costlier, requiring driving partners to manage when and where to charge based on energy tariffs ◆ Battery management: Driving partners will need to understand how to maintain optimal battery levels to avoid range anxiety and ensure smooth operation	◆ Familiarise driving partners with EV charging stations and procedures[31] ◆ Adjust routes and schedules ◆ Manage charging costs	◆ Provide comprehensive training on the operation of EV charging stations and battery management ◆ Create a community or peer support network where driving partners can share experiences, tips, and best practices related to EV charging ◆ Establish a feedback system for driving partners to share their experiences and challenges, allowing for continuous improvement of support programs	◆ **Fleet Operators:** Organize training sessions for driving partners on EV charging procedures and battery management ◆ **Charge Point Operators:** Expand and maintain a network of reliable charging stations along major trucking routes ◆ **Industry Associations:** Share best practices and resources for transitioning to electric trucks and managing charging logistics

31 https://cdn.lightsproject.com/collateral/volvo-lights-lessons-learned-guidebook.pdf

Sr.no	Aspects	Expected Changes	How it will Impact	How to Support	Who will Do it
1D	**Transition to ZETs** **- Computation of Refueling charges/ Energy tariff**[32]	◆ Different terminologies ◆ Varied charging rates apply at different charging stations, unlike the more standardized prices typically found at fueling stations	◆ Need to learn about electricity sector terminologies and how the costs are calculated ◆ Adjust charging habits based on cost	◆ Training on energy tariffs and the importance of adherence to optimal charging cycles ◆ Tools or apps that can help driving partners track tariffs and plan charging	**EV ecosystem entrepreneurs:** Provide apps or tools to track energy tariffs **Government:** Regulate and ensure fair energy pricing. Facilitate policies that strive to promote ease of charging via standardised payment mechanisms, etc **OEM:** Integrate tariff-tracking software in vehicle systems
1E	**Transition to ZETs** **- Changes to driving route/ pattern**[33]	◆ Possible range limitations ◆ Routes may change to include areas with EV charging infrastructure and require the driving partner to avoid unnecessary detours to conserve battery life[34] ◆ Driving partner breaks would be pre-planned as per the available charging station network ◆ Duration of delivery may change as per the charging time of BET, which could be longer than traditional refueling stops in some cases	◆ Driving partners will need to plan routes around the limited range of electric trucks, incorporating charging stops into longer trips ◆ Driving partners will need to stick to the pre-planned route and breaks strictly to charge the vehicle as per schedule to conserve battery life and ensure on-time deliveries ◆ Adjust to new delivery schedules depending on the charging time and charging stations available in the route	◆ Route optimisation tools: Provide driving partners with advanced GPS and route optimisation software that incorporates charging station locations and minimizes detours ◆ Training on EV driving strategies: Offer training sessions on efficient driving patterns, battery management, and trip planning to help driving partners maximize range and minimize downtime	**Fleet Operators:** Provide driving partners with GPS and route optimisation tools, adjust delivery timelines to account for charging breaks, giving driving partners more flexibility and reducing pressure during trips

32 https://blog.fleetx.io/optimizing-electric-vehicle-routes-for-efficient-fleet-management-in-india/
33 Optimizing Electric Vehicle Routes for Efficient Fleet Management in India (fleetx.io)
34 https://www.sciencedirect.com/science/article/pii/S1877050922014065

Sr.no	Aspects	Expected Changes	How it will Impact	How to Support	Who will Do it
				◆ Real-time charging station updates: Ensure access to real-time information about the availability, pricing, and wait times at charging stations to help driving partners plan their routes more effectively ◆ Support infrastructure expansion: Collaborate with local governments and Charge Point Operators (CPO) to expand charging networks along key freight routes, reducing the need for significant route deviations	**OEMs:** Equip electric trucks with built-in navigation systems that integrate charging station locations and battery management features, helping driving partners plan more efficiently **Charging Infrastructure Providers:** Install more charging stations along key trucking routes, ensuring that long-haul driving partners have convenient access to chargers without significant detours

Sr.no	Aspects	Expected Changes	How it will Impact	How to Support	Who will Do it
1F	**Transition to ZETs** **- Vehicle break-down/Safety protocol**	◆ ZETs are a technologically different vehicle. The components vary significantly from traditional ICE trucks ◆ ZETs will require skilled service personnel, and driving partner cannot rely on familiar sources for assessment of vehicle problem ◆ ZET fires, especially battery fires, require specific firefighting approaches different from conventional vehicle fires	◆ Driving partners will need training on new protocol to be followed in event of ZET breakdown ◆ The driving partner needs to assess the requirement and find skilled service personnel during the breakdown ◆ Driving partners must be able to quickly identify signs of potential fire (smoke, unusual odors, warning signals) ◆ Immediate evacuation and establishment of safety perimeter is required ◆ Cannot use conventional fire extinguishers meant for ICE vehicles in certain ZET fire scenarios	◆ Establish protocol for vehicle breakdown ◆ Collate repository of skilled service personnel. ◆ Impart tutorial to driving partners on SoP to be followed ◆ Provide specialized fire safety training modules ◆ Supply emergency response guides specific to ZET fires	**Industry associations/ government body:** Develop SoP for ZET breakdown management, and provide training centres **Industry:** Establish EV Service centres, and provide on-road assistance **Fleet operators:** Provide information on vehicle breakdown management. Collate list of EV service centres for use in vehicle breakdown scenarios

Sr.no	Aspects	Expected Changes	How it will Impact	How to Support	Who will Do it
1G	**Transition to ZETs** **- Working hours**	◆ Changes in shift duration due to charging and route adjustments ◆ New regulation on hours of driving and rest periods for ZET safety	◆ Requires driving partners to adjust to new shifts and work patterns ◆ Need to adapt to working hours regulations	◆ Training/Best Practices to adapt to new work patterns ◆ Fleet operators to have periodic consultations ◆ Usage of technology to track schedules	**Fleet operators:** Training and consultations with driving partners **Government:** Make fleet operators realise the importance of driving partners work life balance and make suitable regulations
1H	**Transition to ZETs** **- Monitoring (GPS, telematics)**	◆ Continuous monitoring of the driving partner and the vehicle through advanced technology like telematics, GPS, etc. ◆ Advanced driving partner behaviour analytics ◆ Charging station utilization tracking	◆ It can become a potential privacy concern and may cause resistance ◆ Can lead to improved driving behaviour[35] ◆ Need to adapt to performance-based evaluation ◆ Increased accountability for driving decisions	◆ Training workshops on understanding the importance of telematics ◆ Incentives rewarding the increased productivity and efficiency with scorecards and trend reports[36] ◆ Clear data privacy policies and transparency	**Telematics providers:** Training and support to driving partners and fleet operators **Fleet operators:** Coordinate and ensure transparency in data usage; Apprise driving partners of driving performance

35 https://www.geotab.com/apac/fleet-management-solutions/driver-tracking/
36 https://www.geotab.com/apac/case-study/shaziman-transport/

Sr.no	Aspects	Expected Changes	How it will Impact	How to Support	Who will Do it
2	**Health and welleness**	◆ Reduced exposure to noise and air pollution ◆ Smoother ride due to their design and electric drivetrain ◆ Scheduled regular charging periods ◆ Mental health benefits from reduced stress due to quieter operation ◆ Improved wayside amenities	◆ More savings due to reduction in health related expenditure ◆ Boost in work environement and productivity ◆ Reduced fatigue	◆ Improve sanitation facilities by constructing and maintaining clean, accessible toilets and washing areas along major truck routes. ◆ Establish health monitoring programs for regular health checks. ◆ Promote health awareness campaigns to educate driving partners ◆ Set up fitness facilities at major rest stops	**Government:** As part of developing new charging infrastructure across highways, ensure better wayside amenities are also built **Fleet operators and Healthcare Providers:** Regular health assessments and monitoring
3	**Personal Safety**	◆ Enhanced Safety Features ◆ Higher safety standards ◆ Panic button/emergency alert systems ◆ Smart route planning with safety considerations ◆ Anti-theft and vehicle security features ◆ Dashcams and surveillance systems ◆ Fatigue detection systems	◆ Increase in overall well-being and productivity ◆ Enhanced operational efficiency with reduced focus on other aspects ◆ Enhanced confidence during night operations ◆ Better response capabilities during emergencies ◆ Better work satisfaction from safer conditions”	◆ Develop secure rest areas with proper lighting and surveillance. ◆ Regular safety audits of rest areas and routes ◆ Implement safety training programs covering self-defense and emergency response. ◆ Development of emergency response protocols”	**Insurance companies:** Risk assessment and coverage **Technology providers:** Implementation of safety systems **OEMs:** Safety feature implementation **Industry Association:** Development of emergency response protocols in consultation with all stakeholders”

Sr.no	Aspects	Expected Changes	How it will Impact	How to Support	Who will Do it
4	**Gender equity**	◆ Enhanced Safety Features ◆ Better wayside amenities ◆ Modern monitoring and communication systems ◆ Reduced requirement of physical strength ◆ Gender-sensitive vehicle design features ◆ Women-focused training modules ◆ Networking platforms for women driving partners	◆ Increased women participation in the sector ◆ Enhanced comfort and hygiene ◆ Creation of role models for future generations ◆ Improved workplace culture	◆ Conduct pilot programs for female truck driving partners, offering training and job placements in collaboration with NGOs ◆ Develop targeted training programs focused on skills development, safety, and career growth for women ◆ Upgrade infrastructure at truck stops to include secure parking, clean restrooms, and proper lighting for female driving partners ◆ Implement supportive policies, such as zero-tolerance for harassment and family-friendly practices to encourage gender diversity ◆ Create women driving partner associations/ networks	**Fleet Operators:** Conduct pilot programs for female truck driving partners **Training Institutions:** Develop targeted training programs for women **Government:** Upgrade infrastructure at truck stops: Government **OEMs:** Women-friendly tech solutions

5	**Social Acceptance**	◆ Improved social image due to advanced technology and safety features ◆ Improved health outcomes ◆ Increase in job satisfaction ◆ Improved job stability ◆ Environmental stewardship role	◆ Better community relationships ◆ Increased pride in the profession ◆ Improved family support for career choice ◆ Better marriage prospects due to profession stability ◆ Higher self-esteem and professional dignity ◆ Increased respect from other road users	◆ Launch public awareness campaigns to educate about the trucking industry's importance and advancements in ZETs ◆ Showcase success stories of driving partners to inspire new talent and promote diversity in the profession ◆ Recognize and reward contributions of driving partners to the zero-emission transition through recognition programs	**Government/Fleet Operators/Industry Associations/ OEMs:** Launch public awareness campaigns **Social media influencers:** Positive content creation

09 Conclusion

As the trucking ecosystem gradually shifts toward ZETs, various stakeholders will be required to adapt to this evolving landscape. Truck driving partners, who are the backbone of the logistics industry, often contend with challenging socioeconomic conditions. As the trucking sector transitions to ZETs, these partners are likely to face significant disruptions. This document emphasizes the unique opportunity presented by this major technological shift to address the systemic challenges that truck driving partners encounter. It highlights that the technological advancements associated with ZETs already offer several benefits to driving partners, as recognized by survey participants.

Additionally, it is essential to consider other key factors necessary for a Just Transition for truck driving partners. The ZET truck driving partner survey indicated notable improvements in access to social security benefits, smoother interactions with law enforcement, and better environmental conditions within truck cabins.

While these advancements suggest progress stemming from the adoption of ZETs, it is important to understand that merely implementing new technologies will not automatically solve all the issues faced by truck driving partners. Systematic changes across the entire ecosystem are needed to ensure significant improvements in working conditions. The goal of a Just Transition should be to minimize any negative impacts while leveraging new technology to enhance conditions wherever possible.

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Established 1936

ABOUT **AIMTC**

All India Motor Transport Congress, a non-political and not-for-profit organisation established in 1936, represents over 3,500 talukas, districts, and state-level transport associations, with over 20 crore individuals directly and indirectly involved in this sector.

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