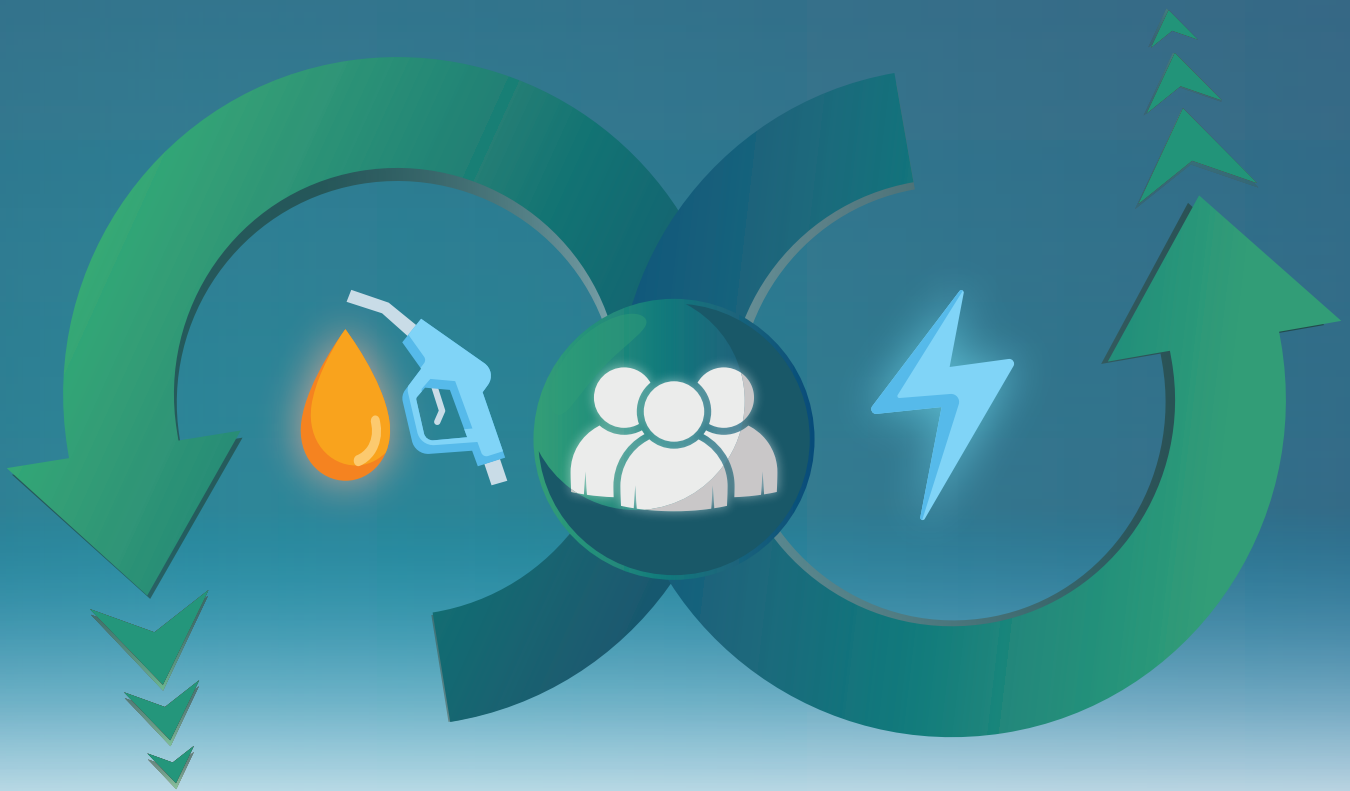


Navigating a **People Centric Approach** in India's Shift to **E-Mobility**

A Briefing Paper



August 2024



VASUDHA
FOUNDATION
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01

INTRODUCTION: ELECTRIFICATION OF INDIA'S ROAD TRANSPORT SECTOR

India's transport sector is indispensable for the country's socio-economic development. It is critical for generating employment, driving economic growth, supporting trade and commerce, and providing vital connectivity for 1.4 billion people. Additionally, it acts as the backbone for other intermodal transport systems, linking airports, ports and railways to their respective users.

The transport sector is the second major consumer of energy after Industry, accounting for roughly 12% of the final energy consumption in 2022-23¹. It witnessed the highest demand growth in India's energy consumption basket, rising from 35 Mtoe to 65 Mtoe in the last decade (FY 2013- FY 2023). This surge is propelled by a growing vehicle usage in the road transport segment with the number of motor vehicles increasing six-fold over the last two decades, reaching 326.3 million in FY2020². Responsible for 87% of passenger traffic and 60% of freight traffic³, road transport accounted for over 76% of total transport-related energy consumption in 2022-23⁴ and 91% of sector emissions in 2019⁵. Further, if India were to follow the current trends of energy consumption, it would require an estimated 200 Mtoe of energy supply annually⁶, by the year 2030 to meet the demand of the transport sector.

To curb the rising emissions and meet the growing demand from the road transport sector, a fundamental shift away from fossil fuels is essential. In this context, the transition from Internal Combustion Engine (ICE) vehicles to Electric Vehicles (EVs) is emerging as a critical strategy for achieving decarbonization in road transport.

The Indian transportation sector is undergoing rapid electrification. This shift is evident in the rapidly rising number of EVs on the road, increased investments in the sector, and expanding manufacturing capabilities for EVs, batteries, and vehicle charging infrastructure. It is expected that India's EV market⁷ will grow at a 45.5% CAGR during 2022-2030 translating to 16 million annual sales across segments and 50 million jobs by the end of 2030⁸.

1 https://www.mospi.gov.in/sites/default/files/publication_reports/EnergyStatistics_India_publication_2024N.pdf

2 [https://morth.nic.in/sites/default/files/RTYB_Publication_2019_20%20\(1\).pdf](https://morth.nic.in/sites/default/files/RTYB_Publication_2019_20%20(1).pdf)

3 Roads Transports | Ministry of Road Transport & Highways, Government of India (morth.nic.in)

4 EnergyStatistics_India_publication_2024N.pdf (mospi.gov.in)

5 indiaenvironmentportal.org.in/files/file/India TNC IAC.pdf

6 Electric Mobility | BUREAU OF ENERGY EFFICIENCY, Government of India, Ministry of Power (beeindia.gov.in)

7 Invest in Indian Electric Mobility Industry | FDI & Companies (investindia.gov.in)

8 EV sales likely to reach 10 mn annually by 2030, create 50 mn jobs: Gadkari | News - Business Standard (business-standard.com)

While these developments are welcomed from an energy transition and decarbonisation standpoint, this transformation will bring many structural changes to the current operations within the sector and will have long-lasting socio-economic implications. New job opportunities will undoubtedly emerge in the manufacturing of EVs and charging infrastructure. However, this transition will also render many existing jobs obsolete and significantly impact the skillsets required across the entire value chain. Disruptions in the supply chain, obsolescence of certain job roles and the inability to meet new skill requirements could threaten the livelihoods of those employed in the sector, with certain vulnerable groups potentially facing greater challenges than others.

Therefore, as we advance towards rapid EV adoption, we must carefully examine the impacts of the transition on the ecosystem, including workers, underrepresented groups, and communities across the road transport sector. This paper aims to address this critical need by delving into the concepts for people-centric transition⁹ in the road transport sector and further exploring the indicators and interventions needed to ensure the e-mobility transition adheres to principles of justice, inclusivity, and equity.



02 FRAMING THE ISSUE: THE NEED FOR A PEOPLE-CENTRIC TRANSITION

The need for a people-centric approach in India's transition to e-mobility stems from the complex socioeconomic implications of this shift. This approach is essential to ensure a fair, equitable, and inclusive transition that aligns with the broader concept of "no one is left behind" while addressing the unique challenges of India's road transport sector. As India makes significant strides in its transition from ICE to EVs, there is a need to build a strong case for why a people centric approach is essential for e-mobility to achieve its full potential. These factors and issues are highlighted below:

Fast Growth in E-mobility

The growth of EVs in India has been remarkable, driven by the adoption of two-wheelers and three-wheelers as shown in the Figure below. In FY 2023, EV registrations in India increased by 154% compared to the previous year. The transition has been particularly disruptive for the three-wheeler segment where EVs accounted for nearly 54% of the new registrations last year. Notably, India even surpassed China in April 2024 to become the leading market for electric three-wheelers globally¹⁰.

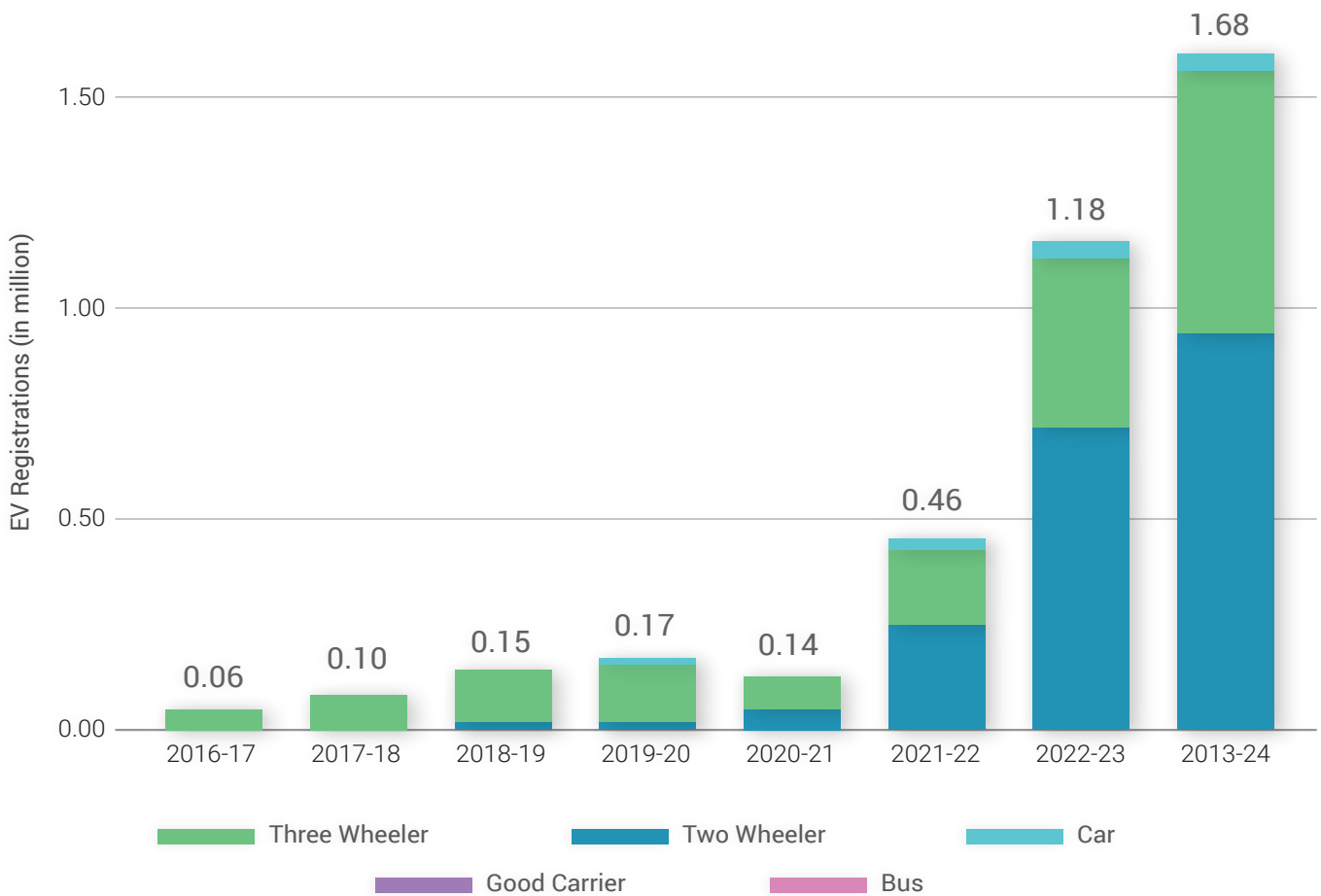


Figure 1: EV Registrations in India over the years

10 India emerges as global leader in electric three-wheeler market, surpasses China in sales, ET EnergyWorld (indiatimes.com)



Vast Employment Footprint

The road transport sector in India has a massive employment footprint. As highlighted in the figure below, the sector employs approximately 13 million directly¹¹ in the automotive sector. Out of this, almost 44% workers are dedicated to servicing alone, indicating a significant employment presence. Further, a report by the Ministry of Skill Development and Entrepreneurship¹² indicates that informal manpower in the automotive industry has more than doubled in the last five years, reaching approximately 75-80% of the total workforce.

Estimated Workforce of the Automotive Sector is ~13 Million

*Figures are in Millions

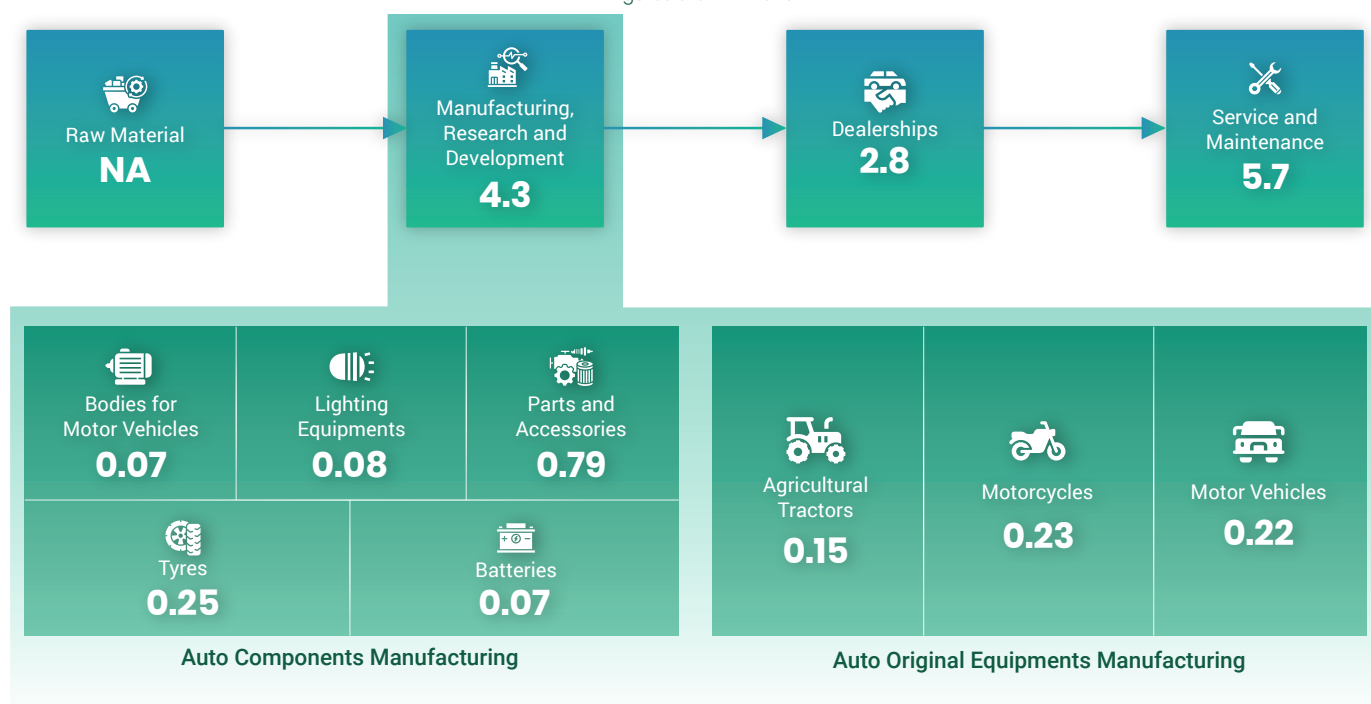


Figure 2: Workforce Estimate in the Automobile Sector. (Source: Annual Survey of Industries, 2019)
Representation Source¹³



Skill Shifts

The transition to EVs requires skill shifts in the current workforce, as EV manufacturing and repair demand enhanced skills. Even the driving partners need to be retrained. According to a survey, more than 50% of truck driving partners¹⁴ are worried about the technical support available to help them adapt new technologies. Automotive sector job roles will need to align with National Skill Qualification Framework (NSQF) Levels 4 and 5 to meet these new requirements¹⁵; thus, needing skilling, upskilling and reskilling of the workforce.

11 [vasudha-foundation.org/wp-content/uploads/Indias-Power-Outlook---Volume-9-People-Centric-Approach-Key-to-Rapid-and-Effective-Clean-Energy-Transition.pdf](https://www.vasudha-foundation.org/wp-content/uploads/Indias-Power-Outlook---Volume-9-People-Centric-Approach-Key-to-Rapid-and-Effective-Clean-Energy-Transition.pdf)

12 Microsoft Word - Release_v2_MSDE Skill Assessment and Anticipation_Study.docx

13 <https://www.vasudha-foundation.org/wp-content/uploads/Indias-Power-Outlook---Volume-9-People-Centric-Approach-Key-to-Rapid-and-Effective-Clean-Energy-Transition.pdf>

14 No fleet left behind: Barriers and opportunities for small fleet zero-emission trucking - International Council on Clean Transportation (theicct.org)

15 Report-1-National-Report-1.pdf (iforest.global)



Structural Changes in Manufacturing

The manufacturing industry will also be impacted as the EV transition will bring about deep structural changes in the manufacturing of motor vehicle components. Studies estimate that about 45-84% of the ICE vehicle parts¹⁶, primarily powertrain components, are to become obsolete which will impact component manufacturers. This is likely to bring changes in the manufacturing segment, thus, necessitating a people-centric transition to support affected workers.



Changes in Maintenance and Repairs

EVs require less maintenance and repair compared to ICE vehicles due to fewer moving parts (e.g., over 1,000 in an ICE car versus 200 in an EV)¹⁷. However, any maintenance required will need to be carried out by technicians who have received proper safety training to handle high-voltage vehicles. This shift will not only affect the existing maintenance and repair workforce due to the need for reskilling and upskilling but will also necessitate equipment upgrades to service these vehicles.



Information Asymmetry

The rapidly evolving nature of the EV industry, characterized by constant technological breakthroughs and shifting market trends, presents a significant challenge of information asymmetry within the workforce. The workforce needs to be agile and have access to information about new EV technologies, their operations and maintenance procedures and consumer demands. There is a need for building robust information channels at all levels in the transport workforce ecosystem.

While the above factors shall have a significant impact on employment and nature of jobs in ICE manufacturing and servicing sector; the EV boom coupled with digitalisation in the transport sector is bound to create a plethora of job opportunities across the supply chain. India has already seen a surge in EV manufacturing, with over 697 active EV manufacturers¹⁸. This growth has also spurred numerous innovative entrepreneurial ventures such as battery manufacturing¹⁹ and recycling²⁰, battery swapping solutions²¹, vehicle-to-grid solutions²², and shared mobility platforms²³. Clearly, the transition will not only change how vehicles are produced and used but will also significantly impact the nature of jobs across the value chain, with varying levels of disruption in each aspect.

Owing to these factors and issues mentioned above, there is an urgent need to ensure that the benefits as well as opportunities emerging out of e-mobility transition are distributed equitably while minimizing negative impacts on people.

16 Report-1-National-Report-1.pdf (iforest.global)

17 EVs Vs ICE Vehicles In India – What Costs More? (inc42.com)

18 VAHAN SEWA| DASHBOARD (parivahan.gov.in)

19 Home – Log9 Materials

20 Global Lithium-Ion Battery Recycling Company | LOHUM




21 SUN Mobility

22 Sheru | Cloud energy storage

23 BluSmart (blu-smart.com)

03 PEOPLE-CENTRIC NODES: WHO WILL BE IMPACTED?

A discussion on people-centric transition, of course, entails understanding how these transitions will be experienced and understood across the workforce. To contextualise and conceptualise what a people-centric approach means for India's transition to e-mobility, we deep-dive into identification of stakeholders likely to be affected, especially the vulnerable ones. This will aid in devising a tailor-made strategy to tackle the socio-economic implications of the transition. The two key segments that will bear the maximum impact includes the workforce in the ICE manufacturing and the automotive service sectors. We provide a schematic overview of who and how they impact in the following section below:

SECTOR	 MANUFACTURING	 SERVICES
SEGMENT	<ul style="list-style-type: none"> Automotive OEMs Automotive Component Manufacturers (ACMs) Battery Manufacturers / Recyclers 	<ul style="list-style-type: none"> Repair & Maintenance <ul style="list-style-type: none"> » Regulated aftermarket workshops » Independent large workshop chains, » Independent small roadside workshops Logistics (Small to Medium Fleet Operators)
WORKERS	<ul style="list-style-type: none"> Workers in OEMs or ACMs Workers in Lead Acid Battery Informal Recycling 	<ul style="list-style-type: none"> Repair & Maintenance Workers e.g. mechanics, garage owners Infrastructure Support Workers, e.g. Petrol Pump staff
	 SUPPORT STAFFS	



Workers In the Automotive Manufacturing Ecosystem

The transition translates to a potential decrease in demand for components like pistons, engine valves, fuel injection systems, and traditional transmission parts and this will significantly impact the micro, small and medium enterprises (MSMEs) producing ICE powertrains and its components. These MSMEs are vulnerable due to financial constraints, limited access to capital, and information gaps in adopting EV technologies. Workers employed by these units are likely to encounter higher impacts due to the absence of social safety nets and may face job insecurity as well as skill obsolescence.



Workers in Lead-Acid Battery Informal Recycling

Lead-acid batteries, used in all ICE vehicles are predominantly recycled by informal workers whose livelihoods depend on this activity. This practice is environmentally damaging and poses significant health risks to these workers. Transition to EVs reduce the demand for lead-acid batteries, it presents an opportunity to shift these workers to more sustainable and less hazardous industries.



Workers in the Maintenance and Repair Ecosystem

Many workers employed in the post-sale services ecosystem are spread across regulated aftermarket workshops, independent large workshop chains, and independent small workshops like roadside mechanics. The maintenance and repair of EVs will require different skills, safety standards, and testing equipment, which traditional ICE repair workers may not have access to. This shift will particularly impact roadside mechanics, many of them are informally employed and are isolated from the larger service ecosystem.



Workers in Infrastructure Ecosystem

The transition to EVs raises questions about the future of workers currently engaged in supporting ICE infrastructure, particularly petrol pump workers. While EV charging stations and battery swapping facilities are emerging, their long-term manpower requirements remain unclear. Traditionally, Indian petrol pumps have been labour-intensive compared to their counterparts in many developed countries. It's uncertain whether this trend will continue with EV infrastructure or if automation will reduce human involvement. Moreover, the EV ecosystem might demand more technically skilled workers for charging and battery management, potentially altering employment patterns and retention rates in this sector.



Driving Partners with Fleet Operators

Driving partners with fleet operators in India often lack access to formal training and skill development programs. They encounter substantial personal safety challenges, such as the risk of road accidents, exposure to crime, and limited access to emergency services. These challenges are exacerbated by significant health issues stemming from irregular and extended working hours. Social stigma and a lack of recognition further compound their difficulties. Additionally, many driving partners also operate as the owners of their fleets, which complicates their ability to stay informed about new technologies and evolving market trends, further marginalizing them.



Support Staff

Beyond the people directly involved with EV production or maintenance, there is a need to upskill support staff across all enterprises about new EV technologies, their operations and processes. This involves providing comprehensive and updated knowledge about EVs to sales and marketing teams at dealerships, logistics and supply chain personnel at fleet operators, and other relevant stakeholders, ensuring their continued employability during this transition.



04 INDICATORS OF A PEOPLE-CENTRIC APPROACH

Presently, the transition is often narrowly perceived as a linear shift towards low-carbon alternatives, focusing on replacing existing infrastructure and technologies. However, a broader perspective is needed—one that considers socio-economic implications and conceptualizes the transition through the lens of fairness, inclusivity, and equity. To ensure no one is left behind, it is crucial to identify key indicators of a people-centric transition, as outlined below:





 EMPLOYMENT	 SKILLING	 EQUITABLE PARTICIPATION	 EMPOWERING VULNERABLE GROUPS
<ul style="list-style-type: none"> ■ Net Employment Generation: Jobs created vs lost ■ Quality of Job: Wages, job security, working conditions, social safety nets, etc ■ Nature of Jobs: Direct, indirect, and induced employment ■ Employment Driven Migration: Migration patterns & their sustainability 	<ul style="list-style-type: none"> ■ Skills Assessment: Evaluate the demand for new skills and their current availability ■ Upskilling and reskilling: Access to & availability of training programs ■ Skilling Infrastructure: Current Status, gaps & projected requirements ■ Placement linkages for Skilling & Training Programmes 	<ul style="list-style-type: none"> ■ Gender Mainstreaming: At each level of the ecosystem and of the process ■ Place women in new & existing job roles: Roles like driver or mechanic ■ Gender Parity in Jobs: equal wages, nature of job, job security, etc ■ Safe, Secure & Comfortable Workplaces: Navigate male dominance/presence across various roles for vulnerable segments in sector 	<ul style="list-style-type: none"> ■ Vulnerable Workers including informal or unorganised workers ■ SME Businesses on which such informal/unorganised workers rely ■ Differently-abled

Figure 3: Key Indicators of a People-centric Transition in the Road Transport Ecosystem

Decent Employment for all

The impact of transition on employment is a critical consideration. Key indicators include net employment generation, comparing jobs created versus those lost, and evaluating job quality in terms of wages, job security, working conditions, and social safety nets. The nature of employment (direct or indirect) also determines the quality of jobs created. Additionally, it is essential to consider employment-driven migration patterns and their sustainability.

A Skilled Workforce

The e-mobility landscape requires new competencies, making skilling paramount. Key indicators include skill assessment to evaluate demand for new skills and their current availability, access to and availability of upskilling and reskilling programs, and the status, gaps, and projected requirements of skilling infrastructure.



Ensuring Equitable Participation

EV sector is presented with a unique opportunity to champion diversity and inclusivity. Marginalised groups (differently abled, lower income groups) and women, often sidelined in major development sectors, can play a pivotal role in shaping the EV narrative. This shall broaden the talent pool and further bring innovative solutions to the ecosystem.

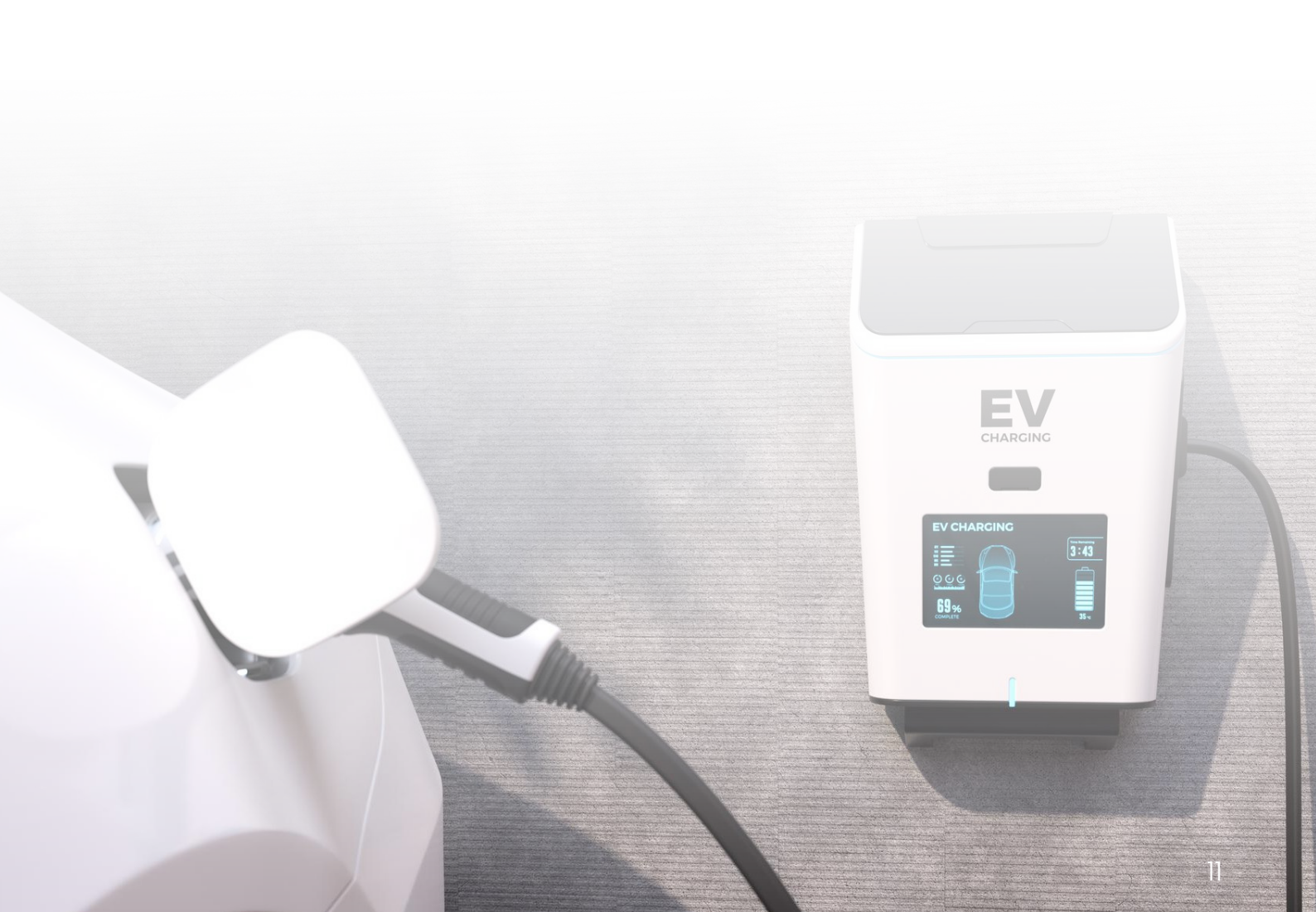


Empowering Vulnerable Groups

Special attention must be given to vulnerable groups that would be most impacted by the transition. While this includes informal workers, roadside mechanics and petrol pump workers who may be particularly susceptible to negative impacts of the transition, it should also be expanded to undertake Micro, Small and Medium enterprises (MSMEs) under its ambit. This is crucial since MSMEs employ such workers and need support to ensure their sustainability.

Additionally, one of the other indicators for a people-centric transition also includes people's awareness and perception of EVs. This should not only include general information on EVs, their environmental benefits, cost perceptions, range anxiety, charging infrastructure, performance perceptions, and government incentives; but also include a more comprehensive approach covering safety perceptions, awareness of life-cycle environmental impacts, and maintenance and repair perceptions. Through this, a more successful and inclusive transition to e-mobility can be supported, ensuring that the shift aligns with public needs and expectations.

By focusing on these indicators, policymakers and industry leaders can develop strategies that not only advance technological and environmental goals but also promote social equity and inclusive growth in India's journey towards e-mobility.



05 **TRANSITION WE KNOW VS. TRANSITION WE NEED**

The transition from ICE vehicles to EV technology is being driven by technological advancements and institutional targets. However, beyond this linear shift, it's crucial to consider the socio-economic implications to minimize disruptions to vulnerable stakeholders. More comprehensive planning and support are needed for those impacted by this transition.

Transition We Need: A people-centric and inclusive approach to transitioning from ICE to EV, supported by a five-pronged strategy:

1 **Targeted Skilling Initiative**

Targeted interventions to reskill or upskill workers are a priority. These skilling initiatives must calibrate and match the technical requirements of upcoming job roles with the beneficiary's sectoral knowledge and skill level. Industry backed and employment-linked skilling programs are needed for talent retention and business longevity.

2 **Quantitative Assessment of the Transition**

The impacts of the transition will be experienced differently by each sector, region, unit and worker. So, planning and implementing an inclusive course of action requires building an understanding of the implications of transition on its affected stakeholders, their varying vulnerability and their specific needs based on their circumstances and job roles. Thus, research and quantitative assessments at a granular level are needed to effectively chart a localised path of action.

3 **Information Symmetry and Awareness**

Information gaps are arising given the rapid pace of transition resulting in stakeholders, particularly individual workers and MSME units being left unaware of policy changes, technological advancements, mandates they may be required to follow, or even emerging economic opportunities. Therefore, facilitating the transparent and easy flow of necessary information to all stakeholders is required to help them navigate the transition better.

4 **Social Inclusion and Dialogue**

Often, smaller and more marginalised stakeholders, like small fleet operators, MSME units, dependent taxi drivers, roadside mechanics, informal workers and many more, are left out of transition discussions and planning due to lack of adequate representation and communication channels. For a successful and holistic transition, efforts must be made to ensure their active participation and the representation of grassroots voices in the planning process. Additionally, planning this transition creates an opportunity to create a space for groups that are underrepresented and often marginalised. Therefore, planning should seek to include women and marginalized groups as well.

5 **Business Diversification Models**

The transition shall make certain jobs obsolete, and the sector's increasing digitalisation will make meeting requirements for certain jobs out of reach for many current workers, mostly with less education and skills. Given the inevitable loss of livelihoods, it is necessary to prepare at-risk businesses with alternate business diversification models like EV retrofits or non-transport related ventures and accommodate at-risk workers into new sectors and value chains.

06 WAY FORWARD

Presented below is a summary of some strategies that can be considered for a people centric approach to the ICE to EV transition.

PILLARS FOR TRANSITION	OBJECTIVE	STRATEGIES
 <p>Targeted Skilling Initiatives and Knowledge Enhancement</p>	<p>Build stakeholder capacities</p>	<ul style="list-style-type: none"> ■ Assess upskilling and reskilling needs. ■ Map available training courses. ■ Link stakeholders to training institutions. ■ Provide financial aid during training ■ Focus on employment-linked training. ■ Develop customized training modules. ■ Utilize e-learning platforms for flexible training options. ■ Partner with industry experts for hands-on training. ■ Create mentorship and apprenticeship programs. ■ Monitor and evaluate training outcomes.
 <p>Quantitative Assessment of the transition</p>	<p>To build a data repository for context-based planning</p>	<ul style="list-style-type: none"> ■ Commission localized studies to: <ul style="list-style-type: none"> » Assess economic impacts, skill levels, and social demographics. » Identify regional hotspots. » Map social vulnerabilities. ■ Develop predictive models to anticipate future impacts. ■ Create an accessible database for sharing findings with stakeholders. ■ Partner with academic institutions for ongoing research.



Information Symmetry and Awareness

Empower stakeholders with information

- Bridge information gaps and barriers at different levels.
- Create tailored education materials and modules according to skill and job level requirements.
- Disseminate market and policy updates periodically.
- Stakeholder outreach through digital and offline communication platforms
- Establish helpdesks and support centers for real-time assistance.
- Conduct workshops and seminars for continuous learning.
- Develop mobile apps and online portals for easy access to information.
- Collaborate with the media for broader outreach.



Social Dialogue and Inclusion

Uphold the interests of vulnerable segments

- Stakeholder integration through surveys and focus groups discussion, especially with smaller and informal stakeholders.
- Create communication channels between stakeholders and policy makers.
- Gather feedback on policy changes and transition activities
- Promote inclusion of women and marginalized groups
- Facilitate community meetings and town halls.
- Create advisory committees with diverse stakeholder representation.
- Implement feedback loops for continuous improvement.
- Provide conflict resolution mechanisms.



Business Diversification Models

Safeguard livelihoods and businesses

- Identify at-risk workers and businesses.
- Explore diversification options.
- Pilot alternative business models.
- Offer training for new livelihood options.
- Develop incubation centers for start-ups.
- Provide financial assistance for business diversification.
- Facilitate market linkages for new business ventures.
- Support digital transformation of traditional businesses.
- Conduct feasibility studies for potential diversification areas.

The transition to EVs offers significant benefits for the economy, technology, and climate action. However, addressing the socio-economic aspects is vital for an inclusive and equitable shift. Collaboration among government, manufacturers, private businesses, academia, philanthropies, and financial institutions is essential to support affected stakeholders and ensure a successful transition. Implementing the right policies and programs with effective strategies will enable a people-centric approach to this technological shift.



Paper by:

Aishwarya Sharma, Vrinda Gupta, Jaideep Saraswat, and Devina Kuttappa

Reviewed by:

Ashali Bhandari, Managing Director – People’s Urban Living Lab (PULL), Transitions Research
Srinivas Krishnaswamy, CEO, Vasudha Foundation



This Briefing Paper is a part of Vasudha’s knowledge series on mainstreaming discourse on People-centric Energy Transitions in India