ISSUE BRIEF

SKILLING INDIANS FOR AN EV-READY WORLD

OLA MOBILITY INSTITUTE

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Abstract

The world is rapidly transitioning to an electric mobility future, with the demand for electric vehicle (EV) manufacturing, servicing, repair, maintenance, and recycling poised to increase drastically. This surge in demand is an opportunity for India, one of the most populous countries in the world and a seasoned exporter of skilled and semi-skilled labour, to plug the supply gap in the global workforce. This Issue Brief builds on extensive stakeholder consultations and secondary data analysis, to underscore intersections between EVs and the future of work, with a focus on skilling today for tomorrow's technology and industrial aspirations. India not only needs to create a skilled workforce for an EV-dominated landscape, but also needs to upskill the current labour force to ensure its relevance once the phasing out of internal combustion engine (ICE) vehicles is complete. This Issue Brief, thus, provides a blueprint for various stakeholders to catapult the country into a global leader of a clean and green future.

Introduction: Skill-propelled growth

The automobile sector forms a whopping 7.1% of India's GDP, and 49% of the manufacturing sector output (DPIIT, n.d.). Driving India's growth, the automobile sector is now at the cusp of Electric Vehicle (EV) transition. EV demand in India is expected to reach 102 million units in FY 2021-2030 (NITI Aayog & RMI, 2021), creating an equal demand for skilled labour to manufacture EVs. The Automotive Mission Plan 2016-2026, a vision statement of the GoI and the Indian Automotive Industry, has projected around 65 million direct and indirect jobs in 2016-26 (GoI & IAI, 2015). From manufacturing to services, from technology for battery to charging infrastructure or even retrofitting the existing motor fleet to be future-ready, EVs have that Midas touch that can turn every avenue into a livelihood opportunity.

The automobile sector being the heavy-lifter of India's manufacturing economy, holds the key to harnessing its much-extolled demographic dividend. At 64% of the population in 2011 (MHA, 2011), India's productive age group of 15-65 year olds will form 68% of the population by 2026. At present, only 10.8% of India's workforce have undergone any form of skilling. Here, a mere 8.6% have received informal skill training of any kind, while only 2.2% of the country's workforce has undergone formal skill training (MoSPI, 2015). At a time when China has 24% of its workforce skilled, and South Korea is at 96% (Shukla, et al, 2015), India must ramp up its skilling efforts, lest this EV revolution turns into a missed opportunity for the country. To tap into this celebrated demographic dividend, one must recognise that skilling the youth today will create the productive workforce of tomorrow.

This Issue Brief explores the intersections between EVs and the future of work, with a focus on skilling today for tomorrow's technology. The Brief provides evidence and a roadmap for how the current workforce, trained in Internal Combustion Engine (ICE), can transition to EVs. Although ICE and EV have certain overlapping components and processes, the skillsets are often not interchangeable. Thus, a focussed skilling plan to prepare the workforce for this EV transition is the need of the hour. From better structured apprenticeship programmes to regulating and standardising the quality of skill training provided, India has a long journey ahead, before it can truly capitalise on the EV boom. This Brief is a clarion call for timely action, if India is to maintain its manufacturing dominance, while minimising job losses when it fully transitions from ICE to EV.

From EV skilling to gainful employment

The projected employment numbers for OEM manufacturing, auto component manufacturing, and vehicle servicing including both authorised service centres and roadside mechanics, will rise from 8.39 million in 2022 to 9.99 million in 2026 (figure 1). Further, the existing automotive skilling infrastructure is highly constrained and incapable of meeting the growing demand for skilled personnel in the industry (ASDC & EY, 2019).

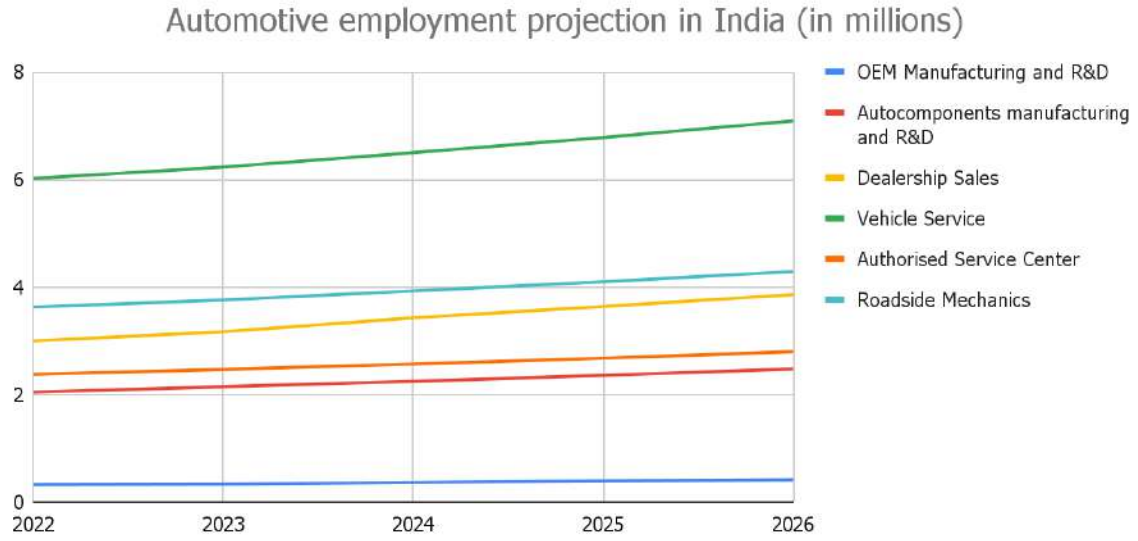

Figure 1: Growth in employment in the Automobile Sector; Source: ASDC & EY, 2019

This is especially distressing since automation and AI are fast replacing repetitive job roles such as welding and painting, with 65% of new jobs slated to require new skill-sets according to a report by FICCI et al. (2017).

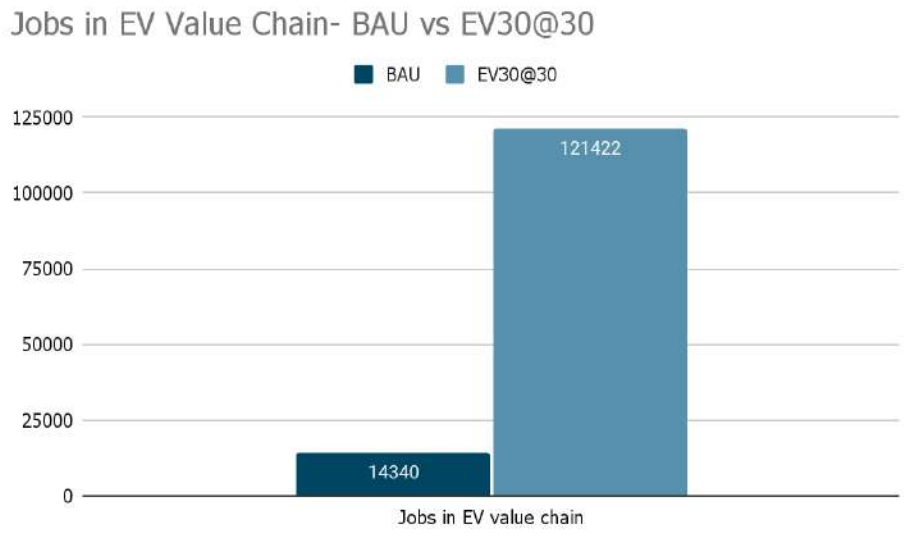

Figure 2[1]: Growth in employment in the EV sector in the Business As Usual (BAU) (current) scenario and in the case of EVs having 30% share if all automobile sales by 2030; Source: CEEW, 2020

[1] This EV30@30 scenario includes jobs created in powertrain, batteries, charging infrastructure manufacturing and jobs in the electricity sector (due to increased electricity consumption by EVs).

In contrast, EVs hold a promising opportunity in terms of new job creation. If we assume EVs to have a 30% share of automobiles (CEEW, 2020) in 2030 then it warrants the creation of 1.2L new job opportunities (figure 2). If skilling infrastructure for existing job roles is inadequate, skilling for an EV landscape will warrant expeditious and substantive revision of the status-quo.

In terms of access to skilled candidates, there seems to be a well-entrenched hierarchy. The labour pool for the auto sector may be divided into three categories comprising individuals with- a) formal higher education, b) technical and vocational education and training (TVET), and c) not in employment, education, and training (NEET) status (ASDC & EY, 2019). Individuals from the first two categories usually aspire to join OEMs, tier-1 auto component manufacturers and suppliers, and, to some extent, OEM-owned or otherwise large vehicle sales dealerships. In such a case, tier-3 and tier-4 component manufacturers, small scale vehicle dealerships or garage owners etc. are compelled to rely on those from the NEET category to fulfil their workforce requirements. Notably, over 30% of India's youth, aged from 15 to 29, are in the NEET category (OECD, 2017). The resulting inequitable arrangement creates a talent divide and hinders the ability of smaller players to achieve role and scale parity or pursue greater enmeshment into prevailing value chains.

Beyond apprenticeship models

Unlike the UK and several other jurisdictions where apprenticeships remain the dominant form of skill provisioning, India sees greater interest from individuals for certification programmes (LiveMint, 2019). At present, the certification programmes only begin at a later stage of education or on completion. A way to impart skilling at an early stage could be through a hybrid of classroom learning and industry training.

An example of this model is seen in the Dual System of Training (DST) initiative in Haryana (Dalmiya & Goel, 2020). Students split their time between a classroom and training in the industry. Unlike apprenticeship, DST does not come at a time cost nor a trade-off for earnings. The model allows partially skilled workers — drivers, plumbers or data-entry operators — to find work and simultaneously upskills themselves. This initiative has been launched in several states, including Gujarat, Madhya Pradesh, Uttar Pradesh, among others (PIB, 2019a). Such a model across industries, especially by OEMs, could instill new life into skilling efforts of the Government.

Thanks to governmental fiscal support, many skilling centres have mushroomed around the country. Despite the widespread skilling efforts, the quality of the training given is suspect. There are lessons to be learnt from the past here. Quality assurance and standardisation of training is often seen as a common problem. In many existing skilling centres, certification does not necessarily lead to employment. ASDC[2] has certified more than 4.7 lakh candidates but the placement numbers have not kept pace, as being skilled is not directly translating into being job-ready (Dhingra, 2017; ASDC, 2020).

Indeed, prioritising shared, connected, electric, autonomous, and AI powered mobility options, continuous learning, coupled with strategic and frequent reskilling would deliver better professional outcomes than attending a one-time training programme.

[2] Automotive Skills Development Council

Regulating and standardising certification

Burgeoning training centres have led to persons with varying degrees of competence even within a horizontal skilling level. While the National Skill Qualification Framework (NSDA, 2013) and National Quality Assurance Framework (NSDA, 2017) form a step in the right direction, their adoption must be ensured. On account of quality concerns highlighted in the previous section, industry and training partners must work together to standardise the quality of skilled individuals.

An incentive-based regulatory framework holds tremendous promise. A scoring system, where training centres are graded based on the skilled workers they produce, could help assess gaps in the programmes. From the industry hiring rate to the performance in the first year on the job, every training centre could be graded on their 'output' i.e. the skilled workforce they produce. Yearly audits and performance reviews through multi-stakeholder efforts could help in assessment, upgrading and realignment of courses, while ensuring requisite quality standards.

ARAI and ASDC could have a greater supervisory role in setting the curriculum of these training centres, ensuring its relevance to the industry. The Government, too, could provide licensing and grants to the training centres based on performance evaluation.

Conventional, ICE focused skill domains that will witness heightened demand in the near future include after-sales service, automotive electronics, etc.[3] The real challenge will be repositioning the existing ICE skills to an EV dominant landscape. Firstly, all individuals working on electric vehicles, irrespective of their specific function, will have to be given preliminary training in handling high voltage power systems and acquainting them with the requisite mechanisms to ensure safe and orderly battery discharge. Secondly, EV specific skilling programmes of the future must seek to go beyond their usual mandate and endow their graduates with an entrepreneurial bent. This will create a network of individuals who not only play a role in the switch to electric but helm the transition in its nascent years - initiating a cycle of EV job creation.

Creating a world class skilling programme

The effort to create a world class skilling programme needs to start from the grassroots. India can take inspiration from the plumbing institutes in Odisha. The skilled manpower provided by Odisha's ITIs[4] is powering infrastructure projects across India. Similarly, India can transform itself to a powerhouse of EV skill sets.

EVs unlock a wide spectrum of opportunities in terms of technology and associated infrastructure. These skill sets are beyond the current remit of ICE vehicles and need a new generation of trained professionals. Thus, upskilling and reskilling will define the future of the mobility ecosystem in India. Table 1 enumerates sectors with significant demand for skilled labour in the EV industry.

[3] Based on interviews with industry experts
[4] Industrial Training Institutes

Table 1: Mapping skills in the EV and ICE sectors; Source: Authors' analysis

Research & Development (R&D)			
Automotive/ EV Pillar	**EV Job Category**	**Skills needed for EV Job**	**Overlap with ICE**
Vehicle Transmission	Electronic power train, Efficient power transfer, wiring system	Electrical & Electronics Engineering	X
Design	Futuristic looks (new design requirements), Optimal weight distribution	Designing and understanding of design systems Vehicle system engineering (simulation & modelling)	Required for ICE but a few aspects are also needed for EV designing, like battery weight/ position etc.
	Aerodynamics	Mechanical Engineering	✓
Vehicle Testing	Vehicle safety	Mechanical Engineering	Required for ICE but considering the different electrical/ electronic components in EVs, the knowledge need on safety will be more for EVs
	Driver monitoring	Computer Engineering	✓
	Battery safety	Electrical Engineering	X
	Fire training	Knowledge of electrical systems and handling high voltage batteries	Because of high voltage components in EVs, there will be additional skilling requirements
Software	Autonomous driver assisted vehicle technology, Infotainment systems	Computers and Electronics Engineering	✓
	Connectivity	Computers and Machine Learning	Much more prevalent in EVs
	AI-enabled technology	Machine Learning	✓
	Vehicle performance monitoring	Computers/ Mechanical/ Electrical and Electronics Engineering	✓

	Battery management	Computers/ Mechanical/ Electrical and Electronics Engineering	X
Battery Technology	Efficient power usage	Electrical and Electronics Engineering	X
	Battery composition	Chemical engineering	X
	End-of-life management	Supply chain/ Electrical/Environmental/ Chemical/ Mechanical engineering	X
	High voltage systems, Battery system	Electrical, Chemical engineering and Electronics Engineering	X
	Cell technology & Drive trains	Electrical, Electronics, Chemical, Mechanical engineering	X
Charging Infrastructure	RE integration	Electrical, Electronics, Power System Engineering	X
	Charging technology (fast, slow, wireless, swap etc.)	Electrical, Power System Engineering, Mechatronics	X
	Charging operations management	Logistics, digital/app-based skills to understand and operate online payment modes	X
Manufacturing			
Automotive/ EV Pillar	**Job Category**	**Skills needed**	**Overlap with ICE**
Vehicle Transmission and other hardware components	Manufacturing and assembly of vehicle components (electronic power train, wiring system etc)	Electrical & Electronics Engineering Includes trained NEET, TVET workforce	X
Vehicle Body	Vehicle body manufacturing, Assembly line	Vehicle system engineering (simulation & modelling)	Required for ICE but a few aspects are also needed for EV designing, like battery weight/ position etc.

		Understanding vehicle body parts, assembly line Includes trained NEET, TVET workforce	
Battery Technology	Manufacturing batteries	Electrical Includes trained NEET, TVET workforce	X
	Battery Management system	Electrical, Chemical, Mechanical engineering Includes trained NEET, TVET workforce	X
Sales			
Automotive/ EV Pillar	**Job Category**	**Skills needed**	**Overlap with ICE**
Sales	EV Sales	Need to understand the features of the EVs Includes trained TVET workforce	X
Driving			
Automotive/ EV Pillar	**Job Category**	**Skills needed**	**Overlap with ICE**
Driving	EV Driving	Need to sensitise the drivers to drive an EV. They need to understand the difference while operating an ICE and EV. Includes trained NEET workforce	X
Service			
Automotive/ EV Pillar	**Job Category**	**Skills needed**	**Overlap with ICE**
Service	Service Technician (Mechanical components)	Service requirements for brake system, vehicle body and components	✓

		Includes trained NEET, TVET workforce	
	Service Technician (Electrical & Electronic components)	Service requirements for motor, wires, controller, voltage regulator, electronic ignition and fuel metering Includes trained NEET, TVET workforce	X
	Service Technician for battery and motor related to EVs	Service requirements for battery pack, cells, software upgradation, electronic parts servicing, diagnostic and testing Includes trained NEET, TVET workforce	X
	Operating digital interface	Soft skill requirement of knowing English and few other languages to read a manual Includes trained NEET, TVET workforce	✓
	Vehicle Safety	Sensitisation for handling EV batteries and other high voltage components during servicing Includes trained NEET, TVET workforce	X
End of Life (EoL) Management			
Automotive/ EV Pillar	**Job Category**	**Skills needed**	**Overlap with ICE**
EoL	Collection	Safe battery handling, safe transportation, fire safety Includes trained NEET, TVET workforce	✓

	Battery Testing, Segregation	Chemical, Electrical Includes trained TVET workforce	X
	Recycling	Chemical, Electrical, Safe battery handling, safe transportation, fire safety Includes trained NEET, TVET workforce	✓
	Safety in disposal	Sensitization is required while safely disposing the hazardous materials (electronic components will be higher in EVs) Includes trained NEET, TVET workforce	X

While most roles in safety, design, aerodynamics and automation will directly translate to EVs, there are some EV specific aspects which will draw on new skills. The simplification of the underlying components provides ground for innovation in terms of an efficient design for comfort and reliability. This also leaves room for technologically superior solutions like real-time driver monitoring, vehicle component reliability and safety features. Charging stations can initially complement existing fuel stations, then evolve as stand-alone hubs for vehicle charging and passenger resting destinations. Moreover, significant talent will be needed for developing compact batteries, as well as super-fast charging and efficient disposal systems. Reskilling our existing workforce will meet this demand to an extent, however, more fundamental investments would be needed to upskill our population.

A step towards multi-stakeholder collaborations

The Constitution of India places skilling and vocational education under the Concurrent List, being a central as well as state subject. However, with the pace at which this sector is set to grow, it needs collaborative efforts from not just the centre and states, but OEMs, training institutes, among others.

The Ministry of Skill Development and Entrepreneurship is already creating a framework for recognition of individual certifications of institutions (PIB, 2019b). Further, they can regulate the modules for EV mechanics and EV trainers, running these across all ITIs in India. The National Skill Trainers Institute (TOI, 2018) is conceptualising modules for trainers in the EV sector. These vocational courses will lower the entry barriers to the automobile ecosystem. Skilling can also be outsourced to the industries by creating mandates, monitoring and evaluation systems. The private sector (manufacturers) must look beyond short-term profitability to create an enabling ecosystem. The centre can boost these efforts by funding research organisations and collaborating with the industries for innovation.

States should allocate funds for skilling and reskilling to match the country's fast paced e-mobility transition. Skilling the workforce at the right time will mitigate the possibility of job loss due to the transition. Being a dynamic sector with rapidly changing technology, there is a need for continuous skilling, reskilling and upskilling. Thus, states and local governments should focus on administrative realignments to support capacity building programmes at the grassroots. States like Karnataka and Tamil Nadu provide a reskilling allowance for employees in the EV manufacturing units (Narain, 2021).

Leveraging DESH-Stack e-portal

Central government's soon-to-be launched Digital Ecosystem for Skilling and Livelihood DESH-Stack e-portal aims to provide skilling, upskilling and reskilling opportunities through online training (Budget 2022-23). The curriculum thus offered could be aligned with the EV industry's needs. Special emphasis could be laid on skilling courses that can enable ICE workers to upskill themselves for EV transition. Further, industry partnerships can help reorient these courses to the needs of the future.

On similar lines, the Budget 2022-23 also focussed on vocational training through 75 new skilling e-labs and also ramping up capacity building in planning, design, financing and implementation manager of PM GatiShakti infrastructure projects. Reorienting the skills training imparted here, paced with the EV transition, will help meet the infrastructural needs of tomorrow.

Existing skilling efforts in Himachal Pradesh, too, exemplify this multi-stakeholder approach. In 2018, the Government of India signed a loan with the Asian Development Bank to boost TVET[5] institutions and enhance the skilling ecosystem (ADB, 2018). The project will establish a polytechnic centre for women, seven rural livelihood centres, upgrade the existing model career centres, and involve private players in this endeavour. As effective as these state policies may be in easing the transition to EVs, it is important that they are supported by local efforts, like city-level Comprehensive Mobility Plans (CMPs), which could include skilling programmes.

An overview of current EV courses

As the world transitions to an EV-ready future, there is a need for EV-centric courses, with collaboration between academia and industry, to create the right skill sets required. Table 2 highlights some of the existing EV courses in India (Hindu, 2021).

Table 2: EV Courses/Training Programmes in India[6]; Source: Authors; compiled from multiple sources

ARAI & NPTEL (initiative of IITs & IISc) – short training and online courses on EVs	ASDC + DIYguru - Electric Mobility Nanodegree	ASDC + MG Motor + Autobot India - EV training programme, Dakshta	ASDC + SIAM (Society of Indian Automobile Manufacturers) EV courses	FADA (Federation of Automobile Dealers Associations) EV courses

[5] Technical Vocational Education and Training
[6] Not an exhaustive list

ACMA (Automotive Components Manufacturers Association of India) EV courses	IIT Delhi - M-Tech in Electric Mobility	IIT Kharagpur, Roorkee, Bombay, Madras - Course on Electric Mobility	UPES (University of Petroleum and Energy Studies) - Course on Electric Mobility	Marwadi University (Masters in Electric Vehicles Engineering)
Gujarat Institute Solar Energy (GISE) EV course	TATA Power Skill Development Institute (TPSDI) EV courses	EMF Innovations EV course	Pragyatmika (Research and Training Company) EV course	Academy of EV Technology
Devise Electronics EV course	MakerMax Inc. (Online Learning Portal) EV course	Haritha TechLogix (Consultancy and Training Service) EV course	pManifold EV Training and Certification Programme	SkillShark EduTech EV course
Ready for Future (Online Learning Platform) EV course	Amika Global Education	Logiczap Technologies Training Institute EV course	Prudent Consultants EV course	Tesla EV Academy - numerous EV courses
Decibels Lab EV course	AutoBot India (Consultancy and Training Service) EV course	Rosefield Energy Tech Pvt. Ltd. EV course		

Even as universities acknowledge the need for EV skilling education and state governments revise their curriculum, it must be noted that these students would still have years before they can formally join the workforce. The existing skilling gap will not only persist, but also grow, without the upskilling and reskilling of the current workforce. To address this, institutes, OEMs and others should focus on short-term courses, vocational training and apprenticeship programmes, which would be faster and more feasible compared to formal university education. This will significantly reduce the turnaround time of upskilling and reskilling.

The way forward

India has long been an exporter of skilled and semi-skilled labour. With more than 20 countries around the world formulating plans to phase out ICE vehicles, the demand for manufacturing, servicing, repair, maintenance, and recycling of EVs and their batteries should witness a drastic increase. This surge in demand for skilled labour is a quarry of opportunities for India, given its obvious demographic strengths and historical legacy in automotive skilling. The country has a chance to strategically plug the gap in workforces around the world at this moment of automotive flux.

Even though EVs make a fraction (2.2%) of automobile sales worldwide, by 2030, they will make up 70% of all vehicle sales in China, ~50% in Europe, ~30% in Canada and the United States, and 29% in India (IEA, 2019). This growing demand creates an urgent need for skilling for two fundamental reasons - India needs a workforce that can be absorbed into the EV sector to remain at the forefront of global automotive manufacturing, and the existing workforce employed in the automotive sector will need upskilling to stay relevant once the transition from ICE is complete.

On the one hand, Tamil Nadu, Maharashtra, Kerala and Uttar Pradesh are addressing the EV sector's labour demand (Subramaniyan, 2019; Tornekar, 2019; ACMA, 2018). On the other, the least employable talent is in the age group, 26-29 years; only 37% being highly employable (Wheebox, CII, & Taggd, 2021), pointing to the need for upskilling the workforce with the changing nature of work.

The EV manufacturing industry can take a leaf from digital platforms' playbook in this instance. Many platform companies provide skilling opportunities to those associated with them. Such measures ensure uniform standards in quality of service, while upskilling a large section of the population. Apart from tie ups with the NSDC, platform businesses have signed MoU[7] with the Ministry of Housing and Urban Affairs to facilitate the upskilling and platform-onboarding of street food vendors (PIB, 2021). In other parts of the world, platform-led upskilling also leads to certification, an accreditation to facilitate their upward mobility (Osborn, 2020). A similar on-the-job skilling certification in the EV sector can not only upgrade the current workers with the changing future of work, but also increase their earning potential.

Until a few years ago, skilling was viewed as a last resort, meant for those who may not have succeeded in the formal academic system. Further, low entry-level salaries and lack of employers' endorsements had made skilling undesirable. However, the country can no longer afford to ignore the urgent need to ramp up its skilling initiatives. India's automobile industry has begun its ascension to EVs, which coupled with its demographic dividend can catapult the country into a global leader of the green future. If skilling infrastructure for existing job roles is inadequate, skilling for an EV landscape will warrant expeditious and substantive revision of the status-quo. Having an incisive strategy in place is no longer enough; individuals trained today will form the workforce of tomorrow.

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www.ola.institute

mobilityinstitute@olacabs.com

https://twitter.com/OlaMobilityInst

https://medium.com/@mobilityinstitute

https://www.linkedin.com/company/ola-mobility-institute/

Authors:

Shilpi Samantray

Shilpi is Lead, Electric Mobility, OMI. She is a multi-disciplinary EV and RE expert with a Master's in Renewable Energy from TERI University.

Chhavi Banswal

Chhavi is Lead, Future of Work & Platform Economy, OMI. She is a former journalist, and holds a Master's. in Public Policy from NLSIU, Bengaluru.

Editor: Aishwarya Raman, Director & Head of Research, OMI

Contributors: Arindam Lahiri, CEO, Automotive Skills Development Council (ASDC); Dr. Nick McCarthy, Cenex; Yash Narain, Ex-Research Associate, OMI

Peer Reviewer: Dr. Christoph Wolff, Lecturer, University of Cologne, and Former Global Head of Mobility and Member of the Executive Committee, World Economic Forum

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