

> REPORT

NATIONAL WORKSHOP FOR INTERNATIONAL ELECTRIC BUS OEMS

NOVEMBER | 2023



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About UITP

ABBREVIATIONS

CAPEX	Capital Expenditure
CPO	Charge Point Operator
DHI	Department of Heavy Industries
E-Bus	Electric bus
FAME	Faster Adoption and Manufacturing of Electric Vehicles
GDP	Gross Domestic Product
GSDP	Gross State Domestic Product
GST	Goods and Services Tax
INR	Indian National Rupees
MoU	Memorandum of Understanding
OEM	Original Equipment Manufacturer
OPEX	Operating Expenses
PLI	Production Linked Incentive
PSM	Payment Security Mechanism
SGST	State Goods and Services Tax
STU	State Transport Undertaking

SUMMARY

India's plan to revamp its public transportation infrastructure through the induction of electric buses, is a giant stride towards India's public transport, paving the way for accessible, affordable, safe, and clean public transport. Several initiatives taken by the Government of India such as the FAME India Scheme, Grand Challenge for Demand Aggregation and currently, the National Electric Bus Program (NEBP) and the PM E-bus Sewa are to attain sustainable low carbon emissions mode of transportation also keeping up with the huge demand of buses in India.

NEBP, CESL, for India has projected to deploy 50,000 public e-buses for the intracity bus segment by 2030, meanwhile, NITI Aayog-apex think tank body of the Government of India has projected an overall 500,000 sale of e-buses in India by 2030. The current trend of large-scale e-bus deployment through demand aggregation done by CESL Grand challenge, indicates a requirement of approximately 16,590 buses in various phases, whereas till date only 5957 e-buses are on the road. Thus, raising concern for the supply-side readiness of the market. Also, the two major Indian OEMs not participating in the 2nd demand aggregation exercise by CESL, raising further concerns about supply readiness.

Thus, based on current trend in the growing electric bus market, along with its massive market potential, reveals that the electric bus supply capacities of major Indian OEMs are estimated to be significantly lower than the actual market demand. This situation paves the way for bringing in pre-established international players (OEMs

and ancillary product manufacturers) into the Indian market. UITP's project on "Advancing Electric Buses in India" also commits to supporting and improving the local supply market for electric buses as part of India's fleet electrification plans.

To boost the readiness of the supply side for electric bus manufacturing, UITP India organised a one-day 'National Workshop for International Electric Bus OEMs', supported by NITI Aayog, held on 30 November 2023, in New Delhi. The workshop aimed to bring together international electric bus (e-bus) Original Equipment Manufacturers (OEMs) and key stakeholders from the Indian Government on a common platform. The major objectives were: 1) To present an overview of both the supply and demand sides of the e-bus ecosystem and have holistic discussions to improve the supply ecosystem of e-buses in India and 2) To understand what the States have to offer in terms of favourable manufacturing ecosystem to the OEMs.

Six different international OEMs and three component manufacturers participated in the workshop due to their keen interest in exploring the Indian e-bus market and understanding the policy setup and ecosystem for entering the market. The workshop featured detailed deliberations from various Central Ministries of the Government of India, highlighting the focused schemes on the promotion of the electric bus sector. Additionally, the workshop had participation from nine States Industries and thirteen State Transport Departments/Undertakings, each presenting their offerings to the International OEMs.

Description	Numbers
No. of OEMs & ancillary infrastructure providers	8
No. of Ministries & Govt Bodies/PSUs	4
No. of States Industrial Department	9
No. of Transport Department/ STUs	13
Human hours spent on planning event	2816
No. of hours of discussion	6

► Table 1 Summary indicating no of participants and hours spent on planning and actual discussion for the workshop

The one-day workshop witnessed the participation of more than 60 delegates who came together with the common goal of accelerating the deployment of e-buses in India.

INTRODUCTION

India's aim to reach net zero by 2070, through restoring its public transportation infrastructure by inducting electric buses indicates is a significant advancement towards sustainable and safe public transport. With the expected current growth rate of Indian electric bus market by 21% from 2022 to 2030 and several Government initiatives/ schemes like NEBP, PM e bus sewa projecting targets to deploy about 50,000 and 10,000 e-buses for intracity usage and Government think tanks like NITI Aayog projecting a large-scale deployment requirement of an overall 5,00,000 of e-buses in India by 2030, indicates the growing Indian market and its opportunities. CESL's, Grand Challenge programme, indicates a requirement of approximately 16,590 buses under various phases, whereas till date only 5957 e-buses are on the road. Thus, raising concern for the supply-side readiness of the market. Also, the absence of participation from major Indian OEMs in the 2nd demand aggregation challenge organised by CESL, raised further concerns of supply readiness.

With the massive potential of the Indian market for e buses and the rate at which it is currently growing, it may be inferred that supply side is not able to cater the growing demand, thus bringing an opportunity for pre-established international players (OEMs and ancillary product manufacturers) to enter the Indian market and help in the supply side improvement for electric bus market. UITP's project "Advancing Electric Buses in India" pledges to support and improve the local supply market of electric buses and contribute to India's electric bus fleet electrification plans.

To improve the supply side readiness in the Indian market, the UITP India team reached out to over 20 eminent International OEMs from various countries like Switzerland, Germany, France, Turkey etc associated with e-bus & ancillary infrastructure manufacturing, based on their expe-

rience in their field. Bilateral meetings were held with each OEM, indicating positive responses regarding positive demand and conducive manufacturing ecosystem opportunities in India and a willingness to explore the next steps for engaging with the Indian stakeholders at the workshop. UITP team also reached out to Departments of Industries and Transport for all Indian States and Union Territories to showcase their offerings related to E bus ecosystem, aiming to attract OEMs to set up manufacturing plants.

As a result, the 'National Workshop for International Electric Bus OEMs', organised by UITP India and supported by NITI Aayog, was held on 30 November 2023, in New Delhi. The workshop aimed to bring together international electric bus (e-bus) Original Equipment Manufacturers (OEMs) and key stakeholders from the Indian Government, State Industries and Transport Departments on a common platform. The goal was to understand both the supply and demand side readiness of the e-bus ecosystem and engage in holistic discussions to improve the supply ecosystem of e-buses in India and understand the conducive environment provided by State's Industries department for attracting the International OEMs for setting up manufacturing plants in India.

The one-day workshop witnessed participation of more than 60 delegates who came together with the common goal of accelerating the deployment of e-buses in India.

KEY SESSION OUTCOMES

The workshop commenced with the opening remarks by **Ms. Rupa Nandy**, Head of UITP India. She welcomed the participants and informed them about the workshop's purpose. She also highlighted that UITP, with the support of NITI Aayog, organised the workshop to understand the facilities, incentives and the local conditions available to manufacturers for setting up manufacturing units, thereby increasing the supply-side readiness of electric buses in the country.



Mr Sudhendu J Sinha, Advisor, NITI Aayog, delivered the welcome address, providing context to the delegates during the workshop. He focussed on decarbonising the transportation system in the country through three measures: shifting from private to public transport, strengthening the public transport systems across the country, and improving the quality of public transport for citizens. He briefed the audience on the FAME 1 & 2 schemes and emphasised that the OPEX model yielded better competition than the CAPEX model. He highlighted that the cost of operating electric buses was 25-30% lower than that of CNG. Currently, India has 1.8 to 2.3 million buses, with only 2.5% of the buses operated by State Road Transport Undertakings. Mr Sinha also mentioned the demand for manufacturing 50,000



electric buses daily, with a 45% to 60% localisation requirement. However, the current market supply capacity falls short of meeting the market demand, and thus welcomed OEMs to consider entering the Indian market, particularly now, when the FDI regime is favourable, and the demand is also available. He assured them of the best possible policy-level support.

GOVERNMENT READINESS ON E-BUS ECOSYSTEM

The first workshop session witnessed active participation from Apex Central Government regulatory bodies, namely the Ministry of Housing and Urban Affairs (MoHUA), the Ministry of Heavy Industries (MHI), and Convergence Energy Services Limited (CESL). They engaged in discussions to sensitise the audience about India's national schemes and policies that promote the manufacturing and deployment of e-buses in the country. The speakers and key points of discussion included:

Mr Surendra Kumar Bagde, Additional Secretary, Ministry of Housing and Urban Affairs, enlightened the participants about the PM E-bus Seva Scheme and the overwhelming response it received since its inception in September 2023. He focused on the salient features of the scheme and pointed out that the scheme would support cities for 10 years of operation under a 12-year



The PM E-bus Sewa scheme to provide per km subsidy for 10 years of operations.

- ▶ 12m bus: ₹24 per km
- ▶ 9m bus: ₹22 per km
- ▶ 7m bus: ₹20 per km

There is also provision of escalation in subsidy part.

contract on a per-kilometre basis. He also elaborated on the potential for obtaining funds for ancillary infrastructures such as charging stations and depots and outlined the requirements of these cities from the manufacturers of electric buses.

Mr Gaurav Joshi, Deputy Secretary, Ministry of Heavy Industry spoke on the readiness of the e-bus ecosystem in India. He covered three major schemes from MHI: the FAME scheme, the Production Linked Incentives Scheme for automobiles and components, and the Advanced Chemistry Cell, a five-year scheme aimed at reducing the cost of battery components in buses. He



emphasised on the importance of skill development for servicing of e-buses. Together, these initiatives, along with schemes from MoHUA and CESL’s grand challenge, constitute an overall ecosystem nurturing the transition to electric mobility in India.

Mr Rajneesh Rana, Head Convergence, spoke on the demand aggregation model for e-buses in the country. He emphasised that out of the projected demand of 50,000 e buses, 16,000 buses have already been tendered out or at different stages of deployment within a



span of only one and a half years. Mr. Rana discussed the challenges faced by CESL at different stages and highlighted the progress and achievements over the years. He pointed out that the manufacturing capacity of e-buses in India is much lower as compared to the demand foreseen by CESL and NITI Aayog, providing a huge opportunity for international OEMs to enter the Indian electric bus market for both domestic demand and international



exports. He also urged all states and STUs to join in the transformative journey with CESL.

INTRODUCTION TO THE INTERNATIONAL OEMS & COMPONENTS MANUFACTURERS

The second session, Introduction to International OEMs & Components Manufacturers, saw participation from six different OEMs and three component manufacturers in the workshop. These OEMs showed keen interest in exploring the Indian e-bus market and understanding the policy setup and ecosystem available for entering the



▶ International OEMs who participated at the workshop

market. Only five of them presented their offerings and raised questions to the stakeholders regarding the Indian market and their expectations. Isuzu, Turkey based company, was present in the workshop, however, did not present their offerings.

HESS INDIA

Mr Pranesh Naik, Head Product Development & Strategy, HESS India, emphasised how HESS believes in an overall public transport solution achieved through rolling stock planning in cities and multimodal integration. The

solutions provided by them, such as light trams, e-buses, and trolley buses, have been tested and proven over 140 years. HESS provides complete solutions to buyers including route planning, the best fit rolling stock solution for routes, and an entire charging solution for a 25-

combination of an automotive supplier and an engineering service company called INTECH based in Germany and Austria. Mr. Kaun highlighted the gap in demand and supply despite numerous electric mobility solutions available in the market. Pepper Motion fills this gap by electrifying existing vehicles for operators and enabling OEMs to quickly bring new EVs to the market. They have also developed a 44kW waterproof DC mobile charger for depots. Pepper Motion's portfolio includes a full e-mobility ecosystem, offering services such as depot management, energy management, planning, and execution among others. They also focus on acquiring local partners for better sales, services, and production.

HESS India
 HESS India (HESS Green mobility India Private Ltd) is the official representation of HESS, a Switzerland head quartered, provider of e-Bus solutions with 140 years of legacy. With technical expertise from HESS Switzerland, they are offering local built state-of-the-art Electrical Buses and Trolley.

year lifetime. They also provide flash charging solutions for trolleybuses, which are 85 times faster than normal charging. For providing mobility solutions, HESS requested support from states and policymakers from the apex ministerial bodies to enable new business models and technology to enter the market. Currently, HESS has manufacturing plants in Switzerland, Portugal, the USA, Australia, and Malaysia.

Questions from the audience focused on the capabilities, efficiency, and scalability of HESS's services and products.

The interactive session included questions about bus capabilities, use cases, technology partners, and challenges faced in deploying e-buses in India. Mr Kaun also highlighted a recent MOU that is signed between the Andhra Pradesh Government and Pepper motion for setting up manufacturing units for e bus production in India.

PEPPER MOTION

Mr Markus Kaun, Product Manager at Pepper Motion, a Germany-based company focused on retrofitting buses and trucks, spoke about the company's inception as a

Pepper Motion
 Pepper develops electric drive systems for buses, trucks, and special vehicles for a fast, economic, and sustainable entry into electromobility.
 It provides both conversion kit for existing vehicles and drive kit for new vehicles.
 Current countries operating in: Italy, Poland, France, and Spain.

PRODUCTION CHAIN

PEPPER STEPS IN BETWEEN TIER 1 AND OEM TO PROVIDE AN EFFICIENT SOLUTION TO ELECTRIFICATION

OEM
Original Equipment Manufacturer

Tier 0.5
Pepper kits

TIER 1
Module or Supplier System

TIER 2
Component Supplier

TIER 3
Parts Supplier

Shared IP with Tier 1 players that produce items according to Pepper needs and indications

Sole exclusivity to Pepper

Two supplier (GER and PL) but many more to add...

Pepper adds its proprietary software to deliver the electrification solution

pepper Kit ("Tier0.5")

- Application of drivetrain
- Additional engineering packages

Documentation

- User Manual
- Service Manual
- Bill of material
- Certifications
- Homologation

pepper Architecture

Tier1 & Own developed components

Functions & Software

- Legislative requirements
- Normative requirements
- ISO26262
- ISO21434
- Pepper requirements

Kaun, Markus

KUMAR Vipul

BOZANKAYA

Mr Yigit Belin, Head of Sales and Business Development at Bozankaya, a Turkey-based manufacturer of e-buses, trolleybuses, tram buses, automotive, and rail systems extensively spoke about the company's journey from being just an R&D company in 1989 to manufacturing trams and buses in 2016. Bozankaya believes in partnering with local stakeholders and bringing localisation for about 70% of their production. For e-buses, they are involved in designing, manufacturing, software cabling, harness production, and creating HV batteries and man-

agement systems. The production capacity at their main plant in Turkey is 1.2 buses per day.

Bozankaya

E-bus variants of 10m, 12m, 18m, 25m length options, 100% low-floor. with a capacity of 75-232 passengers. It provides 230 to 600 kWh battery with 300 to 400 km range.

Current countries operating in: Turkey, Germany, Australia, Canada, Thailand, Luxembourg and more.

	Sub-component Production Plant		Electric Commercial Vehicles & Railway Systems Production Center			Metal Part Processing Plant	
Total Area	40.000 m ²		100.000 m ²			24.000 m ²	
			5.000 m Linear Rail Track				
			30.000 m ² Extension				
Closed Area	26.000 m ²		60.000 m ²			9.200 m ²	
Product	E-bus	Railway System	E-Bus	Tram	Metro	Bus Aluminium Parts	Rail Vehicles Aluminium Parts
Plant Capacity	17 cars/day	2 cars/day	1,2 cars/day	1,2 cars/day	0,7 cars/day	2,3 t/day	0,7 t/day
Employees	White Collar: 51		White Collar: 190 (98 in R&D)			White Collar: 24	
	Blue Collar: 291		Blue Collar: 484			Blue Collar: 98	
	Total: 342		Total: 674			Total: 122	
	TOTAL: 1138						

IVECO

Iveco, a France-based manufacturer known for urban and intercity buses, tourist coaches, and minibuses. Marco Franza, Head of Bus Customer Service and Energy Mobility Solutions, presented on their behalf. He discussed various products and services offered by the IVECO group, highlighting that IVECO holds a substantial 22.6% market share in Europe, and operates globally in more than 40 countries.

With 11 production sites and an annual production of 13,000 buses, IVECO provides comprehensive services for e-buses, from feasibility studies to turnkey projects.

During the presentation, the audience posed questions about e-bus capabilities in different climate conditions, bus design, and overhangs. Mr. Franza also inquired about the best type of product for India, the need for homolo-

gation in India, and whether the Indian Government has specific projects that IVECO could consider.

IVECO

IVECO BUS offers a full range of environmentally friendly solutions, including natural gas and electric vehicles as well as a widespread service network and connected services. They provide complete range of urban and intercity buses, tourism coaches, and minibuses, meeting the needs of public and private operators.

Current places operating in- Europe, Latin America, Africa Middle East, Central Asia, Russia, and South-East Asia countries.

READY TODAY FOR THE FUTURE CHALLENGES

**IVECO
BUS**

ENERGY MOBILITY SOLUTIONS
by IVECO BUS

All services around e-buses
From feasible studies to turn-key projects

CHARGING SOFTWARE

FULL-SERVICE CHARGERS

DESIGN & EXECUTION

SUSTAINABLE SOLUTIONS

ON-SITE TRAINING

CHARGING STATIONS

IVECO ON

Connected vehicle

- Fleet
- Uptime
- Care
- Driving style evaluation
- Maintenance & Repair

e bench
TEST & VALIDATION LAB

Testing facility

- Whole vehicle
- Single e-components
- Accessories & IT
- Climatic Chamber
- BEV, H2, Gas

More reliable, faster to market



ALEXANDER DENNIS

Alexander Dennis, a Canada-based manufacturer specialising in Double Decker and Light Weight buses, was presented by Mr Jamie MacIntosh, Business Development Manager. He shared insights about the 128-year-old company's global leadership with 16 facilities in 10 countries. Alexander Dennis covers the entire process from the first sketch of the vehicle to the homologation of the e-buses. With 2,000 e-buses on the road and an 83% market share in the UK, Mr MacIntosh showcased their products and discussed bus chassis design, safety measures in the battery, backend support, and considerations for bus tendering.

Mr MacIntosh enquired from the audience about India's next five-year goals demand, bus specification requirements, and plans.

Alexander Dennis

They are the world's largest manufacturer of double-deck and lightweight buses, with facilities in 10 countries.

Their products include:

- ▶ Light weight buses: 8.5m, 9.5m, 10.4m, 11.7m, with 45 to 98 passenger capacity, 236 to 396 kWh battery capacity options, and range of approx. 460 km
- ▶ Double decker bus: 10.5m, 11.1m, 12m, with 96 to 129 passenger capacity, 354 to 472 kWh battery capacity options, and have range subject to operating conditions.

Next-generation battery-electric buses



Enviro100EV THE BIG SMALL BUS

- 8.5m length / 2.35m width
- up to 45 passengers with up to 25 seats
- Impact 354kWh or 236kWh battery
- up to 285 miles range
- Voith VEDS MD motor

Enviro200EV THE ALL-ROUNDER

- 9.9m, 10.4m, 10.9m or 11.7m length / 2.47m width
- up to 98 passengers with up to 43 seats
- CATL 396kWh battery
- up to 285 miles range
- Voith VEDS MD motor

Enviro400EV THE CROWD-SHIFTER

- 10.5m or 11.1m length / 4.2m or 4.3m height
- up to 96 passengers with up to 80 seats
- Impact 472kWh or 354kWh battery
- up to 260 miles range
- Voith VEDS HD motor

Enviro500EV THE GLOBAL PEOPLE MOVER

- 12m length / 4.4m height
- up to 129 passengers with up to 90 seats
- Impact 472kWh battery
- range subject to operating conditions
- Voith VEDS HD motor



The session then transitioned to ancillary product manufacturers, who showcased their offerings to the States and Government.

HITACHI ENERGY

Hitachi Energy, a Switzerland-based component manufacturer, presented by Mr Ashish Khanna, Segment Manager, shared the company's commitment to sustainable energy systems. Hitachi Energy has three portfolios: onboard equipment in the form of semiconductors, specialized cooling units, and energy storage system, wayside infrastructure in the form of a charging network with CCS, MCS and even flash charging, and digitalisation, with entire control and protection of high and medium voltage network, SCADA, asset management and performance management solutions. Mr Khanna highlighted that Hitachi Energy is focusing on providing high MV fast charging solutions to OEMs, and Charge Point Operators (CPOs) to boost the Indian Electrical system. Questions to Mr Khanna included queries about flash charging and its impact on battery health.



Hitachi Energy

Focused on bringing in a digital transformation to customers and partners, to accelerate the energy transition towards a carbon-neutral future. Currently, they serve the Indian railways, metros, utility power grids and transformers.

They have done Flash charging pilots with IIT Chennai and Ashok Leyland buses.

WABTEC INDIA

WABTEC India, represented by Mr Gaurav Agarwal, General Manager of Business Development and Strategy, emphasised the company's background and solutions, especially in depot pantograph charging and the opportunity charging and mentioned that Wabtec is the only approved company for Indian Railways for pantographs. He assured the audience of the proven technology used

in Indian Railways, emphasising its potential in the bus domain.



WABTEC India

US based 50-year-old company providing rail technology with rolling stock, pantograph solutions

They provide solutions for e-bus charging components, and innovative passenger door systems, access ramps, wheelchair lifts, high-performance air dryers and state-of-the-art video surveillance and communications.

VENTURA SYSTEMS

Ventura Systems, an innovative door system supplier for public transport, was represented by Mr Wiebe van der Wijk, Business Development Manager. He discussed the importance of supplier solutions for OEMs and highlighted Ventura System's global presence. Mr. Wijk explained how climate, flow rate, and city preferences influence door system selection for buses, emphasising the importance of air sealing to save electricity and prevent leaks.



Ventura Systems

Based in Netherlands providing state-of-the-art electric door systems which improve urban vehicles. Ventura Systems improves the functionality of the vehicle, resulting in the best uptime, optimum passenger flow and maximum interior space.

The session concluded with OEMs sharing their questions and concerns, seeking support from states, policy support at the central level, and expressing interest in projects for which India is seeking international OEMs. The industries departments and the transport departments also raised queries regarding products that could address the challenges faced by cities and the OEMs' intentions to enter the Indian market.

STATE'S INDUSTRIES DEPARTMENT READINESS FOR E BUS ECOSYSTEM

The next session focused on the "State's Industries Department Readiness for the E bus Ecosystem," where the state's industries department primarily addressed topics such as, industrial promotion policy, electric vehicle policy, ease of doing business, the number of manufacturers present in the state, available industrial parks, megaprojects, sustainable development measures, land bank availability, industry licencing, and skill developments for OEMs. Each state's presentation highlighted the ecosystem available for setting up industries and the incentives offered. Nine states participated: Andhra Pradesh, Assam, Bihar, Haryana, Kerala, Madhya Pradesh, Rajasthan, and Tripura. The State of Goa was also present but did not present its offerings to the OEMs. The discussion with each state are detailed below:

Andhra Pradesh: Mr Ashok Reddy Kakarla, General Manager representing the Andhra Pradesh Economic Development Board, spoke about the investment scenario in the state. Andhra Pradesh offers the best avail-



able facilities for new investments for setting up manufacturing units, with annual business reform plans, a favourable ease of doing business policy, three industrial corridors, high road connectivity, abundant water and power supply, and a presence of around 36 large and mega companies in the automotive and EV manufacturing value chain. He also discussed the Electric Mobility Policy that complements the Government of India's Auto & Auto Components PLI Scheme. The state has a

presence of potential suppliers/vendor base, proximity to the demand market in mega cities of Tamil Nadu, Karnataka and Telangana, and partnerships with leading institutes and APSSDC (AP State Skill Development Corporation) for a basic industrial skill development program.

Assam: Mr Tapan Deka, Joint Director of Industries and Commerce, provided an overview of policy support, ecosystem availability, and infrastructure in Assam. The government of Assam offers customised policies for megaprojects with over 12,000 crore investments, providing



incentives such as 150% of fixed capital, GST exemptions, power subsidies, and more. Assam boasts a robust ease of doing business (EoDB) setup, with infrastructure including Assam Industrial Development Corporations (AIDC), Assam Small Industrial Development Corporation (ASIDC), Assam Industry Infrastructure Development Corporation (AIIDC), industrial parks, industrial IT centres and measures for provision of land.

Bihar: Shri Abhay Jha, IAS Administrator, briefly discussed incentives in Bihar, highlighting the robust Industrial policy that provides incentives on registration, electricity connection, power tariffs, employment generation, capital investment and skill development. Bihar offers reimbursements in tax, electricity duty, land registration stamp duty, land conversion fee, and more. Land is also made available for potential investors under Bihar Industrial Area Development Authority (BIADA).



The state has 73 industrial hubs, 17 business cluster undertakings, three airports, and good connectivity through road, rail, and water networks.

Haryana: Mr MK Sardana, the coordinator for the Bureau of Industrial Policy and Promotion, talked about Haryana's GSDP. Haryana has a high volume of exports and is ranked high in the India Innovation Index 2021. Haryana, a leader in automation and producer of 50% of passenger vehicles and 60% of bikes in India has three semi-auto components clusters. Approximately, 30% of the large OEM's of India are also located in Haryana and the state has an integrated multimodal logistic hub and is developing an Integrated Aviation Hub spread. Haryana offers incentives through its EV policy, including capital subsidy on fixed capital investments (FCI), seed and



conversion funds to convert existing manufacturing units to EV manufacturing, net SGST refund, power subsidies, water treatment cost incentives, patent fee reimbursement, and employment generation subsidies. The state also has a dedicated Skill Development University and the Haryana Enterprise Promotion Centre (HEPC) which provides integrated end-to-end single roof solutions including property acquisition, contract approvals and grievance redressals.

Kerala: Ms Diksha Purohit, represented the Kerala State Industrial Corporation. Kerala is the frontrunner in e-governance service delivery, tourism, energy efficiency, innovation, and export preparedness. The state boasts robust connectivity with airports, major seaports, inland waterways, railways, and roadways. She highlighted that about 82 % of total power generated in the state comes from green energy sources, including hydro, thermal, solar and wind. In terms of industrial infrastructure, Kerala has several industrial parks, and new ones are under development. The Kochi Bangalore industrial corridor is a mega industrial corridor project. The state also features a fast-tracked single-window online system for entrepreneurs, ensuring seamless statutory clearances through-



Possibilities of Joint Venture partnership:

Case of Lord's Mark Industries Ltd Joint Venture with Kerala Automobile Ltd (KAL)

Lord's Mark Industries Ltd is a Mumbai based renewable energy products maker, formed a JV with the Kerala state owned Kerala Automobile Limited (KAL) to expand its electric vehicle business for end-to-end EV infrastructure. KAL holds 26% stake in the JV. The manufacturing facility is based in KINFRA Park in Kannur, Kerala, with the aim of distribution across the country and have plans to export in key markets.

out the lifecycle within a 30-day timeline. Mr. Purohit mentioned other initiatives such as SGST refund, a 10% investment subsidy on fixed capital investment, employment enhancer incentives for employing over 50% permanent jobs for the local population, stamp duty exemption, quality certification incentives, sustainability and responsible industrialisation incentives, and case-to-case basis incentives. The government of Kerala has initiated a plan to convert 3,000 buses into EVs by 2025, with 100% government procurement in the initial phases.







Madhya Pradesh: Mr Kamal Peshwani, representing Madhya Pradesh Industrial Development Corporation discussed Madhya Pradesh's (MP) ecosystem, infrastructure, and investments. He provided details on the



total number of operational commercial airports, industrial areas, new expressways, industrial corridors, inland container depot, abundant electricity supply and one of the best labour laws. The automobile sector's growth in Madhya Pradesh has been highest, hosting 10+ OEMs, 3000+ auto components manufacturers. He also spoke about the Pithampur auto cluster. MP has a robust logistics and multimodal logistic park, is home to global companies, and contributes significantly to the total national automobile production. Volvo Eicher Commer-

cial Vehicle is also set to invest in an EV manufacturing unit. MP's industrial promotional policy offers several incentives, including Investment Promotion Assistance of up to 40% of the investment in plant & machinery, green industrialisation assistance, employment generation, power tariff rebates, benefit to export-oriented units, reimbursement of patent charges, infrastructure development assistance, and a customised package for investment in mega-scale industrial units, and a 30-day single-window clearance.

Madhya Pradesh: Case of lucrative incentives to an EV manufacturer

Incentives as per MP Industrial Policy	Over and above the Policy Incentives provided to OEM under CCIP by GoMP	<p>The OEM has proposed an Investment of INR 160 Crores in Plant, Machinery</p> <p>GoMP is incentivizing the firm to a tune of INR 146.23 Cores (93.22 Crores over and above the Policy and 91% Return on investment on Plant & Machinery</p>
 Concession in Land rates: INR 11.56 Cr	Concession in Land rates proved : INR 23.43 Cr	
 No reimbursement in stamp duty as per Policy	Stamp duty reimbursement worth ~INR 4 Crores extended to the firm	
 22.4% Capital subsidy (only on P &M, Buildings) sums to amount INR 41.45 Crores	40% Capital subsidy (inc software tools, transfer of technology etc) sums to amount INR 92 Crores	
 No incentive in interest subvention	Interest subvention @ 50% for 5 years to a maximum sum of INR 25 Crores provided under CCIP	
 <ul style="list-style-type: none"> No subsidy on electricity tariff No exemption on electricity duty 	<ul style="list-style-type: none"> Subsidy @ INR 1/-unit for 5 years on electricity tariff sums to INR 0.72 Crore 100% exemption on electricity duty for 10 years sums to INR 0.72 Crore 	
 No subsidy towards training	Training subsidy to an overall limit of INR 0.36 Crores across 3 years	

Rajasthan: Ms Parthvi, OSD RIICO and State Department of Rajasthan discussed the EV ecosystem in the largest state of India. Rajasthan has developed an EV manufacturing policy, providing a standard and addition-

manufacturing, and a trained manufacturing system that can be availed for training manpower. Rajasthan has two dedicated EV industrial areas nearby NCR Delhi, leveraging the advantage to supply EVs all over India. The Delhi Mumbai Industrial Corridor passing through Rajasthan is another advantage for the ecosystem, along with a connection with Gujarat for access to two ports, improving accessibility.



al package for the ecosystem. The Rajasthan EV policy 2022 offers fiscal and non-fiscal benefits, including reimbursements for retrofit kit, capital subsidies for bus

Tripura: Mr. Subrata Chaudhary, Additional Secretary of the Transport department, presented Tripura's public transport scenario. He informed the participants about their notified EV Policy, containing incentives as per the industrial promotional policy of the state. Under the policy, OEMs can avail of a 30% subsidy on capital investment and subsidies for power consumption as well. He also mentioned Tripura having many industrial estates, a land bank, flexibility with the business model for investment, and more. It also has a single window clearance system for the investment ecosystem in the state.

STATE'S TRANSPORT DEPARTMENT/ STU'S READINESS TO THE E BUS ECOSYSTEM

As Transport in India is a state subject, the Transport Departments and the State Transport Undertakings from various states of India provided a comprehensive overview of their policies and plans of induction of electric buses in their city and state-level fleets. The workshop featured nine state industries and 13 transport departments.

Presentations were delivered by Andhra Pradesh Road Transport Corporation (APSRTC), Assam State Transport Corporation, Bihar State Road Transport Corporation, Haryana Roadways Engineering Corporation (HREC), Himachal Road Transport Corporation (HRTC) Urban Development and Housing Department Jharkhand, Kerala State Road Transport Corporation, Sikkim Nationalised Transport, Telangana State Road Transport Corporation, Tripura Transport Department, Uttar Pradesh Road Transport Corporation and Transport Directorate West Bengal. Although participants from Gujarat State Road Transport (GSRTC) were present at the workshop, they did not make a presentation. State-wise discussions are summarised in the next few paragraphs.

Andhra Pradesh Road Transport Corporation (APSRTC): Mr Tirumala Rao, IAS, Managing Director of APSRTC, shared that APSRTC currently operates a fleet of 11,500 buses, including 2,800 on a PPP model, of which 100 are electric buses on GCC model. The plan is to procure 1000 e-buses in both the current and next financial year, 1,500 e-buses in each of the next two financial years, and



2,000 e-buses in 2027-28, totalling 7,000 e-buses to be acquired by 2028. While highlighting the challenges faced by APSRTC, Mr Rao urged that the Payment Security Mechanism (PSM) enforced under the centralised procurement of E-buses by CESL is not favourable. Additionally, he emphasised the need for high-battery capacity buses.

Assam State Transport Corporation (ASTC): Mr Rahul Chandra Das, Managing Director of ASTC, shared that they currently have 15 e-buses from FAME 1 and have procured about 200 e-buses (CAPEX model) to operate in the Guwahati urban area. These buses are set to be



operational from January 2024, replacing all diesel buses in the city. He also noted that due to the smaller urban sprawl, the daily kilometers operated are only 120 or 140 per day, which is less than the CESL assured kilometres in the demand aggregation model.

Bihar State Road Transport Corporation (BSRTC): Mr Abhay Jha, Administrator for BSRTC, informed the audience that the fleet size of BSRTC is 581, including 166 CNG buses, 25 electric buses and the rest diesel buses. He stated that 50% of all buses would be electric by 2028. Bihar has also placed orders for 400 new e-buses



under the PM E-bus Sewa scheme, for which the Payment Security Mechanism and the viability gap funding are approved. These buses will be deployed in six cities across two divisions on 19 bus stands.

Haryana Roadways Engineering Corporation: Mr. Dev Dutt, General Manager, Haryana Roadways Engineering Corporation informed that Haryana operates a fleet of 3,800 buses across 22 districts, including Chandigarh and Delhi. Haryana has ordered 375 electric buses, with 100 scheduled to be operational in January 2024. Over



the next five years, another 1600 buses are to be inducted. The emphasis is also on the need for high-capacity electric buses for long-distance operations.

Himachal Road Transport Corporation (HRTC): Mr Rohan Chand Thakur, Managing Director of HRTC, shared that HRTC has a fleet of 3,100 buses, including 110 electric buses running across six districts. HRTC was among the first to introduce electric buses in India. Challenges related to mountainous terrain were highlighted and most of the existing e-buses are designed for plains



and intracity operations, and thus the are exploration of options for converting diesel to electric buses was discussed. He urged the policymakers and ministry representatives to consider these challenges and help HRTC in finding solutions for such terrain. Challenges such as long distances between villages, resulting in higher operational costs, and the need for skill development for operating electric buses were also mentioned. Despite the challenges, HRTC is prepared for the transition to e-buses, with state funded charging infrastructure ready and more under construction.

Urban Development and Housing Department Jharkhand (JUIDCO): Mr Utkarsh Mishra, Deputy Project Director, JUIDCO, introduced Jharkhand, stating that while rich in resources and minerals, the state lacks city bus services. The government of Jharkhand has planned for



increased bus services, the development of bus depots and planning Interstate Bus Terminals (ISBT). The State is in various stages of bus procurement for its largest cities, developing its own EV policy, and proposing to have 400 e-buses. The state also has plans to bid for electric buses under the PM E-bus Sewa scheme.

Kerala State Road Transport Corporation (KSRTC): Mr Promoj Shankar, Joint Managing Director, KSRTC, informed about Kerala's growth story with electric vehicles. KSRTC, under a separate entity SWIFT, purchased 117



e-buses on a CAPEX model for operations in Thiruvananthapuram city and plans to acquire 3,000 e-buses by 2025. The acquisition will also be through the PM E-bus Sewa scheme, leveraging Kerala's abundant renewable energy generation for a more sustainable ecosystem.

Sikkim Nationalised Transport: Mr Binay Pradhan, Superintending Engineer (Mech.), Transport Department, informed about Sikkim's public transport scenario. Operating in a small mountainous state, Sikkim has 90 buses for intracity, intercity and interstate operations. The state has a recently modified electric vehicle policy and is also applying for e-buses under the PM E-bus Sewa scheme. Sikkim faces challenges such as narrow roads, difficult hilly terrains, few routes with 100+ km per day operational range, and high dependency on personal vehicles leading to low ridership. Sikkim requires 7-to-9-



meter buses covering 120 to 130 km in a single charge.

Telangana State Road Transport Corporation (TSRTC): Mr GSCS Reddy, AME (EV), from TSRTC Hyderabad informed the audience about TSRTC’s fleet size of 9,800 buses, with 300 operating on a PPP model. In urban areas, 3,300 buses are in operation including 40 e-buses procured under the FAME 1 scheme. Under the National Electric Bus Program (NEBP), TSRTC aggregated 1000 e-buses, comprising 500 for city operation (under agreement process) and another 500 for district operation (agreement completed). Independently, TSRTC also rolled out a tender for 560 e-buses, including 500 for city operation, and 50 buses for intercity



e-buses. The state has hilly forest cover for over 70% of its area, and hence moving to EV made ecological sense for the state. All tourist spots in the state are committed to having charging infrastructure present as per the EV policy. Mr Chaudhary requested policymakers to consider reducing the assured km for the North-Eastern states, as route lengths are less, thus also bringing down the per km cost.

Uttar Pradesh Road Transport Corporation (UPSRTC): Mr Masoom Ali Sarwar, MD UPSRTC gave a brief introduction to UPSRTC and further elaborated on the challenges they face. UPSRTC has a fleet of 11,600 buses and is divided into 20 regions. UPSRTC buses carries 16



operation. A total of 1850 e-buses are in various stages of procurement. Mr Reddy reiterated points from APSRTC, emphasising that Payment Security Mechanism (PSM) is an issue for obtaining buses through CESL and stressed the need for higher capacity buses for intercity operations with higher assured km.

Tripura Transport Department: Mr Subrata Chaudhary, Additional Secretary, Transport Department talked about the future of e-buses in the state. He emphasised that, in 2024, 40 e-buses will be procured and deployed, and in 2025, an additional 100 buses will be added to the bus fleet. Tripura also hopes to create a retrofitting centre in the state, which would speed up the adoption of the



lakhs+ (1.6 million) people every day. In short-term planning, UPSRTC has dedicated 30 routes for electric buses, with significant portions running in NCR. They plan to have 5,000 electric buses by 2028 and 25,000 buses in the next 25 years; however, in the initial phase, they plan to purchase 100 buses outright and 250 buses on the GCC model.

Mr Sarwar also shared that the FAME scheme has primarily focused on Intracity transportation instead of intercity. However, UPSRTC, like many other transport undertakings, has maximum passengers travelling from rural regions and hinterland to urban areas for better opportunities. Thus, he urged to shift the focus of aggre-

gation models to intercity as well and to explore possible bus models supporting such operations.

Transport Directorate West Bengal: Mr Dibyendu Das, Director and Special Transport Commissioner, West Bengal (WB) presented the statistics for the state. WB has a fleet of 6,000 buses, of which 200 are e-buses. By the end of financial year 2024, they plan to procure 1,000 more electric buses. The Government of West Bengal also encourages private bus owners to shift to electric buses, for which they have introduced initiatives such as registration fee waiver and a two-year road tax waiver. However, he also highlighted some challenges for



the state, such as the higher capital cost of e-buses, the non-availability of charging stations, and the disposal of lithium-ion batteries.

The issues emphasised by the state transport departments were addressed by Mr. Sudhendu J Sinha. He urged the states to aggregate the number of private bus operators interested in acquiring electric buses, along with their requirements, to bring down the upfront cost of the bus by approximately by 20% or more. For charging stations, he suggested collaborating with Oil Marketing Companies (OMCs) responsible for setting up 22,000 charging stations in the country. For hilly areas, he suggested that OEMs must run pilots for 6 months to prove that the buses can operate in difficult terrains. Regarding battery waste management, he mentioned that the Ministry of Environment, Forest and Climate Change has issued elaborate battery waste management rules with a complete protocol on how the disposal needs to be managed, forming a circular economy related to it.

CONCLUSION

The workshop ended with Mr Sudhendu J Sinha, Advisor, NITI Aayog, advising both international OEMs and States to continue or initiate dialogue/discussions for improving the supply-side readiness for e-buses in the future. Ms. Rupa Nandy suggested the next steps UITP

would take to advance the conversation.

The following conclusions emerged from the workshop:

1. **Many International OEMs are interested in the Indian market**, viewing it as a significant opportunity for business expansion.
2. **The Indian Government is actively enhancing the EV ecosystem** through schemes and initiatives to achieve the target of net-zero emissions by 2070.
3. **All states have robust industrial promotion policies**, particularly focusing on incentives to attract international OEMs, including land availability, ease of doing business, and the presence of existing companies.
4. **Transport departments/STUs are prepared for the transition to E-buses**, actively working to replace older fleets with new electric buses. Several cities have applied for the PM E bus Sewa Scheme and are planning for a bigger sustainable fleet in the future.
5. **States like Kerala, Andhra Pradesh and Himachal Pradesh have expressed interest in holding a second round of discussions with OEMs. All OEMs are keen on taking the conversation forward.**
6. The feedback from OEMs emphasises the expectations from the Government and industry departments to **clearly define e-bus transition projects, fostering long lasting relationship with OEMs along with a solid local partner.**

WAY FORWARD

1. **UITP, under Advancing Electric Buses project, pledged to provide support to international OEMs in taking the next steps** over the next two years, continuing discussions/dialogue with the Indian Government and States.
2. **UITP will facilitate discussions between interested states industries and transport departments with International OEMs.**
3. Publishing and disseminating the knowledge brief on the enablers and barriers for investment in India in the E-bus manufacturing and ancillary parts production sector.
4. **Niti Aayog to send D.O letters to OEMs and the states**, thanking them for their participation in the workshop and if any feedback or queries they have could be addressed through one-to-one talks.

ABOUT UITP

INTERNATIONAL ASSOCIATION OF PUBLIC TRANSPORT (UITP) is the international network for public transport authorities and operators, policy decision-makers, scientific institutes and the public transport supply and service industry. It is a platform for worldwide cooperation and the sharing of know-how between its 1,800 members from 100 countries.

In March 2007, UITP opened its first **Indian office in Bangalore** and in December 2019 in **New Delhi**. The prime objective of the Indian office is to better address the specific needs of regional members as well as the Indian public transport sector and its stakeholders.

UITP in India aims to offer assistance and services to public transport organisations in the country through access to knowledge on national and international technical and policy developments in urban mobility, peer reviews, projects and studies on specific issues of concern.

UITP supports the public transport sector and its development in India by advocacy, knowledge sharing, organising technical trainings, data collection, international benchmarking, etc. There are over 50 UITP members in India.

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PUBLICATIONS

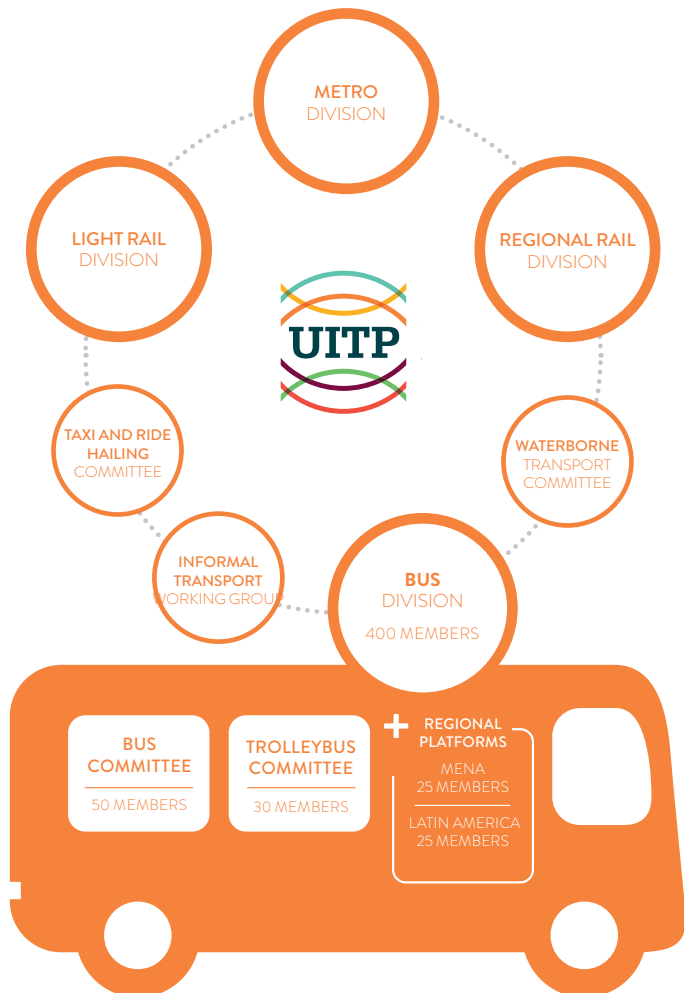
Some key publications from UITP focusing on buses are:

- Knowledge Brief: Large-scale bus electrification: the impact on business models, [Large-scale-Bus-Electrification-KB-Final.pdf \(uitp.org\)](#) (2021)
- Knowledge Brief: In motion Charging - Innovative Trolleybus, [Knowledge-Brief-Infrastructure-May-2019-FINAL.pdf \(uitp.org\)](#) (2019)
- Knowledge Brief: Infrastructure for In Motion Charging trolleybus systems, [Knowledge-Brief-IMC-final.pdf \(uitp.org\)](#) (2021)
- Knowledge Brief: 2nd hand bus study, [Knowledge-Brief-Second-hand-bus_final.pdf \(uitp.org\)](#) (2020)
- Report: Electric Bus Procurement Under FAME-II: Lessons Learnt and Recommendations for PHASE-II, [UITP-India_FAMEII_E-Bus-Procurement.pdf](#) (2020)
- Report: Performance Evaluation Framework for Electric Buses in India, [UITP-India-Performance-Evaluation-Electric-Bus.pdf](#) (2020)
- Working Paper: [Strategies for deploying zero-emission bus fleets: Development of real-world drive cycles to simulate zero-emission technologies along existing bus routes \(theicct.org\)](#) (2020)
- Working Paper: [Strategies for deploying zero-emission bus fleets: Route-level energy consumption and driving range analysis \(theicct.org\)](#) (2021)
- Policy Brief: Boosting accessibility and employment: Investing in India's public transport sector, [India_policy_brief_2020_final_web_corrected.pdf \(uitp.org\)](#)

ABOUT UITP BUS DIVISION

Bringing together 400+ organisations and operators from around the world, the **Bus Division** is the largest modal community in UITP.

Collectively, the Division provides a global platform for the exchange of knowledge and business opportunities. This work is led by the **Committees**, which are responsible for a range of initiatives and supported by the **Regional Platforms** for a localised exchange of information.



What we work on:

- ✓ Autonomous vehicles
 - ✓ Customer service
 - ✓ Decarbonisation
 - ✓ Design
 - ✓ Digitalisation
 - ✓ E-buses
 - ✓ Electrification
 - ✓ Network planning
- ...and many more!

From Knowledge & Innovation projects to the development of business intelligence, guidelines and benchmarking tools, the Bus Division engages with all facets of the industry.

Recent projects include:

- ▶ SORT and E-SORT referential – setting the standard for the sector
- ▶ Bus and e-bus tender - procurement structure document
- ▶ Standards for e-bus charging interface
- ▶ Bus benchmarking project – based on standard cost activity model
- ▶ BRT Guide and Workshop
- ▶ Trolleybus asset peer review
- ▶ EU Advocacy achievements
- ▶ Bus fleet renewal Checklist
- ▶ Training programme on electric buses, safety, planning and operations or bus network design and route structuring

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This Report was prepared by UITP India.



NOVEMBER | 2023



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