PREFACE

The National Urban Transport Policy (NUTP), 2006 of the Government of India, inter-alia, lays strong emphasis on building capabilities at the state and city level to address the problems associated with urban transport and lays down the guidelines for developing sustainable urban transport systems as well. As part of the NUTP enunciations, the Ministry of Housing and Urban Affairs (MoHUA), Government of India has taken the initiative to organize an annual Conference-cum-Exhibition on Urban Mobility India (UMI) to disseminate information, facilitate exchange of ideas and provide update on best urban transport practices.

The 16th Urban Mobility India (UMI) Conference 2023 was organized by the MoHUA during 27– 29 October, 2023 at the Manekshaw Centre, Delhi with focus on the theme "**Integrated and Resilient Urban Transport**". The conference was structured into 2 plenary sessions, one conclave, 8 technical sessions and 8 round table discussions besides Inaugural and Valedictory session. In addition 8 sessions of Research Symposium were also organized for students and research.

Day wise theme based specific urban transport issues were deliberated on Resilient Urban Mobility system, collaborative governance in Urban Transport and Pathways toward Digitization and Energy Transition. Discussion in the technical sessions emphasized on embedding resilience in urban transport systems, challenges in multi-modal integration, financial sustainability of mass transit projects, implementation of transit oriented development, scaling up E-buses, gender mainstreaming in urban mobility, future of mobility with digitalization and sustainable urban freight and logistics, etc. About 1,200 delegates registered in the Conference comprising of senior officers from the Centre, State Governments, Union Territories, Managing Directors of Metro Rail Companies, Urban Transport Experts and Planners from …… states and UTs, as well as foreign delegates and experts from …. countries, Academia from India and abroad participated. All the sessions, had presentations from eminent experts in the field and revolved around the live case studies in India and across the world. The sessions were lively and interactive.

In the Valedictory Session, awards for excellence in urban transport/ best practice projects to the winning States/ UTs and cities were given by Shri Manoj Joshi, Secretary, Ministry of Housing and Urban Affairs, Government of India in the following 8 categories.

No.	Award Category	Winner	
		City	Organisation
1	City with the Best Public Transport System	Srinagar	Srinagar Smart City Ltd.
2	City with the Best Non-Motorized Transport System	Pimpri Chinchwad	Pimpri Chinchwad Municipal Corporation
3	City with the Most Innovative Financing Mechanism	Jabalpur	Jabalpur City Transport Services Limited
4	City with Best Record of Public Involvement in its Transport Planning	East Khasi Hills (Shillong)	Sustainable Transport and Efficient Mobility Society
5	City with the Best Green Transport Initiative	Kochi	Kochi Metro Rail Ltd.
6	Metro Rail with the Best Multimodal Integration	Mumbai	Mumbai Metropolitan Region Development Authority
7	Metro Rail with the Best Passenger Services and Satisfaction	Delhi	Delhi Metro Rail Corporation Ltd.
		Lucknow	Uttar Pradesh Metro Rail Corporation Ltd.
8	Running trophy for the State / UT, which has Implemented Best Urban Transport Projects during the previous year	Bhubaneswar	Capital Region Urban Transport

The Conference, was well attended and appreciated by the participants and sponsors. Proceedings and outcome of the conference are presented in this document. Detailed presentation of technical papers UMI photos and proceedings of the conference are available at www.urbanmobilityindia.in.

(Jaideep)
Officer on Special Duty (UT) & Ex-Officio Joint Secretary
Ministry of Housing & Urban Affairs

Contents

Introduction

Urban Mobility India Conference and Expo, an annual mega event of the Ministry of Housing and Urban Affairs, Government of India, provides an excellent platform to the stakeholders to deliberate upon and share the national and international experiences on current urban transport issues. This year the 16th UMI 2023 Conference and Expo held during 27th – 29th October 2023 at the Manekshaw Centre, Delhi with focus on the theme "Integrated and Resilient Urban Transport". It was structured into 2 Plenary Sessions, one Conclave, 8 Technical Sessions and Round Table Discussions each besides Inaugural and Valedictory Sessions. In addition, 8 sessions of Research Symposium were also organized for students and researchers. Day wise theme based specific urban transport issues were deliberated on Resilient Urban Mobility Systems, Collaborative Governance in urban transport and pathways towards digitization and energy transition. Discussions in the technical sessions emphasized on embedding resilience in urban transport systems, challenges in multi-modal integration, financial sustainability of mass transit projects, implementation of transit oriented development, scaling up E-buses, gender mainstreaming in urban mobility, future of mobility with digitalization and sustainable urban freight and logistics, etc. About 1,200 participants comprising high level officials from state and central governments, city and metro authorities, metro rail companies, national and international experts from the field, academia and professionals attended the 3 day conference and shared their experiences and best practices in the urban transport field in the cities across the world. All the sessions had presentations from eminent experts in the specific areas which revolved around live case studies in India and abroad. Discussions in the conference were lively and interactive. The outcome of the conference is summarized below:

- **General Outcome**

- The conference was of unanimous view that embedding resilience in urban transport system is an ongoing process that requires collaboration between government agencies, private stakeholders and the community.
- Integrated and resilient urban transport should have proactive planning, investment and adaptability to ensure that urban transport system can withstand and recover from various challenges in a shortest possible time.
- State governments responsible for operation and maintenance of public transport system both metro rail and bus system may create a separate "Reserve Fund" for use in emergency. Metro system may use this reserve funds irrespective of being government or private run metro.

- The need is for better planning of metro system in terms of route alignment, ridership projection, traffic and transport modeling.
- Effective partnership be developed with data provider for analysis of demand scientifically and purposefully.
- With substantial improvement in network and coverage, safety issues be given due importance to have zero lapse.
- Future planning should concentrate on comprehensive urban transport eco-system having integration of bus, metro and civil aviation.
- A framework with benchmark need to be developed for design, operation and maintenance of metro system for wider use and reference.
- Metro system cannot function as standalone system and has to be in combination with bus based system. It should follow user focused approach than mode focused.
- Feeder and NMT modes be integrated well with Metro system as it will help in widening the catchment area of Metro by 2-3 times.
- Integrated approach be adopted while designing transit system taking into consideration urban form and transit system together and not in isolation.

➢ **Specific Outcome**

- Resilient Urban Transport
    - Public transport agencies including Metro Rail Corporations should move from a fragmented urban transport system to an integrated system. Emphasis should be more on transport system instead of transport infrastructure.
    - Ministry may take up formulation of a guide book on standardization of urban transport system information for wider use and reference.
    - In specific terrain like hilly areas, public transport system should be more user friendly providing end to end connectivity.
- Multi-modal Integration
    - In multimodal integration of urban transport system user centric approach be followed. Decision making be based on data driven approach.
    - Multimodal integration should be taken up right at the planning and implementation stage of metro rail system and should not be an afterthought effect. Metro agencies may reserve 10% of the Metro project budget for multimodal integration at metro station.
    - Last mile connectivity challenges be addressed in a way that mode used for this purpose like e-rickshaw should not create congestion and chocking of ‘city roads.

- Multimodal integration has to be at various level Such as stakeholders, institutional, fare, design, physical and operational.
- Kochi example of seamless transportation comprising metro train, city bus, auto rickshaw, feeder bus services, city taxies walkways and cycle track making it as one network, one timetable and one card is noteworthy for replication in other cities.

- Financial Sustainability of Mass Transit Projects.
  - Use of National Common Mobility Card be propagated effectively in all Metros, public transport modes and for other non-transit purpose across the country.
  - Efforts be made to have a greater modal split in favour of public transport.
  - More and more focus be on affordability while designing and operating the public transport system both rail and road based.
  - Urban transport system should have a proper mix of capacity with management trained and cutting edge technology manpower.
  - Public transport if integrated with other modes is expected to attract 50% more ridership adding to the financial sustainability of the Mass Transit projects.
  - The railway plus property model focusing on new metro projects, operation and maintenance of metro system is better workable financial model as is being followed in Hong Kong.
  - Common rules and regulations be formulated for reference and guidance of various vendors engaged in metro rail service for completion of metro project without any cost and time overrun.
- Facilitating TOD Implementation
  - TOD may be taken up in the form of transit mode, hub development, influence zone development i.e. node, hub/ area and corridor.
  - Priority zones/ nodes may be identified by Metro authorities for development in a phased manner as has been attempted by Delhi Metro.
  - Success of TOD approach is based on robust legal framework and its enforcement mechanism, strong municipal system, cooperation among various stakeholders, availability of multiple financing options, integration of mobility infrastructure with urban planning and design and taking up station as key development zone as has been prevalent in the Netherlands.
- Scaling up E-Mobility
  - State governments should be encouraged to formulate well defined decarbonization policy while taking up electric vehicle policy issues.

    - Electric buses are no doubt capital intensive at initial stage but over a period of time it deliver operational cost benefits.
    - Strategy for scaling up of e-buses should be based on regulatory framework formulated by the state governments highlighting incentives for electric vehicles, disincentives for diesel and CNG buses and approach for transition with priority in cites.
    - Shared charging infrastructure for all large vehicles in metropolitan areas and along corridors be provided.
    - Battery passport system may be initiated by E.V. authorities to facilitate the traceability of batteries in terms of environmental footprints, manufacturing source and other pertinent data.
- Gender Mainstreaming in Urban Mobility
    - Data on women travel pattern and behavior should be collected using video analysis as being done in Bhubaneswar and Kochi for better planning of gender mainstreaming.
- Digitalization in Urban Mobility
    - There should be seamless flow of data between various transportation system operating agencies in a standardized data format.
    - Emerging technology of AI and big data be utilized optimally to provide seamless mobility and integrated solution.
- Role of local Government in Sustainability of Urban Transport
    - UMTA be set up by the state govt. in right earnest to make its role effective.
    - Urban local bodies be involved closely while planning, designing and implementation of public transport projects.
- Urban Freight & logistics
    - Freight has to be given due importance in city Mobility Plans and Master Plans.
    - The need is to create a hierarchy of freight handling facility at city and regional level.

A. Inauguration of the Exhibition

The exhibition is a special feature of the UMI conference to disseminate and showcase the latest development in urban transport technology, system and service, best transport projects and propagation of innovative ideas. The exhibition was inaugurated by Shri Hardeep Singh Puri, Hon'ble Minister of Housing and Urban Affairs and Petroleum and Natural Gas, Govt. of India. The latest technologies, urban transport start-ups, metro rail projects in operations, intelligent transport system, digital payment systems, foreign collaborators stalls were of special interest to the delegates and visitors. As part of side activities urban transport quiz were conducted during tea/ coffee break on each day to keep the participants engaged.

Chief Guest inaugurating the exhibition


MESSAGES


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B. Inaugural Session

The 16th Urban Mobility India Conference & Expo 2023 was inaugurated by Shri Hardeep Singh Puri, Union Minister for Housing and Urban Affairs, Petroleum and Natural Gas, Government of India, Shri Pradeep Singh Kharola, Chairman and Managing Director, India Trade Promotion Organization, Shri Manoj Joshi, Secretary, Ministry of Housing and Urban Affairs, Government of India, Shri Vikas Kumar, Managing Director, Delhi Metro Rail Corporation and other dignitaries graced the inaugural session and enlightened the august gathering on the theme on " Integrated and Resilient Urban Transport" as well as on the importance of annual international mega event on Urban Mobility India Conference cum Expo. An outcome of the inaugural session is discussed in the following section.

Chief Guest & other dignitaries are lighting the ceremonial

- Welcome and Opening Address by Shri Manoj Joshi, Secretary, Ministry of Housing and Urban Affairs, Govt. of India.
- Key Note Address by Shri Pradeep Singh Kharola, Chairman and Managing Director, India Trade Promotion Organization.
- Release of Publications and Inaugural Video.
- Inaugural Address by Shri Hardeep Singh Puri Hon'ble Minister of Housing and Urban Affair and Petroleum and Natural Gas, Govt. of India.
- Vote of thanks by Shri Vikas Kumar, Managing Director, Delhi Metro Rail Corporation.

Secretary, MoHUA welcoming the Chief Guest and other distinguished guests

Welcoming the dignitaries on the dais, delegates, participants, distinguished guests Shri Manoj Joshi, Secretary, Ministry of Housing and Urban Affairs, Govt. of India gave a brief background of the UMI Conference & Expo. He said that in the last few years urban mobility has been given special attention. Hon'ble Prime Minister has taken keen interests in urban mobility projects and lots of investment made particularly during the last one decade. A tender floated for procurement of 5,000 e-buses for large and medium cities in

India. Metro rail system expanded and its full potential benefits are being tapped. Now, the emphasis is being given on indigenous technology by manufacturing the metro system components under Make in India programme with a focus on standardization and optimization. The need is for better planning in metro system in terms of route planning, ridership projection, traffic and transport modeling, etc. We should develop effective partnership with data provider so as to analyze the traffic demand pattern scientifically and meaningfully. Specific attention needs to be given to address the last mile connectivity challenges suitably. Delhi metro has to some extent solved the problem of last mile connectivity through e-rickshaw. But with this some associated problems have also cropped up in terms of congestion and chocking of city roads. Other cities should take some lessons from it while addressing the traffic issues. Proper areas be identifies in the city for parking of e-rickshaws and other similar vehicles, charging points and other related associated infrastructure. Efforts be made on standardization of the urban transport system to reduce the cost. Hon'ble Prime Minister has welcomed global partnership in this regard and we look forward that conference will dwell on providing such avenues. Efforts be made to use National Common Mobility card extensively in Metros and other urban public transport systems and also for non-transit purpose across the country.

Chief guest & other dignitaries addressing in the inaugural session

In his key note address Shri Pradeep Singh Kharola, Chairman and Managing Director, India Trade Promotion Organization narrated the significance of urban mobility in urban development. Highlighting on the predominant trends in terms of rapid urbanization, economic growth, increasing income levels of individuals, rising middle class there is also increase in demand for improved public transport. To address the issues regarding congestion on roads, environmental concerns, government responded by formulating National Urban Transport Policy 2006. Smart cities mission, promotion of green transport, metro rail systems transit oriented development are some of the other initiatives which have helped in substantial increase in various modes. In the last decade metro rail network length as well as spread has increased tremendously with a total network of about 1,000 km in 20 cities. Soon it will be available in 27 cities. Total ridership has also been in the range of one crore per day. With the substantial improvement in network and coverage

there is improvement in safety also in the system. Environmentally clean with less consumption of energy, the metro system has also developed lighter variation in the form of Metro Lite and Metro Neo. There is considerable improvement in modal split in favour of public transport. For instance in Delhi, public transport share is about 40 percent of the total trips.

He mentioned that in spite of continuous improvement in public transport systems in terms of technology, ridership, operation, efficiency, etc. there are still some challenges which need to be addressed earnestly. Accessibility of public transport is still poor and limited. Its coverage is required to be increased by providing last mile connectivity. All modes including NPT need to be integrated. Affordability is another issue which requires serious consideration. Between viability and affordability focus has to be more on affordability while designing and operating the public transport system both rail or road based. This issue is not only concerned for poor people but for middle class also. As regards multi-modal integration, it has to be at various levels such as stakeholders, institutional, fare, design, physical and operational. Institutional arrangement in the form of umbrella agency like UMTA should be made effective. Demand management should be given preference than supply side. Challenges regarding human resource management need to be addressed appropriately. Both the situation, over staffing, untrained, under staff be avoided. Urban transport system should have a proper mix of capacity with management trained and cutting edge technology manpower. In the face of increasing metro rail network proper bus based city transport system cannot be wished away because metro rail cannot function as standalone system and has to be in combination with bus based system. For all this, buses are also to be efficient. For creating congenial environment of efficient operation and management of public transport system legal and financial regulatory framework need to be simplified and rationalized. For instance high cost of taxation in the range of 20% on buses could be re-looked for smooth operation of the bus system. For spreading the coverage of mass transit system whether rail or road based small cities cannot be ignored and due attention be given to these cities particularly tier 2 and tier 3 cities. Since transport is a derived demand and cities being

Release of publication at the inaugural session

engine of growth its success needs an efficient public transport and as such integrated system is necessary.

Chief Guest addressing the gathering in the inaugural session

In his inaugural address Shri Hardeep Singh Puri, Hon'ble Minister of Housing and Urban Affairs and Petroleum and Natural Gas, Govt. of India said that he was delighted to be in UMI conference at Manekshaw Centre, Delhi where we are meeting again after 8 years. Agreeing with the earlier presentations in the session by the Secretary, MoHUA and Keynote speaker Shri Kharola who have touched the important issues in urban transport, he stated that of late country has succeeded in changing methods and approach related to urban transport in view of challenges posed by rapid urbanization. There is clear distinction in the process of urban transport development before and after 2014. Even now challenges are growing which demand redressal in greater pace. In 2014 Hon'ble Prime Minister stressed for taking urbanization as opportunities and involved foreign collaboration in technology and other areas. Urban transport not only require good concept plan but its implementation is equally important in time bound manner. In the initial attempt, beginning was made for Metro Rail in 1972 which took 12 years and by 1984 the network length of 4 km was provided which increased to 16 km by 1995. It took almost 50 years in Kolkata to have 45 km. of network length with a ridership of 7 lakh per day. Now, in 4 years a metro line is completed including planning and its implementation. As on date India has a total Metro rail network of 895 km. in 20 cities. Very soon metro rail system will cover 27 cities and will also emerge as the world second largest system. No doubt we started late but have taken benefits of using latest technology. In the next phase we will have a comprehensive urban transport eco system having integration of bus, metro and civil aviation. In the face of all these development we do have some problems of last mile connectivity which require urgent action. Pace of cities growth and rapid urbanization are mind boggling and we will have to improve connectivity between the cities at regional level. Namo Bharat rail as part of Regional Rapid Transit System covering a section of 17 km on Delhi-Meerut route flagged off last week by the Hon'ble Prime Minister is just a beginning of new era of regional rail connectivity.

There are approximately 40,000 city buses operating but the requirement is of 1,20,000 buses and the Ministry has started e-bus Sewa scheme to strengthen the city bus service. This will help in reduction of GHG emission and meet the requirement of climate change. With the increase of e-buses demand for fossil fuel will be reduced but viability question is also to be seen. Urban sector and energy are important contributor to national economy. Today we have almost one crore ridership per day in metro rail system which is also increasing continuously. It calls for well-developed public transport system. There are some startling figures which clearly show the fast development in the country. Almost 6 crore people fill gas/ petrol in their vehicles per day. In 2014 biofuel mixing was just 1.4 percent and our target was to have 10 percent by November 2022 which we achieved 5 months in advance. Further our target of biofuel blending is 20% by 2025 and there will be more than 5,000 retail station for blended fuel.

As regards electric vehicles propagation, country is focusing on 3 pillars such as availability, affordability and sustainability as part of green transition. We are moving on all these fronts. After making Metro rail system fully operational, greater emphasis is on RRTS for improving regional connectivity and support system. Second generation ethanol mixing, green hydrogen are other alternatives being promoted vigorously. By middle of the 21st century when half of India's population will be living in urban areas we are striving fast to meet the changed situation in a better way be it urban transport system or livability in cities.

Before delivering his inaugural address the Hon'ble Minister released some of the publications and the inaugural video as under:-

- Toolkit on "City Electric Mobility Strategy (CEMS).
- A document titled "making way for Buses-Guidance in Indian cities".
- Green Urban Mobility Partnership Newsletter.
- Short film on "Integrated and Resilient Urban Transport".

Audience in the inaugural session

In the end Shri Vikas Kumar, Managing Director, Delhi Metro Rail Corporation Ltd. proposed a vote of thanks. He thanked the Hon'ble Minister for Housing and Urban Affairs and Petroleum and Natural Gas, Govt. of India Shri Hardeep Singh Puri, Shri Manoj Joshi, Secretary, MoHUA, Shri Pradeep Singh Kharola, Chairman and Managing Director, ITPO,

Principal Secretary Transport NCTD, OSD (UT), MoHUA and other dignitaries, delegates and participants as well as the organizing team of MoHUA, Officers of IUT and DMRC. In his speech he also mentioned that 2023 conference will shape the future of cities and urban transport system in the country.

C. Plenary Session

The UMI-2023 hosted two plenary sessions to initiate and provide a platform for discussion on urban mobility needs and emerging trends. The first session on the role of local government in sustainability of transport with Mayors of Municipal Corporations as the distinguished panelists underlined the limited role being played currently by the local bodies in urban transport system. The session emphasized for enhancing their involvement in planning and operation of urban transit system and its sustainability. The second plenary session dwelt on India's roadmap of action towards decarbonizing transportation. It focused on measures and actions required to achieve the target set for 2047 when India will be celebrating 100 years of Independence and country will be fully developed. It also deliberated on another target of net zero emission by 2070 as agreed in 15th CoP in Paris. These Plenary sessions concentrated on the ways and means to strengthen the role of urban local bodies in public transport system and reduction in emission to achieve the set target of zero emission.

Plenary Session 1:- The Role of Local Governance in Sustainability of Transport (Mayoral Session)

Indian cities present a diverse set of challenges when it comes to sustainable transportation. The discussion touched upon the role of active engagement by city mayors in shaping sustainable transportation initiatives. Local governance plays a crucial role in fostering collaborations between public and private stakeholders to develop a holistic approach that addresses mobility challenges while considering environmental, economic, and social aspects. But in reality, most local bodies have played a limited role in planning, developing, operating and maintaining sustainable mobility including walking, cycling and public transportation in the cities. In most of the cities, walking, cycling, and informal public transport are the primary modes of transportation for the citizens. Here, the local government can play a significant role in providing and regulating these modes.

Through the recent initiatives of MoHUA such as "Cycle4Change" "Street4All" and "Transport4All" Challenges, municipalities have played a lead role in working out sustainable transport solutions through collaboration with citizens and local organizations. This session facilitated a robust exchange of ideas and experiences to pave the way for effective, simple, and context-specific transportation solutions to make better and liveable cities for everyone.

This session having Mayors as panelists both from India and abroad, dwelt on the subject at length with the following objectives: -

- To identify the issues and challenges experienced by the local bodies in their involvement in making urban transport sustainable.

- To highlight the good practices and innovations in establishing collaborative governance mechanisms for sustainable and resilient urban transport.
- To suggest strategies for the rightful involvement of local bodies in making the city's transport system sustainable.

Chairperson : Shri Manoj Joshi IAS, Secretary, Ministry of Housing and Urban Affairs, Govt. of India

Co-Chair & Moderator : Dr. I. P. Gautam IAS (Retd), Former Member, Lokpal of India

Panelists-

i. Adv. M Anil Kumar, Mayor, Kochi Municipal Corporation
ii. Mr. Dirk de Jager, Deputy Mayor, Ouder-Amstel, Amsterdam, Netherlands
iii. Mr. Junaid Azim Mattu, Mayor, Srinagar Municipal Corporation
iv. Mr. Pushyamitra Bhargav, Mayor, Indore Municipal Corporation

Highlights of Discussion

- Urban local bodies are established as third tier of government as per provisions of 74th Constitution Amendment Act but there is great variations in the system as regards their role is concerned in urban transport system.
- Kochi Municipal Corporation has been associated with planning and operation of city bus service as well as Kochi metro rail but its involvement is not well defined.
- Srinagar Municipal Corporation has played a key role in construction of pedestrian walkways and cycle tracks in the city in collaboration with state government and other stakeholder agencies.

Panelists sharing their views in the plenary session

- In the Netherland, situation in cities is different than Indian cities. Amsterdam City Corporation is closely involved in preparation of 10 years City Master Plan with equal participation of citizens and other stakeholders. Bicycle tracks are developed in a

planned manner throughout the city. It plays a key role in last mile connectivity and providing safe mode for riders.

- In Ahmedabad and Surat, BRTS planning, implementation and operation have full involvement of respective Municipal Corporation and public as well as other stakeholders.
- Indore city also has involvement of Municipal Corporation and public at large in planning and operation of city BRTS which is one of the good system in the country.

Outcome

- Mayors of Minicpal Coporation present in the session were of unanimous view that there should be a clear cut policy on hand holding of urban local bodies in development of sustainalbe urban transport.
- Three Fs i.e. funds, functions and functionaries need to be well defined and also entrusted to the local bodies appropriately to enhance their capacity adequately so as to enable them perform effectively.
- Municipal Corporations should specificaly be involved in deciding the route aligbment of public transit system both road and rail based.
- Municipal corporations felt that parking fee in the city be enhanced to dscourage the use of private vehicles and to give a boost to ridership in the public transprot.
- There has to be right balance between centre, state and local bodies in their role in planning and operation of mass transit system in the cities. Local bodies role should be enhanced for operation of all modes like NMT, IPT, public transport.
- In the last one decade MoHUA has initiated urban transport projects under its various schemes and programme amounting to more than Rs. 4 lakh crores. Involvement of urban local bodies is crucial in spreading the fruits of developmetn in cities across the country.

Memento being given to the Panelist. Audience in the session

Plenary Session 2:- India's Roadmap of Action towards Decarbonizing Transportation

India's transportation sector is a key consideration for determining transformative low-carbon strategies. It contributes 10% of total national greenhouse gas (GHG) emissions, while road transportation contributes about 87% of the total emissions in the sector. Vehicle ownership per households is increasing every year. It will further grow in the coming years with the booming automobile industry, increasing purchasing power of the citizens and favorable environment for financing.

On the other hand, the aggressive entry of electric vehicles in the Indian market and favorable national and state-level policies for their mainstreaming in the last 5 years are seemingly positive development in curbing transport emissions to some extent. Market trends envisage a 30% EV sales penetration in India by 2030 as a consequence of existing policies, which could even reach 55% if aggressive measures are implemented to achieve the goal of limiting the global temperature rise to below 1.7-1.8°C. Successful transition to e-mobility is critical for India in the context of severe pollution challenges it faces with nearly half of the world's 50 most polluted cities being in India.

This session focused on measures to decarbonizing transport sector in India. The Govt. of India has shown commitment through key policy initiatives like National Hydrogen Mission, Gati Shakthi, LIFE Mission, National Electric Bus Program (NEBP), FAME, etc. The session explored strategies to operationalize the transition from fossil fuel-based transport to shared, active and clean sustainable transportation in a just and inclusive manner.

Financing this transition in a consistent manner is a key constraint – the session looked at innovative models like Viability Gap Funding for Public Transport, payment security mechanisms, business models like leasing, battery swapping, etc. that may be leveraged

Moderator Ms. Anumita Roychowdhury, Executive Director, Centre for Science and Environment

Panelists-

i. Mr. K R Jyothilal IAS, Additional Chief Secretary, Government of Kerala
ii. Mr. Sudhendu J Sinha, Advisor (Infrastructure Connectivity – Transport and Electric Mobility), NITI Aayog
iii. Mr. Manish Gupta, Executive Director – Electrical Energy Management, Railway Board (Ministry of Railways)
iv. Mr. Sharad Saxena, Principal Transport Specialist, Asian Development Bank
v. Mr. Madhav Pai, CEO, World Resources Institute (WRI) India

Highlights of Discussion

- Transport is an integral component of India's commitment towards achieving the targets of fully decarbonization and net zero. It therefore calls for ambitions changes in urban mobility.
- In plan for renewable energy, hydrogen is a strong alternative. Kochi is emerging as a hub for hydrogen and the efforts are on liquefaction so as to transfer it easily. The need is to reduce the cost of hydrogen to make it viable. In Kerala retro fitting of buses with fuel cells is also being done alongwith use of biomass and mixing of ethanol to make it sustainable acquisition of alternative fuels. Kerala has set a target to be net zero by 2050. It is also acquiring e-boats and has taken multiple projects to decarbonize the different modes of transport.
- Under FAME-II scheme vehicle segment has to be addressed separately, it also requires some restructuring. In this context requirements of buses in various tiers of cities may be taken in collaboration with OEM's. Under the scheme, aggregation of cars, heavy duty vehicles, e-tractor, etc. may also be considered. For all such e-vehicle promotion programme adequate charging infrastructure be provided at appropriate locations.

Panelists sharing their views before start of the session

- Railway is the bulk consumer of energy and it has taken up a massive programme of shifting from diesel to electric. Now railway is using HOG complaint coaches which are energy efficient. By 2030 it planned to meet the requirement of renewable energy. Simultaneously railway stations are also being re-developed as super ECBC complaint. It has developed an umbrella system to control all electrical devices and all its procurements are of 5 star (BEE) rating. Along the railway lines afforestation programme has also been taken up.
- ADB give due consideration to decarbonization while financing the transport projects. Its financing system is aligned with the outcome of COP-15 Paris agreement. It is supporting many flagship programmes in India and sovereign guarantees are channelized through MRTS projects. It also helps in getting climate funding.
- Digital transition in transport is required to be in fast mode. Increase in digital transition in mobility will enhance the efficiency of bus operation. Household survey

for travel behaviour need to be undertaken in a comprehensive manner to set the systematic benchmark. For enhancing the ridership in Metro Rail system concentration of work centers along the metro corridor would be necessary as has been done in Bombay where along the suburban corridor about 30,000 jobs are available in one sq.km area. In view of the increasing number of e-rickshaws in major cities the time is ripe to develop a centre of excellence for e-rickshaw in the country.

Outcome

- For achieving the outcome of faster decarbonisation convergence of transport and emission issues is the priority need and the agencies concerned should take it up in an integrated manner.
- State governments should be encouraged to formulate well defined decarbonisation policy on the line of electric vehicle policy.
- Broad strategy for faster decabonisation should focus on electrification, modal shift in favour of public transport, alternative fuels and improving efficiency of existing transprort system.

Panelists addressing the session and participants interaction with panelists

Special Session :- ONDC Mobility – A Catalyst for Collaboration (Open Network for Digital Commerce)

Financing this transition in a consistent manner is a key constraint – the session looked at innovative models like Viability Gap Funding for Public Transport, payment security mechanisms, business models like leasing, battery swapping, etc. that may be leveraged

Moderator Mr. Nitin Nair, Vice President, Open Network for Digital Commerce (ONDC)

Panelists-

i. Mr. Shan M.S, Chief Growth Officer, Juspay Technologies
ii. Mr. Manish Rathi, Chief Executive Officer, Intrcity SmartBus
iii. Mr. Amit Kumar Singh, Co-Founder & Board Director of Maventech Labs
iv. Ms. Priya Singh, ONDC

Highlights of Discussion

- Special session covered safe payment modes to provide meaningful solution for mobility. It emphasized that mobility will be sustainable only when bus and metro modes are integrated.
- Bus system utility will improve with better road network. For safety issues in bus transport ONDC platform have developed the techniques to address the safety problems.
- Digitizing e-mobility give better returns in terms of occupancy of buses and revenue.
- ONDC developed platform regarding bus services and mobility which provide all the features to the users in a transparent manner.
- It has amply been seen that bus operation including ridership improve with better first and last mile connectivity.
- Of late there is wider acceptance of digital ticketing. One can buy ticket any time and from anywhere for seamless travel.
- It is estimated that total e-retail penetration is about 6 -7% in India. ONDC platform can facilitate enhancing the revenue and efficiency of service provider. On this platform all stakeholders, users, service providers can interact with each other to improve the service. It can also help in multi-modal integration.

Outcome

- ONDC platform provide most of the features for bus service and mobility for the users in an integrated and transparent manner.

D. Technical Sessions

In all 8 technical sessions covering a wide range of urban transport related issues were organized as part of the conference. Technical sessions provided a platform to the experts, professional and policy makers to share their experience, best practices, issues and trends in urban transport sustainability and resilience with the distinguished participants and delegates. All the technical session were well attended, interactive, informative and lively.

Technical Session 1:- Embedding Resilience in Urban Transport Systems (Focus on Metro)

Resilience in the context of urban transport can be defined as the ability of urban transport systems to continue its services in the face of obstacles and also rebound back to its normal activity level after removal of the obstacles with minimum impact on its performance parameters. These obstacles can include natural disaster, major accidents, pandemic, system failures, cyber-attacks, and financial shocks among others. Climate resilience has been getting importance in the recent times.

Embedding resilience in the urban transport system involves designing, planning, financing and operating the urban transport infrastructure components and services in a way that minimizes the impact of unexpected events and allows for quick recovery when disruptions occur. Key aspects of resilience in the urban transportation sector include disaster preparedness, climate change adaptation, design & maintenance, flexibility & adaptive management, financial prudence and innovativeness, data & technology utilization.

Resilience assumes a prominent role when it comes to urban rail, better known as metro rail in India because of the relatively larger investment outlay, huge capacity, larger sections of potentially vulnerable population and relatively lesser flexibility in alignment.

The session explored some best practice examples of resilience in urban transport systems in general and urban rail in particular from India and abroad. It discussed how mass rail transit projects can be innovative in adopting flexibility in design, planning, financing & operations and be ‘resilient’.

Chairperson & Dr. Mukund Kumar Sinha, Senior Transport Specialist, Asian

Moderator - Development Bank (ADB)

Speakers

i. Mr. P. Uday Kumar Reddy, General Manager, Metro Railway Kolkata and Chairman, Kolkata Metro Rail Corporation Ltd (KMRCL)
ii. Mr. K V B Reddy, Managing Director & CEO, L&T - Metro Rail Hyderabad Limited
iii. Dr. Klaus Liebig, Head of Division, Climate Finance and Mobility South Asia, KfW Development Bank
iv. Mr. D K Sinha, CEO, Mumbai Metro Line 3 (O&M)
v. Ms. Rashmi Bhardwaj, Additional General Manager Architecture, Delhi Metro Rail Corporation (DMRC)
vi. Mr. Sandeep Fuller, Senior Vice President (Systems), Systra MVA India Ltd., Faridabad
vii. Prof. Gaurav Srivastava, Associate Professor, Civil Engineering, IIT Gandhinagar

Highlights of Discussion

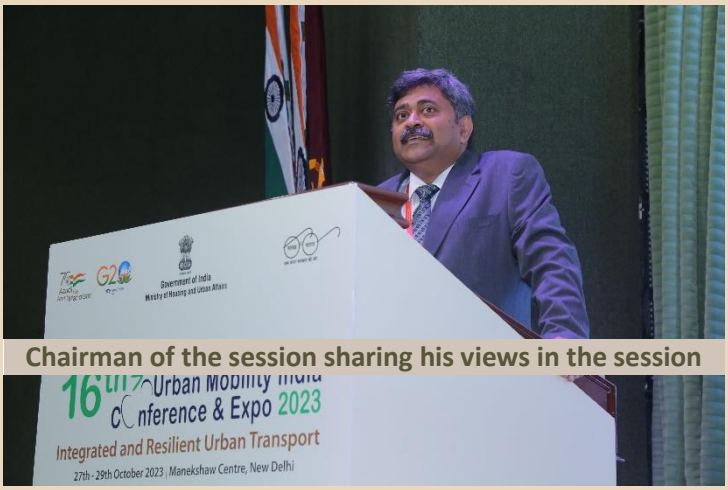
- Nation's journey for mass urban transport began at Kolkata where the first metro train rolled out on October 24, 1984.
- Kolkata has constructed the first transportation tunnel under any mighty river in India i.e. Hooghly. The length of the tunnels below Hooghly river bed is 520 meter.
- Howrah metro station is one of the deepest metro stations in India. It has a deepest metro escape shaft at Strand road.
- The live feed of CCTV inside all the rakes is available at the operation control centre which is a unique feature of east-west metro in Kolkata.
- Underground section of blue line in Kolkata is resilient to monsoon. For 40 years metro has been resilient even when monsoon flooded the city when other transport system failed. Hence it is called lifeline of the city.
- Metro in Kolkata is without DG set in stations, depots and is in 40 years of service. It is also resilient for sub-soil temperature and fire condition.

- To reduce restoration time after untoward incident mini-ART equipment is to be provided at every 3-5 stations.
- There is video communication directly with passenger and OCC during any untoward incident.
- Artificial intelligence enabled CCTV surveillance is being provided for crowd management.

Presentation being given by the Speaker

- Hyderabad metro is the largest metro project in the world on PPP format based on design, build, finance operate and transfer model.
- During construction phase cutting edge solution and technology used. It used pre-cast construction to suit urban fabric of Hyderabad city. Stations are on single pier following spine and wing concept. It has light weight modern rolling stock with regeneration feature.
- Metro designed for 90 seconds train frequency with 6 coaches. It has IOT based asset management system.
- Hyderabad metro rail is fully prepared for all kinds of emergencies such as major fire, train accidents, terrorist attack, unmanageable crowd, pandemic, natural calamities widespread violence and public disturbance.
- A disaster management plan and SoPs are in place to tackle the emergencies.
- Regular and surprise mock drills are being conducted frequently.
- A disaster management special task force is in place.
- During COVID lockdown all preparations were made to keep the system live and within 24 – 48 hours the system was started again. Mitigated all the risks for re-starting the metro system safely.

- Delhi Metro Rail Corporation followed the following 4 fold approach while designed for resilience.
    - Absorptive capacity means ability to absorb shocks and stresses and maintain normal functioning.
    - Restorative capacity relates to ability to recover quickly following a shock or stress and return to normal.
    - Equitable access stress for ability to provide access across the community during both shocks as well as normal times.
    - Adaptive capacity call for ability to change in response to shocks and stresses to maintain normal functioning.
- It has planned for sudden surge of users by building spare capacity, provision for ease of dispersion and maintaining level of service.



Chairman of the session sharing his views in the session

- As regards cyber security it has added intelligence in the metro network both in terms of development and operational needs and the maintenance requirements.
- DMRC has developed some stations as good example of design for resilience. JLN Stadium underground station built specifically to cater to JLN stadium during commonwealth games. On the other hand Ashram underground station planned with lack of space using spare capacity. Punjabi Bagh interchange is a good example of structural resilience which has seen increment of 2.1 lakh passenger trips per day on both the lines (green and pink lines) after opening of the interchange. In the same category of resilient structure are INA interchange, Maa Anandmayee Marg underground station.

- Resilience aspects need to emphasize on passenger centricity, continued technical improvement, cost effectiveness and sustainability.
- Compact design for underground station can save about Rs. 2 crore per station because of reduction in fans and dampers. U shaped girder metro station can be made in elevated section to save space, faster construction and for PSD installation.
- Operational resilience be built into the system right from the inception of the project to meet the changing mobility needs in terms of design, maintenance and operations.

Outcome

- Standards for resilience aspects in metro system particularly railway cyber security are evolving. A framework with benchmarks need to be developed for design, operation, and maintenance of metro system for wider reference.

Participants in the session

- Government may consider creating a separate fund such as Resilience/ Reserved fund for use in emergency by various metro agencies.
- Improvements in the design of tunnel and underground metro particularly for cross passages be made for safer evacuation at the time of emergency.
- Embedding resilience in transport system is an ongoing process. As such it should be a collaborative effort between government agencies, private stakeholders and the community.
- Resilience in transport system be a part of proactive planning so as to make the system adaptable so that it could withstand various challenges.

Technical Session 2:- Strategies for Meeting Challenges in Multi-modal Integration of Urban Transport Systems

The transport sector in India is one of the most extensive in the world, it contributes close to 4.85% of India's Gross Value-Added products (2018-2019). Road Transport contribute 4.3 lakh crores (3.10%), Railways (0.79%), Air Transport (0.15%), Water Transport (0.06%) and Services Incidental to Transport (0.75%).

On the other hand road transport also has the highest share in carbon intensity of emissions that pose a number of challenges in terms of deteriorating air quality and the associated negative health impacts. Although investments in the transport sector have significantly increased over the past two decades, various other challenges include strengthening supply chains, improving the quality and accessibility of passenger services and enhancing connectivity

In future, more metros would be implemented in the upcoming Tier 2 and Tier 3 cities and that a semi-high speed and bullet train projects are coming up in future. In this context, Multi-modal Integration is one of the key challenges for Mass Rapid Transit Systems that could ensure good ridership for these capital-intensive projects. Therefore, Multi-modal Integration must be ensured right at the time of planning of MRT and LRT projects

Discussion and interactions in the session reflected upon challenges being faced for Multi-modal integration in MRT and LRT Projects, it also highlighted what have been the achievements till date. It suggested a "Way Forward" towards ensuring a holistic urban transport solution by embedding MMI in each and every upcoming transport projects.

Chairperson Mr. Shravan Hardikar IAS, Managing Director, Maharashtra Metro Rail Corporation Limited (Maha Metro)

Speakers -

i. Mr. Loknath Behera IPS (Retd), Managing Director, Kochi Metro Rail Limited (KMRL)
ii. Mr. Vinay Kumar Singh, Managing Director, National Capital Region Transport Corporation (NCRTC)
iii. Dr. Shalini Sinha, Professor, Centre for Environmental Planning and Technology (CEPT) University
iv. Mr. Guido Bruggeman, Senior Urban Transport Expert,

Netherlands

v. Mr. Daniel E. Moser, Director Transport India, GIZ

vi. Mr. Antonio Lleras, Coordinator of Accessibility, Exteriors and Signage, Metro Madrid

vii. Mr. Hans - Jörg Gisler, Head, HESS's international OEM partners and customers Carrosserie HESS AG, Bellach, Switzerland

viii. Ms. Aditi Singh, Principal Consultant, Mott MacDonald Pvt Ltd

Highlights of Discussion

- Kochi has developed seamless transportation comprising metro train, city bus, auto rickshaw, boat service, feeder bus, city taxi, walkway and cycle track making it one network, one timetable and one card.
- Kochi is first city in India which has developed water metro. It is integrated urban water transport with electric hybrid boats. Terminals of water metro have various passenger amenities. The system is disabled friendly with floating pontoons. It is the most modern system with ITMS, OCC, AFC, PCS and safety provisions.
- Water metro is operating on 15 routes with a route network of 76 km. It has daily ridership of 34000 with 78 boats and 38 terminals and a frequency of 8-15 minute headway at a speed of 8-10 knots.
- It is similar to Metro with fixed headway, automatic fare collection, centralized control (OCC) common ticket and also has feeder service.
- Water metro has also planned to develop inter modal hubs by linking metro-bus station-water transport at 4 locations and bus station and water metro at 12 locations. It is well integrated with NMT, walkways, elevated path and cycle tracks. Vytila is one of the important integration hub.
- RRTS is enhancing one hour reach covering a distance of 100 km from Delhi in NCR with polycentric development. A beginning is made with 17 km priority section on Delhi-Meerut corridor inaugurated by Hon'ble Prime Minister of India on 20th October, 2023 and is now operational for public. Three priority RRTS corridor namely Delhi-

Meerut, Delhi-Panipat and Delhi-Alwar will be interoperable at Sarai Kale khan station. The proposed interoperability will help in reduction of capital cost, optimum utilization of assets, economies of scale, reduction in waiting time and use of common standards for the 3 RRTS corridor.

Participants interaction with the Speakers in the session

- RRTS alignment connect the multi modal hub such as Sarai Kale Khan, Anand Vihar, Ghaziabad on Delhi Meerut Corridor for efficient integration with Delhi Metro, Indian railway and other modes.
- As part of multimodal integration RRTS has attempted integration at 5 levels including network, physical, operational, information and institutional with other modes/ agencies in NCR.
- All the 3 prioritized RRTS corridor are to be interconnected with airport, Indian railways, Metro Rail, Metro Neo and Metro Lite, E-Rickshaws, autos, ropeway, ride sharing cabs, city bus operations, ISBTs, etc.
- Multi modal integration facilitates in improving delivery of public transport services, passenger comfort and convenience, access to major facilities and activities centers, revenue for public transport operators and shift to sustainable modes.
- Shifting of commuters to public transport is challenging in the face of competition from private modes, aspiration of commuters and non-availability of quality public transport system.
- Travellers don't do modes they do journey as such they want one integrated system. One information portal and one payment system.

- In multimodal integration all public transport modes and other modes to be taken together. A good network brings added value to the individuals modes and routes.
- High quality interchanges in mobility hubs should have short walking distance, clear signage, sheltered safe and clean service points.
- The difference between public transport and an integrated transport system is 50% more passengers.
-
- Public transport network in Berlin is comprised of U-Bahn having 173 stations 10 lines with 146 km route length, S. Bahon having 166 stations 15 lines covering a route length of 327 km, Tram with 22 lines, 404 stations and 189 km of route length, Bus system has a wider network with 3227 stations 151 lines and 1626 km. of route length and the Ferry also operates with 5 lines.
- Multimodal integration in Berlin has helped in reducing private vehicle mode share.

Panelists exchanging their views in the session

- Most of the public transportation modes are administered by the same organization known as BVG (Berliner Verkehrsbetriebe) reconstituted as a public body in 1994 and responsible for the U-Bahn (rail) buses, trams and ferries. It runs on integrated journey planner.
- Berlin has mixed use development and do retrofitting of streets. It makes trips shorter and promotes walkability. Cycle tracks also move alongside multimodal integration among public transport modes.
- Key features of Plaza Eliptica Transport Interchange Station (Metro De Madrid South Africa) are exclusive bus access tunnels, no pedestrian – vehicle conflict, minimized

travel distance inside station for changing the modes, vertical transport facilitate movement between different levels, 100 meter in two minutes.

- In Lucerne city (Switzerland) approach towards sustainable mobility follow a sequence comprising rolling stocks modern eco system, mass transit lane, planning for route and finally multimodal integration. It has achieved a maximum vehicle utilization (minimum 18 hrs/ day) full flexibility and adaptation for existing space in a shortest time.
- In special terrains (hilly areas) challenge for multimodal integration are different than in plane areas.
- Challenges faced in Aizawl town (Mizoram – India) are topographical constraints, poor regional connectivity, proneness to disaster (earthquake zone) high cost of travel in urban areas, limited land availability.

Memento being given to the speaker

- Solution suggested in Aizawl includes promotion of walkability, building ropeways, ensuring seamless interconnections, strengthening vertical connections and improving bus services, constructing public stair cases.

Outcome

- For multi modal integration comprehensive approach should be followed rather than adopting standalone measures. It should be user focused rather than mode focused.
- Approach requires to be re-oriented by developing public transport as an integrated system, introducing quality improvement in public transport, having coherence in transport strategies towards common vision and resorting to branding of public transport services.

- Feeder buses and NMT modes be considered as integral part of multimodal integration. The experiences show that they increase the catchment area of metro station by 25 times.
- There is need to reserve at least 10% of the budget of Metro projects for providing effective multimodal integration at stations.
- In special terrain (hilly areas) public transport system should be more user friendly and provide end to end connectivity. Make traditional mode more user friendly including walking. Innovative use of technology / system be explored to complement buses as public transport system.

Technical Session 3:- Financial Sustainability of Mass Transit Projects (Sponsored by ADB)

Mass transit projects are amongst the most complex yet critical infrastructures for successful performance of our cities. They deliver high economic & environmental benefits and are the most suited for providing mass public transit to the people even in densely populated cities & regions.

The session explored how financial sustainability of mass transit projects can be enhanced. Farebox revenues are usually constrained as fares are to be kept low to be affordable to the masses. Fortunately, mass transit projects offer numerous other opportunities for leveraging innovative financing ranging from advertising, station naming, transit-oriented development schemes, and value capture financing instruments, among others.

The session also indicated some best practices and examples from around the world and discussed how transit projects can be innovative in generating new revenue streams and become financially sustainable.

Chairperson Mr. Sharad Saxena, Principal Transport Specialist, Asian Development Bank.

Speakers -

i. Mr. Anjum Parwez, IAS, Managing Director, Bangalore Metro Rail Corporation Limited (BMRCL)
ii. Ms. Namita Mehrotra, Director Finance, The National Capital Region Transport Corporation (NCRTC)
iii. Ms. Niti Kothari, Director Finance, Madhya Pradesh Metro Rail Corporation Limited (MPMRCL)
iv. Mr. Anil Kumar Kokate, Director (Strategic Planning), Maha Metro
v. Mr. Saurabh Singhal, Managing Partner, StrategyTech Ventures
vi. Mr. Junkichi Kano, Director, Urban Renaissance Agency (UR), Japan
vii. Mr. Nikhil Mittal, Consultant, Asian Development Bank

Highlights of Discussion

- Mass Transit System is a complex system and faces several unique challenges such as capital intensive, rising benchmark lending rates, exchange rates variation, and limited flexibility in fares and low ridership.
- Operating agencies generally adopt 3 approaches in their efforts to ensure financial viability. It focuses on core operations, development of alternate revenue streams and developing new innovative frontiers.
- Hongkong MTR follows a unique business model of rail plus property. It has leased out about 3.00 lakh sq.m. space during financial year 2022.
- Singapore MTR operates multi-modal public transport services including rail, bus, taxi and offers technically backed advertisement with rider insights.

Outcome

- There is a need for strategic planning for financial resilience as being done in Water Metro Project in Kochi.
- Designing of Metro system should be futuristic so as to meet the eventualities after implementation of the project.
- Metro operation and maintenance should follow commercial model/ hybrid model involving PPP. TOD policy needs to be given special attention to sustain mass transit system.
- For construction and implementation of metro benchmarking of cost is required.

Discussions being held in the session between Speakers and Participants

Technical Session 4:- Facilitating Implementation of TOD – Case Studies for Replication

Transit-oriented development (TOD) has become an increasingly important strategy for urban development in India. With rapid urbanization and increasing demand for transportation, TOD has emerged as a key approach to promote sustainable, equitable, and liveable communities. The Government of India has recognized the importance of TOD and has introduced policies and taken initiatives to promote its implementation in Indian cities.

The National Urban Transport Policy (NUTP) of 2006 was the first policy document to recognize the importance of TOD in India. The policy emphasized the need for integrated land use and transportation planning and called for the development of compact, mixed-use, and pedestrian-friendly neighborhoods around transit stations. The policy also highlighted the importance of public transport and non-motorized modes of transport in reducing congestion and improving air quality.

In 2017, the MoHUA released the National Transit-Oriented Development Policy, which provides guidelines and best practices for the planning and implementation of TOD projects in Indian cities. The policy emphasizes proper need for integrated land use and transportation planning, the importance of public participation and stakeholder consultation and the need for innovative financing mechanisms to support TOD projects. The policy also highlights the role of public private partnerships in the development of TOD projects.

Indian cities have also acknowledged the significance of TOD and City Planning indicating policies and projects that promote TOD principles. While the success of TOD projects may vary from city to city but the fact is that we have been able to propagate the concept of TOD. Indian cities have taken steps towards implementing TOD and are working towards creating sustainable, equitable, and liveable communities.

The session on transit oriented development in the Indian context brought together experts, practitioners, and stakeholders to discuss the opportunities and challenges of TOD in Indian cities. The session provided a forum for participants to share best practices, exchange ideas, and explore innovative approaches in TOD and identified actionable steps that cities and regions can take to promote sustainable, equitable, and liveable communities through TOD in India.

Chairperson & Ms. Ashwini Bhide IAS, Managing Director, Mumbai

Moderator - Metro Rail Corporation Limited (MMRCL)

Context Setting : Mr. Gerald Ollivier, Lead Transport Specialist, World Bank

Speakers -

i. Mr. Shankar C Deshpande, Chief, Town & Country Planning Division, Mumbai Metropolitan Region Development Authority (MMRDA)
ii. Dr. Sanjeev Kumar Lohia, Sr Advisor (Railway & Urban Mobility Sector), World Bank
iii. Mr. Ajit Sharma, Director Finance, Delhi Metro Rail Corporation Limited (DMRC)
iv. Mr. Mukut Sharma, Chief TOD Expert, The National Capital Region Transport Corporation (NCRTC)
v. Ms. Lise Breuil, Country Director, The Agence Française de Development (AFD) India
vi. Mr. Guido Bruggeman, Senior Transport Consultant, Netherlands
vii. Prof Jignesh Mehta, Centre for Environmental Planning and Technology (CEPT) Ahmedabad
viii. Ms. Namrita Kalsi, Chief Architect, Haryana Mass Rapid Transport Corporation Limited (HMRTC)
ix. Mr. Alok Jain, CEO & Managing Director, Trans-Consult Ltd.

Highlights of Discussion

- Mumbai Metropolitan Region (MMR) is being transformed through transit oriented development. MMR is planned to be developed as a destination for economic activity by promoting infrastructure development and improving the quality of life.
- MMR has planned 14 metro lines with a network length of 337 km and 225 metro stations. It will have 1.3 million daily ridership by 2031.
- Presently of the total planned network, 46.50 km is operational, 145 km under construction, 42.60 km in the process of tendering and for 103 km. DPR being prepared.
- TOD Master Plan covers about 10% of the total MMR area and about 20% of total developable area of MMR.
- In fact successful implementation of TOD Master Plan in MMR is seen in terms of increased ridership on public transit, increased public transport share, increased walkability and bike-ability and increased average journey.

- There is a land value premium from land transit TOD through mixed land use and people centric planning is transforming cities, regions, lives of 25 million people living in MMR.
- TOD across planning scale from macro scale at national level to micro scale at street level can realize an inclusive, liveable and vibrant urban areas.
- TOD is a planning and design strategy that focusses on creating urban development pattern which facilitate the use of public transit, walking and cycling as primary modes of concentrating urban densities, communities and activities within 5 – 10 minute walking distance from mass rapid transit stations.
- Urban structures based on public transport corridors creates various investment opportunities.
- Influence zone of a transit station is an approximate area of 800 m. radius (a walking distance of 5 – 10 minutes) from the points of alighting at the station.
- TOD facilitate generating sustainable non-fare revenue via property development and station development. It is a response to the rising desire for pedestrian friendly living spaces.

Presentation being discussed in the session

- Planning for TOD aim at promoting walking, NMT modes like cycling, locating development near public transit corridor, mixed land use, dense and compact development, etc.
- TOD is grouped into three categories such as transport node / hub development, multi-modal integration and influence zone development.
- Greenfield TOD projects involve the development of previously less developed or vacant land often on the outskirts of urban areas or in suburban locations.
- Brownfield TOD projects involve the redevelopment or repurposing of previously development land that may be abandoned and underutilised
- DMRC has identified following 12 nodes for development in the first phase.
    - Kashmiri gate Multi-Modal transit hub.
    - Nizamuddin Sarai Kale Khan Multi-modal transit hub.
    - Anand Vihar Multi-modal transit hub.

- New Delhi Railway station.
- Dwarka Sector 8 to Sector 14 metro station corridor.
- Jangpura RRTS station.
- Haiderpur Badli Mor metro station (Mukarba chowk)
- Rohini Sector 18 metro station.
- Mukundpur metro station.
- Karkardooma pink and blue line metro station taken together.
- Trilokpuri metro station.

- DMRC has initiated the work on integrated property development at Okhla NSIC, Multi-model integrated development at Chattarpur metro station.
- DMRC is ensuring fully accessible and all inclusive metro station with pedestrian friendly access and integration with other transportation modes. Promoting sustainable and green practices in station planning and TOD development. Creating integrated transit hubs and last mile connectivity solutions.
- NCRTC is coordinating with government of Haryana, UP and Delhi (DDA) for operationalization of TOD along the phase – I RRTS corridor from Delhi to Meerut. Each of these states have their own distinct TOD policy framework.
- Metro/ BRTS influence zones are taken as corridor of 500 m / 800 m on either side of the alignment. In RRTS, 1.5 km influence zone is taken on either side of alignment.
- NCRTC is operationalising the TOD policy applicable in Delhi and included Master Plan for Delhi – 2021 by preparation of influence zone plane of 3 Nodes identified along RRTS alignment in Delhi namely Jangpura RRTS station, Anand Vihar station, Karkardooma and Sarai Kale Khan TOD nod.
- Various agencies are coordinating in influence zone plane such as Indian Railway for Anand Vihar Railway Station, DDA in Karkardooma TOD scheme, DTC for Anand Vihar ISBT, NCRTC in Anand Vihar underground RRTS station, DMRC involved in Karkardooma and Anand Vihar MRTS and UPSRTC in Kaushambi ISBT.
- Conceptually TOD zones along the RRTS and Metro alignment in Meerut Development area are as per UP TOD policy. These are corridor influence zone of 500 m on either side along MRTS, Radial influence zone of 1.5 km. radius from centre of RRTS and high potential area / special development area in the corridor.
- NCRTC is also involved in implementation of TOD along the corridor by way of Zonal Development Plans for TOD zones of the RRTS corridor.
- Value capture for RRTS financial sustainability is to be realised by using following instruments. Incorporation of TOD zones in Master Plan / Zonal Development Plan of the respective town by amending the relevant legislation, special amenity fees and

urban use charges by amending the UP Urban Planning and Development Act, 1973 and by making provision for additional FAR in TOD zones.

- RRTS has also deviced sharing formula for value capture revenue with concerned City Development Authority. Similarly, RRTS has also finalised the TOD and VCF roadmap in Haryana as part of RRTS corridor of Delhi-Alwar and Delhi-Panipat passing through Haryana and incorporated the same in Haryana TOD policy.
- In the Netherlands, TOD concept as such is not followed but it does mobility oriented urban planning and design. It also have transit oriented mind-set where transit is the central focus point for any urban plan and infrastructure design.
- In the changed approach urban planning and infrastructure design is around public transit concept which resulted in attractive and efficient public transport and NMT.
- In development of Utrecht new town public transport, walking and cycling are taken as starting point for design. The mobility concept in the town has resulted in a high quality urban environment around sustainable mobility by creating traffic calmed area, attractive public space and quality of life.
- Dedicated bus routes of 40 kilometre and 6 rail stations are the basis for urban design.
- In Almere town bus infrastructure is integrated with shopping mall which is the largest mall in the Netherlands. It has a focus on public transport, walking and cycling.
- In Houten city of the Netherlands 35% of rail users travel by bicycle to railway station. In Utrecht town also station design is integrated with walking and cycling. Amsterdam central station is integrated with Bicycle parking with a capacity of 13000 bicycles. In Rotterdam central station public space is created in front of the station leading to transformation of the area. There is a seamless transfer between transport mode with sufficient space reserved around the station and integrating railways, metro, tram, bus, bicycle and pedestrian modes. In Hague central station also LRT and train services are integrated.
- Success of TOD approach in the Netherlands is attributed to the robust legal framework and its enforcement, strong municipal system, cooperation between various stakeholders, availability of multiple financing options, integration of mobility infrastructure with urban planning and design and taking station as key development zone.
- The present status of TOD planning under statutory plans, regulations and prevailing policies indicate that Ahmedabad, Bangalore, Delhi, Gurgaon and Kochi metro has made some progress in identification of TOD zone provisions.
- In Ahmedabad TOD planning is taken at two levels namely Development Plan and Local Area Plans and Town Planning Scheme. Multiple Local Area Plans for TOD

corridors along BRTS and Metro rail are being prepared. Local Area Plan emphasise on improving street network and area development schemes. In central business district and new development local area plan mechanism as part of TOD zone are being given priority by taking up residential mixed use and institutional development.

Active participation in the session

- Gurugram is emerging as an important centre for value capture financing through TOD. It is a hub of commercial, industrial and urban activities in the region. It has become as an allegory for the urban aspirations of modern India. Transport continues to occupy a significant share of land in the city.
- Primary goals of Haryana TOD policy are to reduce/ discourage private vehicle dependency and induce public transport use through design policy, regulatory measures and enforcement. It also envisages to provide easy transport access to maximum number of people within walking distance through densification and enhanced connectivity.
- It has identified intense TOD zone of 500 mtrs. on both sides from the boundaries of ROW of the road on which MRTS corridor is proposed to be provided. Another TOD zone is between 500 to 800 mtrs depth on both sides from the boundaries of ROW of the road on which MRTS corridor is proposed to be provided.
- In Haryana, TOD Policy was issued on 17.08.2014 which was subsequently amended on 9-2-2016, 11-4-2017, 8-2-3018 and 9-3-2019. In Haryana TOD Policy there is a provision for mixed land use upto 30% by having residential component in commercial zones in licenced colonies. The height restrictions shall be subject to the regulations of the Airport Authority of India and structural stability and fire safety compliances.
- Additional FAR can be purchased in the slabs of 0.5 and 0.25 subject to a maximum of 1.75 (in intense zone) or 0.75 in transition zone on the payment of proportionate charges.
- The Hong Kong government fosters TOD throughout the city through a comprehensive set of policies and strategies such as Hong Kong planning standards and guidelines, railway property development, pedestrian friendly infrastructure and transport and land use integration.

- Hong Kong planning standards and guidelines stipulates higher plot ratios at transit nodes, much lower parking provision at transit modes and multi-modal public transport integration.
- Hong Kong achieved high population density by clear planning intent. Approximately 25% Hong Kong total land area is developed with just 7% allocated for residential purposes. There is a focus on high rise compact urban planning and optimisation of land usage and transit accessibility.
- The railway + property development model finances new projects and operation and maintenance.
- MTR ordinance facilitates land acquisition. It pays a land premium based on the market value without the railway, greenfield and no railway. It also builds the new rail line in partnership with private developers. Govt. grants land development rights along the new rail lines. Linear city is a new paradigm of TOD.

Outcome

- Along the TOD corridor job opportunities be created. It should be dense development with a provision for parking, NMT facilities, commercial centers and residential development.
- TOD approach followed in Hong Kong and Netherland may be emulated in Indian cities with suitable modifications as per local conditions.
- Implementation of TOD and land pooling policy should be worked out in proper time perspective. Development in Transit corridor areas be inclusive and sustainable with required facilities and amenities.

Technical Session 5:- Roadmap for Scaling Up E-Buses: Vision 2030

Buses are the backbone of passenger mobility in India catering to an estimated 28% of the total passenger transport. They will continue to remain the mainstay for affordable, safe, clean and equitable access to mobility for majority of the Indians. Government of India (GoI) has recognized the need for improving bus based public transport and has included in its development program as well as decarbonization strategies. India has about 1.8 million buses, out of which about 1,46,000 buses (~8%) are operated by State Transport Undertakings (STUs) and Special Purpose vehicles (SPVs) formed exclusively for urban bus operations, while the rest are operated by the private sector (~92%). The number of buses - both public and private - remained relatively stagnant in the past decade while cars and two-wheelers have increased more than 10% per annum during the same period.

On the one hand the poor financial health of STU has constrained fleet renewal and growth. While on the other STU's need to retire and replace about 32,000 buses, i.e., more than 20% of their fleet. Further, there is need to augment fleet by an additional 2,50,000 buses by 2031 to fill the backlogs and cater to India's increasing travel demand.

The cost of e-bus services has gone down in the past three years due to government supported schemes. Several STUs transitioned from in-house ownership and operations to a Gross Cost Contract (GCC) (also called as wet-lease) based procurement wherein the ownership, operations and maintenance of fleets are provided by private Original Equipment Manufacturers (OEMs) and operators. This resulted in cost savings associated with the workforce. These benefits were combined with an aggregated procurement based on homogeneous procurement norms across the country under the Grand Challenge which led to lower e-bus GCC prices than diesel/ CNG buses prices even without subsidy.

Encouraged by these results, the NEBP was launched with the aim to deploy 50,000 e-buses across STUs by 2027. The first round of NEBP aggregated demand for 6,465 buses on GCC basis without subsidy. Market feedback indicated that the payment risks associated with STUs' poor finances led to the low participation and added to the costs. To ensure the employment of the in-house crew in STUs, the second round of NEBP aggregated 4,675 buses deployed on a dry-lease model wherein the bus would be leased from the OEM to STUs which operate and maintain these buses.

The session discussed the key takeaways of the eBus procurement in India and identified the challenges and their mitigation measures for accelerating the adoption of e-Buses. Session touched upon the 1) payment risk mitigation in GCC, 2) operationalising the dry-lease model, 3) alternate business models and unlocking of the private sector financing, 4) increase eBus uptake in private bus operations 5) need for capacity building.

Chairperson - Mr. Vishal Kapoor, CEO, Energy Efficiency Services Limited (EESL)

Moderator - Mr. Gerald Ollivier, Lead Transport Specialist, World Bank, India

Speakers -

i. Mr. Bhanu Pratap Singh Bhadoria, Director (Urban Transport), Ministry of Housing and Urban Affairs (MoHUA)
ii. Mr. Daniel E. Moser, Director Transport India, GIZ
iii. Ms. Veronika Pliats, Principal Portfolio Manager, Climate Finance and Mobility South Asia, KfW
iv. Ms. Malavika Pillai, Principal Investment Officer, Infrastructure & Natural Resources, IFC

Highlights of the Discussion

- India made several advancement towards e-bus adoption. 8000 e-buses procured through FAME and state level program. E-buses are now 24-26% cheaper than diesel/ CNG buses due to transition to gross cost contracts, aggregation and standardisation of procurement.
- National Electric Bus Programme (NEBP) launched with a target of 50000 e-buses. 6465 e-buses already procured through NEBP-Phase I. PM e-bus sewa for 10000 e-buses announced.
- India aims at deploying 300000 e-buses by 2030. It requires INR 4.5 lakh cr. of investment including INR 3.6 lakh cr financing. It can mitigate GHG emission of 180-300 mt Co2 e through technology transition, green energy adoption and mode shift.

- Public and private buses have varied approaches to achieve large scale e-buses adoption but policy, financing and infrastructure require market specific approach.
- Public buses numbering about 1,50,000 buses accounts for 8% market share. It comprises about 35,000 urban buses (23%) and 1,10,000 rural and intercity buses (77%).
- This segment needs to focus on fleet renewal and service gaps. It is driven by policy and financial viability for which dedicated infrastructure is available. Buyers are specific and the government support is available.
- Private buses segment has about 6,25,000 intercity buses (stage and contract carriage) 7,30,000 school buses and 4,30,000 employee transport. Contrary to public buses it is driven by profitability and competitiveness with limited infrastructure. Its operation is fragmented, only 13%operators own more than 50 buses and there is no direct government support.
- Electric buses are capital intensive but deliver operational cost benefit over time. Up scaling of e-buses face manifold challenges in terms of functionality and financing.
- As regards functional challenges there remains uncertainty on performance over time, availability of charging facility, low capabilities in EV tech in terms of planning, maintenance, operations and risk management. Functionally it is also unknown in life cycle management.

Panelist speaking on the session theme

- Financing challenge for public and private buses vary. Public buses operate within weak financial position of STUs/ and limited bankability of contracts such as lack of VGF, timely payments, dispute resolution, etc. It also has legacy preference for costlier in house delivery.
- Financing challenge for private buses includes challenge converting economics into Return on Investment (ROI), high upfront cost / uncertain resale value with no subsidy and small scale purchases. There is a risk of competitive obsolescence with limited financial solution. It has unclear scalability (OEM and availability)

Outcome

- Strategy for scaling up of e-buses should formulate policy framework and regulations fostering stability in incentives, disincentives to diesel / CNG buses and indicate mandate for transition with priority in cities.
- There should be bankable STU contracts specifying standardised contracts, VGF facility, provision for payment security dispute resolution, etc.
- Provision be made for shared charging infrastructure for all large vehicles in metropolitan areas and along corridors.
- Financial innovations including pools to achieve economies of scale, access to green bonds, support to first 10% of private e-buses with incentives and stimulation of business models reducing upfront costs.
- Eco system for capacity building and training programmes for the manpower engaged in e-bus services be created in collaboration with specific institutes.
- R&D be developed for improving products being used in India. Share the experiences of e-buses and disseminated the same widely.
- For private buses under STUs green bonds may be issued to improve access to finance so as to protect small time operators from capital risk.
- Establish Bus Ports for parking, charging and maintenance through PPP for easy transition to e-buses.
- A balanced approach is to be followed while addressing the risks in bus operation. In public sector focus is on efficiency, value for money, quality service and good competition while in private sector ease of working, adequate returns, payment security and improving efficiency are the major concerns.

Panelists on the dias sharing their views

Technical Session 6:- Gender Mainstreaming in Urban Mobility

Differing social and economic roles taken up by women and men are reflected in their travel patterns. Short trip length, dependency on public and non-motorized transport, restricted travel times and trip chaining are general characteristics of woman's travel pattern. Moreover, they decide the mode of travel bearing in mind the parameters such as affordability, coverage, frequency, safety and comfort. While this purports the need for gender-sensitive transportation systems, the planning approach in India uses standardized mobility solutions for men and women. Disaggregated data is rarely collected and analyzed for transportation planning and operations.

This has resulted in gender-neutral transportation systems. Further, under-representation of women in technical jobs of the sector is echoed in the infrastructure systems as well which lacks women's perspective. Several initiatives have been taken up at national and city level towards gender inclusion and improving women's safety in transport system.

This session focused on the initiatives taken up at the national and city level, the issues, challenges and the success stories for its implementation. It also discussed the need for a national framework which can lead to penetration of gender inclusive transportation systems in all cities.

Chairperson - Ms. Ashwini Bhide IAS, Managing Director, Mumbai Metro Rail Corporation Limited

Moderator - Dr. Laghu Parashar, Senior Transport Specialist, World Bank

Presenters -

i. Ms. Laura Ballesteros Mancilla, Alternate Senator, Founding member of Mujeres en movimiento, Mexico
ii. Ms. Krishna Desai, Gender Focal Point-Mobility Practice, SUM-ACA, GIZ
iii. Ms. Swati Khanna, Senior Sector Specialist, Urban Development & Mobility, KfW Development Bank
iv. Mr. Chris Bruntlett, Communications Manager, Dutch Cycling Embassy
v. Dr. Aanchal Jain, CEO, PMI Electromobility Solutions

vi. Ms. Mitali Nikore, Transport Specialist (ETC), World Bank Ms. Reji Nair, Senior Director, STQC, Ministry of Electronics & Information Technology

Highlights of Discussion

- In view of the low female workforce in transport sector, lack of gender perspective in planning, unsafe transportation systems and impact on women's workforce gender mainstreaming is necessary.
- At present there is only 3.5% women workforce in transport sector, 4 out of 5 women feel unsafe using public transport and unsafe and restricted mobility impacts women's work opportunities.
- Only a handful of Indian transit system have females in leadership roles. Similarly, number of females as bus drivers remains abysmally low.
- There are various barriers to female employment in transport sector namely working conditions, infrastructural inadequacy, regulatory restrictions, societal notions, etc.
- In working environment odd hour shifts, long distance travel, vulnerable working conditions, safety issues and lack of training opportunities for women are some of the major barriers for female employment.
- Unmaintained and poor conditions in rest rooms, inadequate lighting in buses, terminals, depots, manual steering and seating are discouraging factors for female employment in transport sector.
- Some regulatory restrictions in the form of requirement of HV driving license with specific years of experience makes it difficult for women to enter as bus driver.
- Societal beliefs that transport sector is patriarchal and female are less suited for transport specific tasks, it is a male dominated sector and lack of female role models are some of the stereotype causes come in way of female employment.
- Lack of gender perspective in infrastructure design is mainly reflected in plying of high floor buses, poor visibility of the system, unmaintained facilities at terminals, absence of footpaths, ill lit bus stop, inadequate lighting, etc.
- GIZ took some initiatives towards mainstreaming gender in transport. CRUT Bhubaneswar has included women in first and last mile connectivity modes. 120 women and transgender were hired and trained to driving for MO E-ride electric rickshaws in Bhubaneswar.
- In cycle training for women in Kochi, 700+ high school girls and women from low income families were provided cycle training so as to give them an affordable green mobility options for independent commute.

- As a result 34% of trained women have shifted to cycles for their commute. One out of 4 unemployed women trained under this programme have found a job after the training.
- As part of gender sensitive training to first line staff 14 days training provided to the crew of CRUT and OSRTC with special module on fender sensitization.
- Under CRUT and SMART SUT's capacity building initiative of Bus Pathshala, 1200 members from the bus crew of CRUT and OSRTC were trained on passenger friendly approaches including gender sensitive responsiveness by first line staff.
- In Kerala some gender reforms are included in urban transport. It has set up a nodal agency for gender mainstreaming in transport sector which work on coordination with various agencies, compile annual gender statistics, set targets for women employment and monitor and evaluate data regarding infrastructure planning.
- In order to enhance women employment in transport sector it has introduced women friendly work place policies, started collaboration with self-help groups, relaxed qualification criteria, targeted specific advertisement programme and training and developed basic amenities.

Moderator in the session setting the tone for further discussion

- In respect of developing gender responsive infrastructure it has introduced UBS-II compliant buses, started providing real time information of transit system, making easy grievance redressal system, issued street design guidelines and developed bus stop / terminal – CCTV helpline no. vendors, etc.
- Gender disaggregated data framework is based on ticketing data by assessing the women footfall on stops across time. Segregated data is collected through ETM, Smart cards. Segregated data collection and analysis for comprehensive Mobility Plan is done based on mode share, trip purpose, trip length, cost sexual harassment faced, NMT infrastructure within 500 mts of transit hubs.
- First and last mile planning is done through pedestrian oriented streets, public toilet availability, streets with pink petrol, well lit streets, unsafe street as per street audits and street wise vendors.

- Stops/ terminal infrastructure includes facilities provided for women and its utilization such as public toilets, resting lounge, nursing room, free drinking, water, etc.
- Universally accessible bus stops should have proper lighting, proper signage, provision for venders, dustbins, PIS and helpline numbers.
- Harassment reports include complaint within vehicle, bus stop, terminal, etc. It should have comprehensive data records on harassment issues in bus, bus stops and terminals.
- Bhubaneswar is the first Indian city to collect gender disaggregated data through gendered ticketing with ETMs. Kerala State Road Transport Corporation has also recently started to initiate gendered ticketing.
- Data from gendered ticketing includes route wise female ridership, hourly distribution of ridership and stepwise boarding and alighting.
- Applications of gendered ticketing are in service planning, working out demand on different routes deploying female drivers/ conductors/ marshals, scheduling early/ late service and for priority infrastructure development.
- Gender based differences in mobility pattern having implications for Public Transport Authorities are as under: - Timing and purpose of travel, distance travelled, trip chaining, trip duration route choice, preferred modes, etc.

Audience interacting in the session

- Key drivers behind these gendered preferences are cost/ affordability considerations safety, crowding at choke points, first and last mile connectivity issues, etc.
- Framework should follow the following approach. Assess the ground situation, strengthen the planning and policies, build capacity and raise awareness and improve the infrastructure and services.

Outcome

- Metro being the modern public transport system need to show the way.
- Data on women travel pattern and behavior should be collected using video analytics as is being done in Bhubaneswar and Kochi for better planning of gender maintaining.
- Women leadership in metro system needs to be ensured may be though reservation.

Technical Session 7:- Shaping the Future of Mobility with Digitalization

The future of mobility is undergoing a transformative shift, thanks to the convergence of artificial intelligence (AI) and big data. These cutting-edge technologies are revolutionizing the way we move, commute, and navigate our cities, offering unprecedented opportunities for efficiency, sustainability and improved user experiences. Artificial intelligence brings intelligent automation and decision-making capabilities to the mobility sector. By analyzing vast amounts of data, AI algorithms can optimize traffic management, predict demand patterns, and even enable autonomous vehicles to navigate safely and efficiently. Big data, on the other hand, provides the fuel for AI systems, offering a wealth of information gathered from various sources, including sensors, smartphones, and connected devices.

Public transportation systems can also benefit from AI and big data as predictive analytics can optimize routes, schedules, and fleet management, resulting in improved efficiency and better user experiences. For multiple operators and regions to benefit from the effective use of data and improve their transportation systems, there is need to bring openness and standardization to the way data is handled. There should be sufficient clarity on the part of the government to put out data in the open domain to benefit the research community and the private sector who can address the gaps in the services.

Though governments are largest influencers in transportation, the majority share of the transport operation lies in the hands of the private sector. This creates barriers to data being available to the governments to better plan their urban areas. There should be capabilities with the government to know what data they need and what tools they need to make sense of the data. These capabilities will enable governments to ask the private operators for the right kind of data, in the right format and make it easy for private operators to engage with the government as agents shaping the urban areas. The following experts deliberated on the above issues in the session.

Chairperson - Mr. Anjum Parwez, IAS, Managing Director, Bangalore Metro Rail Corporation Limited (BMRCL)

Moderator - Mr. Vivek Ogra, Partner, Transport Consulting, EY

Speakers -

i. Mr. Sajeev Maheshwari, Executive Director IT and AFC, Delhi Metro Rail Corporation
ii. Mr. Nitin Nair, Vice President, ONDC
iii. Mr. Alok Jain, CEO & MD, Trans-Consult Ltd

iv. Ms. Priya Singh, Cofounder and Director, Chalo Mobility

v. Mr. Prashanth A., Vice President, Mobility Platform & Services, Bosch India

vi. Mr. Vivekanand Kotikalapudi, Transport, Infrastructure Advisor, GIZ

vii. Mr. Arun Bothra, IPS, Managing Director, Capital Region Urban Transport (CRUT)

Highlights of the Discussion

- DMRC is generating lot of data in its operation and management of Metro Rail in Delhi and NCR. It is working to put all stakeholders like e-commerce giants, last mile connectivity providers, passenger/ users of metro on single platform. It is also mining data in big ways such as manually, through equipment use and control and management service.

Panelist putting forward his views

- Multimodality of transportation system is a challenge which should be considered on priority by the operation and management agencies of Mass Transit System. Data generating platform have to be optimally used.
- Technology is not the solution but it is a tool to find the solution. Indian transit system is challenge for pan India consumers or first time passenger. Hong Kong have Octopus Card which can be used for all transit & non transit purpose as one card. Indians metro system may take clue out of it by resorting to NCMC in the same fashion.
- It is amply evident now that transport system should have consumer centric approach. To achieve this there should be easy interoperability. Need is to work on model of interactive programmes and behavioral change effects to operational efficiency.
- There should be seamless flow of data between various transportation system operating agencies. AI will help us when we have standardized data format. Entrepreneurs should use the big data so generated to build innovative models for customers.
- Digitalization should be institutionalized within an organization. There should be a digitally skilled team and Data Dashboard approach should be customer centric.

Outcome

- Multimodal integration of transportation is the need of the hour. Transportation system to make full use of AI and big data. There should be open data centre managed by operating agencies where various players could plug in.
- Silos of data is hampering common mobility. There has to be seamless integration of big data for use of all stakeholders.
- New technology of AI and big data be utilized optimally to provide seamless mobility with integrated solutions.
- Mobility data needs to be standardized for multifarious application.
- Collaboration among various agencies both government and private, research and manufactures is required to work out solutions that facilitate seamless mobility.

A close interaction among the participants and panelists in the session

Technical Session 8:- Integrated & Sustainable Urban Freight and Logistics

At the COP 26 Climate Summit in Glasgow, India set ambitious targets of attaining net-zero emissions by 2070 and a 45% reduction in the emissions intensity of its GDP below the 2005 levels by 2030. Currently, the transport sector accounts for approximately 14% of the country's total GHG emissions, with a large dependence on fossil-fuel energy consumption. Urban freight traffic contributes up to around 15% of total vehicular movement. On road, freight movement in India is highly dominated by diesel vehicles accounting for 64% of total diesel consumption, contributing significantly to the local air pollution.

With the growing affordability of the rising urban population which in turn is becoming increasingly dependent on online commerce, the externalities related to high freight movements in the cities are increasing. Inadequate infrastructure and inefficient last-mile delivery have resulted into congestion and safety issues. In addition to that, increased vehicle movement has been a great contributor to urban pollution.

As the urban freight sector is dominated by small and informal players, the deployment of clean technology vehicles as well as optimized resource planning is facing certain hiccups. To address the challenges posed by urban freight movement, focused initiatives such as Shoonya Campaign have been launched by the NITI Aayog. The policies on Gati Shakti Multimodal Cargo Terminal Development and National Logistic Plan focus on reducing the logistics cost and facilitating efficient intra-modal connectivity. As a follow-up, multiple states such as Karnataka and Uttar Pradesh have constituted 'City Logistics Co-ordination Committee' to identify challenges in the city logistics and improve efficiency in the sector. A number of cities and logistics players have developed and implemented sustainable freight movement plans to supplement the vision of net zero by 2070.

The future of urban freight and logistics is shaped by emerging technologies and innovative strategies like, electric vehicles, advanced data analytics for route optimization, and the integration of multiple modes of transportation. Implementing these solutions can lead to more sustainable, efficient and integrated urban freight systems. The discussions explored the pathways of achieving integrated and sustainable urban freight and logistics and its significance in improving sustainability and efficiency. All these issues were discussed at length in the session.

Chairperson & Moderator - Mr. Sudhendu J Sinha, Advisor (Infrastructure Connectivity – Transport and Electric Mobility),

	NITI Aayog
Context Presentation	Ms. Viral Joshi, Research Associate (Transport and Urban Governance Division), TERI
Speakers -	i. Dr. Gitakrishnan Ramadurai, Professor (Transportation Engineering Division), IIT Madras. ii. Prof. Sanjay Gupta, Dean Research and Professor of Transport Planning, School of Planning and Architecture (SPA) Delhi. iii. Mr. Shalendra Gupta, CFO & Co-founder, AltiGreen iv. Ms. Priti Shukla, Project Manager (Electric Mobility Program), Shakti Sustainable Energy Foundation

Highlights of Discussion

- Urban freight transport in India is heterogeneous consisting of two wheelers three wheelers, pickups and trucks.
- Transport planners and Policy makers require freight trip generation model for freight and logistic service planning. For this a variety of data is collected through primary and secondary sources.
- For developing a Comprehensive Planning Framework for urban freight in Chennai data sources such as Economics Census and Google API, Commercial Tax Department and Chennai Corporation were tapped. Establishment based Freight survey conducted in 2016 were used for planning framework Daily and Weekly Freight trip generation models by vehicle type including freight trip production and freight trip attraction worked out for planning framework.
- Based on the data analysis Roadmap for Sustainable Urban Freight Mobility in Chennai implemented. It included development and evaluation of freight consolidation strategies, Development of Freight Parking Management Plan and development of roadmap for electrification of freight vehicle.
- In truck parking plan 14-22% saving achieved in travel time due to dedicated freight parking.
- It reveals that transporting goods quickly, safely, economically and reliably is seen vital to a city’s prosperity.

- Basic statistics as per UN-Habitat 2013 report indicate that goods transport account for 10 to 15 percent of equivalent km. travelled in urban area, 2 to 5 per cent of employment urban work force and 3 to 5 percent of urban land use.
- Urban goods transport (including transiting heavy goods vehicles) accounts for 31% of energy use and 31% of CO2 emission respectively (2006).
- Issues and challenges for urban freight are enumerated as under:
    - Emerging urban sprawl and its impact on freight deliveries.
    - Increasing e-commerce deliveries and its environmental impact.
    - NMT is treated as a neglected option of urban freight mobility.
    - Barriers towards EV adoption in urban freight.
    - Poor freight operations infrastructure in major freight generating areas.
    - Freight is a neglected component in city Mobility Plan and Master Plans.
    - Weak institutional set ups, inadequate technical capacity, absence of standards and performance benchmarks.
    - Absence of data and research on urban freight leading to absence of informed policy planning.

Technical session in progress

- Sustainable urban freight policy includes the following measures:-
    - Land use and planning.
    - Transport Infrastructure.
    - Managing Infrastructure.
    - Pricing
    - Attitudinal and behavioral
    - Information provision
    - Modal shift.
    - Other measures to reduce the environmental impact of vehicle use.
- City logistics is based on 3 components:-
    - Modes consisting of trucks and other modes.
    - Operations including scheduling, routing parking and loading and unloading.

- Infrastructure consisting of terminals, roads, distribution centers and alternative infrastructure.

- Some global best practices in sustainable urban freight for emulation. International practices such as urban consolidation centre, cargo cycles for last mile delivery, kiala points lockers, nearby delivery areas are notable. Mumbai Dabbawallas and urban delivery networks UDAAN are some of the good Indian examples.
- Originating and destined tonnage in recent years in Delhi show an interesting picture. Estimated 1.93 lakh freight vehicles move in and out of Delhi everyday (2023). Building materials, textiles and fruits and vegetables account for 40% of total daily vehicle arrival and 45% of tonnage entering Delhi.
- E-Commerce freight demand in Delhi in case of Flipkart reveal an interesting scenario. There are 357 delivery hubs delivering 6.60 lakh orders of 6.60 lakh units every day. Average line haul distance from the Fulfilment Centre to the delivery hub is 27 km. whereas average last mile delivery distance from delivery hubs to customers is 6.3 km.
- Phenomena logistics sprawl in Delhi shows that wholesale markets have sprawled upto 28 km from the centre of Delhi towards the peri urban-areas during 1962 – 2014.
- Delhi Master Plan 2001 suggested decentralized wholesale markets through integrated freight complex at 4 location which provide for regional and intra-urban freight movement, ware-housing and storage facilities, specialized markets and service and other facilities.
- However in walled city Delhi wholesale markets NMT modes play an important role in freight operations which include loading/ unloading, NMT, head load and establishments.
- An estimated 37425 tonnes of goods are handled daily by 7 major whole sale markets resulting in 0.16 million tonnes km of movement through various modes (2013). About 55% of daily estimated tonnage is handled by NMT. While in daily tone km NMT share is 67% in comparison to 70% in terms of vehicles km.
- Major barriers for E.V. adoption in small freight vehicle in Delhi are :
    - Less electric range
    - Inadequate charging infrastructure.
    - Absence of battery swapping facility.
    - Less repair and maintenance outlets.
    - Limited financing option.
    - High cost of vehicle
    - Few EV models
    - Lack of awareness of EV system

- As against the myth of slow adoption - EVs adoption is entering the exponential phase. During 2021 – 2024 EV adoption of 3 wheeler cargo has gone up from 1% in 2021 to 25% in 2024.
- In respect of another myth about inadequate charging infrastructure now EVs are almost everywhere in the country from north to south and east to west.
- Similarly myth regarding range anxiety a case study of a customer revealed that it covered 35,000 km. distance in 173 days. Another one is continuing for the last 177 days since April. A third customers is driving average distance of 180 km. per day. Survey showed an interesting feature where hundreds of such customers are covering in the range of 120 km per charge.
- Contrary to the myth that EVs are based on imported technology now it is part of make in India and made for India campaign. Various components such as motor, controller, battery and BMS, DC-DC converter, gearbox / transmission, display, telematics, wire hireness, etc. are all made as part of Make in India programme.
- Efforts are on catalyzing the adoption of carbon free transportation. This is the need of the era when it is estimated that pollution kills 2.4 million people every year in India. As per WHO Report 14 of the top 15 worst polluted cities are in India. This is the conditions when India has only 22 cars per 1,000 persons as compared to 838 in USA, 615 in Japan, 561 Germany, 384 in Brazil and 181 in China.
- Altigreen is developing world class electric vehicle solutions built for India and emerging markets. In fact electrification of road transport requires vehicles especially built for the differentiated needs of India geography where cities have frequent water logging, potholes common features of the roads, heterogeneous traffic, high temperature, overloading, etc.
- Altigreen success story shows that Altigreen connected vehicles have covered more than 20 million km of distance so far. It has saved 2100 tonnes of CO2 in this process. It equalize to 3 tonnes per year per vehicle thereby saving one acre of mature forest. It process 550 million telematics packets every mouth.
- Altigreen is a triple bottom line company contributing to profits, planet and people. It helps in reverse climate change that is each 3 wheeler saves more than 3 tonnes of CO2 annually which is equivalent to one acre of mature forest. Its zero emission vehicles lead to improved air quality index in a region notorious for polluted air.
- It also claims that their reliable vehicles increase disposable income by 50-100 percent for the bottom of the urban pyramid. Its intellectual property belongs to India with 100% Make in India – Make for India retaining all the jobs within India. EVs made by

them are much easier to handle and suitable for women drivers to become financially independent thereby empowering the women.

- Freight movement is important component of transportation system. It consumes 80 billion liters of diesel accounting for 90% of total diesel consumption in India. It also contribute 213 Mt CO2 emission amounting to 10% of India's total. Freight demand is estimated to grow by over five times in the next three decades.
- Modal split for freight movement in India is 70% by roads, 18% by rail, 6% each by water and pipeline (2022). Of the total tonnage of freight 76% is carried by heavy duty truck. 21% by medium duty truck and 3% by light duty truck.
- Key challenges in electrifying freight are I) manufacturing barriers in terms of cost, high import duties, low energy and power density batteries, II) awareness and adoption regarding EV technology and III) charging infrastructure inadequacy.
- For addressing the above barriers some policy framework is required comprising fiscal incentives to OEM, transition to ZET, regulatory measure for manufacturing barriers, awareness and advocacy programme and success stories of pilot projects and establishment of strong charging infrastructure.
- Decarbonizing freight at the national level by providing opportunities that fosters a conducive freight electrification.

Outcome

- Create a hierarchy of freight handling facility.
- Create freight operation supportive infrastructure to improve freight productivity.
- Promote incentive schemes for EV transition in the urban freight sector and encourage green freight deliveries.
- Conduct capacity building programmes for officials, policy makers and stakeholders of urban freight.
- Disseminate research practices and best examples for informed policy planning.
- Shifting to EVs would be beneficial in saving of total cost of operation, reducing 10774 tonnes tailpipes CO2 emission annually and also reducing 2820613 liters of diesel consumption annually.
- Electric freight accelerator for sustainable transport may be introduced on a large scale in champions of change for the following sector – India post, e-commerce, dairy, fruits and vegetables bottling plants, etc.
- TERI has developed a calculator for estimation of greenhouse gas emission in tonnes of CO2 for road and rail based on tonne-km. The emission factor is in Kg CO2 per ton

km. It is 0.009 for rail and 0.04 is for road. This factor may be employed while working out the GHG emission.

- Electric mobility is key enabler to decarbonize transport. High penetration of electric vehicles could lead to 14% reduction in the total energy requirement in 2030 and 26% by 2050.
- ASI approach (Avoid, shift and Improve) work better for urban freight. It involves avoid end mile, set up collection centre and regulate delivery hours. In respect of shift go local, shift to NMT/ EVs for end mile. With regard to improve aspect it should be data driven planning, improvement in vehicle and fuel technology, seamless intermodal transferee, dedicated freight circulation areas, route optimization / spatial planning.

Lively interaction in the session

E. Round Table Discussions

A total of 8 Round Table Discussions covering a wide range of transport related issues such as compact cities for sustainable future, innovation in urban mobility, technology in metro rail projects, NCMC ecosystem, E-mobility framework, alternative mobility paratransit transport, EV charging infrastructure, clean energy transition in transport, etc. were conducted as part of this year's UMI conference. Discussions in Round Table sessions provided a platform to the speakers and participants to interact on the issues in areas of topical interest and sharing experiences of ongoing and completed studies and research projects across the cities in India and international. In each session a key presentation was made eliciting the comments and views of the expert panelists and participants, which was moderated by the expert moderator in the field.

Round Table 1:- Compact Cities: Pathways toward India's Sustainable Future (Sponsored by ITDP)

In the next 30 years, the way people move around in cities will have extensive impacts on economies, public health, social justice, and the climate. These changes will be determined by the policies that governments enact now and their effects will linger for decades or even centuries. Road passenger transport currently is responsible for about 10% of humanity's greenhouse gas emissions worldwide & as people in emerging economies become wealthy enough to buy cars, emissions from urban passenger transport will further increase.

ITDP and the University of California, Davis, modelled the global changes that will be necessary to decarbonize urban passenger transport as well as create a roadmap for the Indian context. One promising approach to reducing emissions from urban passenger transport lies with electric vehicles (EVs) & the right policies can promote rapid electrification of passenger fleets. Another approach to decarbonizing urban passenger transport is the promotion of compact cities built around walking, bicycling, and public transport. Cities around the world from Copenhagen to Bogotá, have already seen great benefits from pursuing this strategy. In addition to reducing carbon emissions, compact cities can reduce the cost of transportation while promoting social inclusion.

The research models four possible scenarios for change in urban passenger transport. It includes business as usual; extensive vehicle electrification; promotion of compact cities built around walking, cycling, and public transit and the combination of vehicle electrification plus compact cities and mode shift. The research highlights that neither electrification nor compact cities alone are capable of reducing emissions to a level consistent with limiting global

warming to less than 2°C. Only with both vehicle electrification and compact cities - developed for walking, cycling and public transit together can we limit future global warming to less than 2°C and stand any chance of the climate returning to a warming of less than 1.5°C by the end of the century.

Session Chair - Mr. Jaideep, OSD (UT), Ex-Officio Joint Secretary, MoHUA

Moderator - Ms. Aswathy Dilip, South Asia Director, The Institute for Transportation and Development Policy (ITDP)

Context Presentation - Ms. Vaishali Singh, Deputy Manager, The Institute for Transportation and Development Policy India (ITDP)

Speakers -

i. Mr. Shekhar Singh IAS, Commissioner, Pimpri Chinchwad Municipal Corporation
ii. Mr. Gerald Ollivier, Lead Transport Specialist, World Bank, India
iii. Ms. Anantha Paladugula, Head of Mobility India, C40
iv. Mr. Sharif Qamar, Associate Director, The Energy and Resources Institute (TERI)
v. Mr. Theirry Desclos, Project Director, Cerema
vi. Ms. Shelley Bontje, Project Manager, Dutch Cycling Embassy
vii. Mr. Jacob Mason, Research and Impact Director, Institute for Transportation and Development Policy (ITDP)

Highlights of Discussion

- National Urban Transport Policy 2006 (NUTP) has been an instrument for transformation of transport priorities in India. Its objective is to ensure safe, affordable, quick, comfortable, reliable and sustainable access to transport facilities.
- It envisaged to bring about comprehensive improvements in urban transport services and infrastructure with a focus on moving people rather than vehicles.
- Various central schemes launched by central government have promoted the urban transport system in a people centric manner. Latest is approval of PM E-Bus Sewa scheme to deploy 10,000 electric buses nationwide. More than 90% funds allocated under Smart cities Mission utilized included transport component also. All 7000 e-buses under FAME-II may ply on Indian roads in next one year.

- Provision of 30000 buses under JnNURM, FAME schemes and PM E-Bus Sewa scheme, 300 km of BRTS built in 10 cities across the country indicate that there is emphasis on more buses and better buses in the cities.
- About 900 km of operational metro network in 20 cities and over 600 km under construction point to the fast growing network of metro rail in the country.
- Now there is a momentum transforming roads to healthy streets. Through initiatives like JnNURM, Smart cities Mission over 1000 km of roads have been transformed into safe and liveable streets.
- The move is on accelerating the transition towards electrification since 2015. This is a big push for electric vehicles to boost demand, cut air pollution and fulfill the PM's vision of sustainable transportation. 26 states have draft EV policies and have set targets for electrification.
- In spite of all these development Indian cities are still witnessing an unabated growth in private (ICE) motor vehicles. During 2012 – 2022 urban population increased from 40 crore in 2012 to about 50 crore in 2022while registered private motor vehicles increased from 13 crore to 32 crores during the same period.

- It is estimated that traffic congestion in Delhi, Mumbai Bengaluru and Kolkata costs the economy Rs. 1.5 lakh crores annually as per study conducted by global consultancy firm.
- Transport is responsible for 10% of air pollution related deaths in India. Sprawl and trip lengths increasing in Indian cities. If India continues the refactoring of the last decade, private motorized travel will increase 8 times by 2050 as per the forecasts by the International Energy Agency (IEA).
- In the next 10-15 years transport will be priority and it will have both horizontal and vertical integration in urban areas. Complete transition will occur with adequate development of supporting infrastructure.

Chairman giving his opening remarks in the Round Table

- The need is for strategic thinking and how to change mind set and behaviour pattern. Debate be initiated for fixing yearly quota for registration of private vehicle as is done in Chandigarh.

Outcome

- All new or imported vehicles need to be electrified by 2040 in line with the CoP 26 Glasgow Declaration.
- There is a need for mode shift and compact city planning combined with reallocation of both funding and street space to walking, bicycling and public transport. It should also be combined with rapid electrification.
- Electrification plus modal shift the only way forward to achieve net zero target by 2070. There is a need to minimize life cycle emission of cars to achieve India's net zero target
- Example of Paris which reduced car travel by almost 50 percent in 30 years by

investing in other modes and traffic central strategies may be worth emulating.

- India must do differently to accelerate the shift to compact liveable cities built on the foundation of public transport, walking and cycling, where motorized travel is clean yet controlled.

Distinguished participants actively involved in the discussion

Round Table 2:- Urban Mobility India Innovation Challenge (Sponsored by GIZ)

In recent years, Indian cities have witnessed the emergence of a number of start-ups providing digital solutions and mobility services in various aspects of urban transport. Their numbers are increasing and they are now being widely recognized as important engines for growth and employment generation. Through innovation and scalable technology, start-ups can generate impactful solutions and thereby act as vehicles for socio-economic development and transformation.

The objective of the session was to bring together innovations, entrepreneurs & ventures driving the future of urban transport digitalisation in India. Through this platform these start-ups got the chance to pitch their innovation before an expert jury and scale up the selected innovations in Indian cities. The start-up innovative solutions in the Round Table covered the following thematic areas:-

i. Digitalisation in Public Transport
ii. Mobility Data Analytics & Management
iii. Urban Freight and Logistics
iv. Road Safety

Expert Jury -

i. Mr. Kunal Kumar, IAS, Joint Secretary & Mission Director, Smart Cities Mission, Ministry of Housing and Urban Affairs
ii. Mr. Prashanth A., Vice President, Mobility Platform & Services, Bosch India
iii. Mr. Armin Wagner, Senior Advisor, GIZ
iv. Mr. Shishir Maheshwari, Managing Director, Eversource Capital
v. Hiramany Malik, TUMMOC
vi. Mr. Gita Krishan, Patholeraja
vii. Saurabh Kumar, Patholeraja
viii. Inder Sethi and Kshitij Srivastav-Chastr
ix. Prithvi Raj, Namma Yatri
x. Ankit Bhargava
xi. Abhas Dudega and Lalit Chaubey, EoPT

Moderator - Ms. Lena Kliesh, GIZ & Mr. Narendra Verma, GIZ

Highlights of Discussion

- TUMMOC App works for digitizing public transport, efficiency, reliability and better user experience. With real time data it does route optimization and tickets solution. Having large market size it also integrate with mass solution.
- Good move starts-up work to ensure every truck delivery in city green. It is based on A1/ML algorithm. It works with B2B, D2C and B2C. Execute urban pool for logistics App based booking and has scheduled pick-up and delivery options.
- Pothaleraja works on GRID Math. It has made roads by recycled plastic waste. It has honey comb sign which has good strength. It helps to reduce carbon emission.
- CHARTER is an open data App. It provides facility of digital self-ticketing, live journey tracking, multimodal trip planning and bus ticketing.

Speaker in the Round Table setting the direction for further discussion

- Namma Yatri App helps in cutting down middleman, minimizing pollution and congestion. It uses open network for optimal trips.
- Step up is a planning tool to assess and improve walkability. It works on auditing of such places and for speedier audit it works with A1.
- EV opt works on fleet electrification. Provides testing for drivers. It is a data driven tool using GPS data and supports multiple stakeholders.

Outcome

- Navigation is going to be a challenging task in the coming years so right decision are important at this stage to meet the future challenge. Deeper analysis and investigation are necessary to find out the right solution of the prevailing problems.
- There is a need to make the replication of solution as per the situation so as to be fruitful. One should know who is willing to pay and what is the problem then accordingly the solution be given.
- To give better solution for any ongoing issue in urban mobility coordination with all stakeholders including government agencies is of prime importance.
- Uniqueness is the key element to be on the top in the field. Replication of short term solution need to be analyzed in detail so as to emphasize its uniqueness.

Round Table 3:- Integrating Technologies in Metro Rail Projects: Lessons and Innovations (Sponsored by Spanish Embassy)

As the fourth largest metro network in the world and current ambitious expansion, India is increasingly attracting interest from Spanish actors. Capitalizing on unique opportunities in urban transport, companies from Spain are strongly committed to contributing to 'Make in India', transferring new technology, manufacturing locally, contributing to further developing the industrial base & supply chain, and creating employment. In this dynamic Round Table Session, Spanish companies leading in innovative technology and expertise in the metro and railway sector converged with Indian metro organizations, public authorities, and local companies and experts to explore collaborative opportunities for sustainable and prosperous urban development in India.

The objective of this session was to serve as a platform for discussion & presentation by Spanish companies in the metro sector, showcasing their experience and willingness to strengthen and develop India's metro & RRTS networks alongside local stakeholders. The focus was on sharing experiences and best practices in the development of metro projects in Spain and around the world, with an emphasis on overcoming challenges as well as delving into opportunities that can be replicated and adopted in the Indian context, while fostering mutually beneficial partnerships, knowledge exchange and capacity building.

Opening Remarks -	Lucía Paternina, Chief Economic & Commercial Counsellor, Embassy of Spain
Keynote Speaker -	Dr. Nina Fenton, Head of Regional Representation, South Asia, European Investment Bank
Session Chair -	Mr. Antonio Lleras, Coordinator of Accessibility, Exteriors and Signage, Metro Madrid
Moderator -	Mr. Om Hari Pande, Director, Delhi Metro Rail Corporation Limited (DMRC)
Speakers -	i. Mr. Vinay Kumar, Commercial Director, CAF India ii. Mr. Alberto Gonzalez Galvez, International Director, Ardanuy iii. Mr. Enrique Huertas García, Director, Colin Buchanan iv. Mr. Edwin Cruz, Sales Manager – ASEAN,

Teltronic

v. Mr. Anoop Rai, Chief Scientist - Central Research Laboratory, Bharat Electronics Limited

vi. Mr. Luis Alfonso

vii. Mr. Mariana Alvarers

viii. Dr. Nina Fenton

Highlights of Discussion

- In this session a number of companies working in rail sector and other related areas participated and made presentation about their expertise in the field. CAF India works in R.S. Manufacturing. It has worked in Airport Express line with DMRC. It has 50 plus maintenance centers with business in 40 countries.
- Ardanuy established in 1992 is working in India since 2002. It is working on cost optimization in traction system. It works with safety and traffic management and now increasing investment in designing.
- Colin Buchanan working in India since 2007 in the area of pedestrian and crowd simulation by using performance test simulation technique. It takes into consideration the data on passenger behaviour demand for crowd management and also user digital twin model.

Panelilst in the Round Table sharing their views

- Teltronic works in technological advancement in telecom system. It provided services to NCRTC for its RRTS project. It worked on LTE Tetra technologies and its migration. It ensures interoperability and system upgradation.
- Cemosa works on quality control. It uses A1 technology better outcome. It does reforms in R&D front and envisages saving in energy. It utilize digital print and simulation and certify the quality of material involved in construction.
- Ayesha works as general consultant for RRTS projects. It has also worked with Delhi Metro in optimization of air conditioning system, power supply and tunnel ventilation system. Presently working on optimization of services and innovation.
- BEL is working on product development of automation in railways. It is working with DMRC on i-CBTC (signaling system), simulator of different systems. It is involved in super scada system for promptly rectification of failure with manpower optimization.

- Nina Fenton focus is on importance of technology. Its emphasis is on how to reduce congestion and pollution. Talked about principles of working for and with people keeping in view the environmental concerns. Advocated for stringent norms for deploying external vendors.
- Use of LED lighting in station area and solar panels on station roofs are to promote. Integration of old technology with new technology a challenging task.
- There is greater challenge with the fast expansion of Indian metro system in near future but it also provides opportunities to use new and innovative technologies.
- In Madrid (Spain) 75-85% people have access to metro within a distance of 300-400 m. from their origin point. This may be fulfilled in India also after strengthening the first and last mile connectivity.
- Use of AI may help in estimating life cycle of equipment. Active participation in R&D and quality control is required.
- Experience of Madrid Metro may help metros in India to ensure proper maintenance of old and new metro system.

Outcome

- Emphasis should be on environmental sustainability while using various technologies. In each project financial viability be the key objective.
- The need is for promoting new technologies in integration with metro rail projects. Value addition and benefits in such integration be the priority.
- Environmental friendly design needs to be promoted. Common Rules and Regulations be formulated for reference and guidance of various vendors engaged in metro rail service for completion of metro projects without any cost and time overseen.

Lively interaction among the participants in the Round Table

Round Table 4:- Uniting India's Mobility Ecosystem with NCMC (Sponsored by CHALO)

In 2019, Hon'ble Prime Minister Shri Narendra Modi launched the One Nation, One Card with the National Common Mobility Card (NCMC). The goal to be achieved through NCMC are as under:

- Provide citizens with an easy and fast digital payment option across different mobility modes
- Enable low-value transactions without internet connectivity
- Facilitate payments for transit, smart city touchpoints, tolls, parking, and other merchant transactions, in addition to regular day-to-day retail payments

From a public transport operator perspective, NCMC can help reduce cash handling, revenue leakages, and the cost of cash reconciliation. By adopting NCMC, India seeks to transform itself into a digitally empowered society and a cashless economy.

Four years since its launch, NCMC has been implemented only in a handful of cities because of a fragmented approach. The high cost of setting up an integrated NCMC infrastructure has delayed its widespread implementation. The failure to promote and market the benefits of NCMC cards also contributes to the lack of awareness and adoption amongst the citizens.

To realise the full potential of NCMC, a unified approach by all stakeholders is critical. The need of the hour is to have co-operation and synergy among the Government, National Payments Corporation of India (NPCI), Banks, and Metro and Bus operators. A successful collaboration between stakeholders can help us achieve seamless integration and rapid adoption of NCMC cards nationwide. Once implemented, it can help us harness valuable data insights about people's travel patterns and help us build integrated mobility for India. By revolutionising the way people transact and travel, we can further strengthen India's position as a global leader in digital payments.

The session dwelt on the following:

- Challenges in standardizing the implementation of NCMC for both bus and metro undertakings across diverse Indian conditions.
- Risks that State Transport Undertakings (STUs) might encounter during NCMC implementation and need for effective mitigation strategies
- Identify incentives for various stakeholders, including government agencies, transport operators, technology providers and financial institutions to drive the successful adoption of NCMC.

- Examples and lessons learned from the successful deployment of NCMC

Session Chair Mr. Anurag Jain IAS, Secretary, The Ministry of Road Transport and Highway (MoRTH)

Moderator - Ms. Priya Singh, Co-founder and Director, Chalo Mobility Pvt. Limited

Speakers -

i. Mr. Loknath Behera IPS (Retd), Managing Director, Kochi Metro Rail Ltd
ii. Mr. Arun Bothra, IPS, Managing Director, Capital Region Urban Transport (CRUT)
iii. Mr. Sushil Kumar, Managing Director, Uttar Pradesh Metro Rail Corporation Ltd.
iv. Mr. Rahul Chandra Das, Managing Director, Assam State Transport Corporation
v. Mr. Mohit Dubey, Founder and CEO, Chalo Mobility Pvt Limited
vi. Mr. Abhijit Sengupta, Country Director, APSCA India
vii. Mr. Naveen Chaluvadi, Chief Digital Officer, Yes Bank
viii. Mr. Denny Thomas, Head – Transits, NPCI
ix. Mr. C.K. Goyal, Senior Vice President, Delhi Integrated Multi-Modal Transit System (DIMTS) Ltd

Highlights of Discussion

- NCMC is PM's vision of one card across the country to ensure ease of living for the citizens. It is based on open network for digital commerce and how it can transform commerce across the globe. Challenges in use of NCMC card need to be addressed. For instance when Bank issues the card KYC takes time. The chip balance and e-balance are constructs that needs simplification. It should be virtual so as to reside in phone. Its usage could be incentivized. Kochi was the first metro to ONDC platform on the behest of central government and Kerala government.
- The question is that who will bear the 0.9% MDR (Managed Detection and Response) depends on the potential of NCMC. Right now the rebates are acting as an incentives to NCMC. But when the number of transaction increase, it becomes difficult to incentivize. It should be borne either by the bank or the customers. But in general

customer do not want to pay anything extra. For smaller metros, it makes sense to transfer to end users. For larger metros that have the financial wherewithal the Metros can bear it.

- Another challenge is converting closed loop card users to NCMC users for which public good infrastructure is required to be created.
- In fact customers prefer card as a form factor. As such giving incentives to customer is what could help convert closed loop card users to NCMC. In this respect National Payment Corporation of India (NPCI) can help to encourage use of NCMC.
- For smooth adoption of NCMC in India- it is not the technology but the business model that needs to be changed. Technology needs to be built for the entire ecosystem.
- Unified Payment Interface has been a success across India because of the players like Google Pay and PhonePe who incentivize its use. For encouraging the use of NCPC NPCI, banks, STUs private player and all the shareholders need to come together to make NCMC successful.
- In Delhi NCMC initially is issued to the customer by ensuring easy distribution and making available through the conductors.
- KYC being constraints faced by Banks is looked into by NPCI to allow transactions without KYC for a certain threshold. Bank is also looking at delivering offline payments using mobile in the near future.

Intensive discussion on the theme of Round Table

Outcome

- If people to carry a card like NCMC at all it should be possible to make it digital so that it reside in mobile phone.
- NCMC may be made open network digital commerce (ONDC) compliant so that all modes of transportation go to ONDC and get you a unified solution for payment.
- Before a bus even rolls out on the road we should ensure that infrastructure is in place for it to accept NCMC payments.
- A more robust implementation of Interactive Teller Machines (ITMs) will help in inter-operability and faster adoption of NCMC.

- It was felt that what UPI has done to the payment system, ONDC will make efforts to do the same thing for digital commerce.
- Interoperability in transit system should be done with ease in ONDC platform.
- Integration of multimodal transit system may use statistic and technology like Artificial Intelligence makeup language (AMIL)

for better management.

Active involvement of participants in sharing their views with the Speakers

Round Table 5:- Institutional and Governance Frameworks for E-Mobility Action (Sponsored by WRI)

India has set an ambitious target to achieve net zero by 2070. To attain this target, it is essential to decarbonize the transport sector, the third most greenhouse gas emitting sector in India. Electric mobility serves as a vital pathway for sustainable urban transportation. India is a signatory to EV 30@30, a global commitment to have at least 30% new vehicle sales be electric by 2030. To support the national level targets, as many as 27 Indian states and union territories have developed their e-mobility policies. State governments are entrusted with the governance of road transport, electricity networks, and urban planning, all of which are integral to developing a robust e-mobility ecosystem.

Therefore, the role of sub-national governments is pivotal in driving policy and regulatory interventions for an accelerated e-mobility transition. A collaborative and cooperative relationship among various stakeholders including transport, power, urban development, heavy industries, state transport undertakings and urban local bodies is essential for driving e-mobility growth.

This session focused on crafting innovative institutional and governance frameworks aimed at driving the adoption of e-mobility at the sub-national and local levels, aligning them seamlessly with national goals.

Hence this session promoted a discussion on the instrumental role that sub-national governments play in accelerating e-mobility growth in India. Furthermore, the session featured successful case studies and policy innovations of state governments, fostering cross-state knowledge sharing to aid the attainment of sub-national e-mobility targets.

Session Chair - Dr. Surendra Kumar Bagde IAS, Additional Secretary, MoHUA

Moderator - Ms. Chaitanya Kanuri, Associate Director – Electric Mobility, Sustainable Cities and Transport, WRI India

Context Presentation - Ms. Diksha Choudhary, Lead - Electric Mobility, WRI India

Speakers -

i. Mr. Amit Sharma, IAS, Secretary (Transport) Transport Department, Govt. of Ladakh
ii. Ms. Shilpa Shinde IAS, Managing Director, Delhi Transport Corporation, Government of Delhi
iii. Mr. Shahzad Alam, IAS, Special Commissioner,

Transport Department, Government of Delhi

iv. Mr. Pramoj Sanker, IOFS, Additional Transport Commissioner and Joint Managing Director, Kerala State Road Transport Corporation (KSRTC)

v. Mr. Rajneesh Rana, Head, Convergence Energy Services Limited

vi. Mr. Vijay Saini, Manager, ICLEI

vii. Mr. Jaideep Saraswat, Senior Manager - Clean Power, Electric Mobility & Green Hydrogen, Vasudha Foundation

viii. Mr. Mohammad Athar Saif, Partner & Leader, CP&I and Industrial Development, PWC

ix. Ms. Sunitha Anup, Researcher, The International Council on Clean Transportation (ICCT) India

x. Mr. Kuldeep Sharma, Project Manager - Solar Projects & Component Leader, E-Mobility GIZ India

xi. Mr. Kuhan Madhan, Policy Analyst, Guidance TN

Highlights of Discussion

- Ensuring inter departmental coordination and engagement with various stakeholders at both national and subnational level is paramount for accelerating the development of the electric mobility ecosystem.
- Delhi, Mumbai and Tamil Nadu are in the forefront in creating single-window mechanism for subsidy disbursement and accelerating EV adoption.
- Expanding the bus fleet is imperative to accommodate the rising transport demand and encourage a transition towards public transportation.
- With the introduction of e-buses the bus eco-system needs to be modified to enable e-mobility transition.
- PM e-Bus Sewa scheme adding 10,000 buses across 169 cities will make small and medium cities with limited bus infrastructure to run effective bus services.

- For management of buses it would be necessary to be well conversant with commonly practiced gross cost contract model for operation of smooth service. In this regard cities need to leverage new technologies, use of Intelligent Transit Management System (ITMS) and implementation of automated fare collection system with robust data management.

Chairperson opening the discussions with his initial remarks

- It is estimated that over 60% of EV charging will eventually take place in private residences and workspace setting. There is thus pressing need for concerted initiatives to develop guidelines to streamline the establishment of private charging infrastructure in private and semipublic spaces both on a national and sub-national scale.
- The Battery eco-system is another segment that requires a cohesive framework to enhance recycling initiative. But it is essential that recycled battery materials are certified so as to bolster the effectiveness of battery recycling initiatives.
- While on the supply side initiatives focus should be on fostering industrial development. In this regard states to create an environment conducive to streamline business operation for industries in the state itself.
- Enhancing skilled workforce in the EV industry will play a significant role in the sector. There is also a need to have collaboration and interaction between industry, academia and policy makers to adopt the evolving and dynamic demands of the EV industry.

Participants involvement in the session

- Digital public platform like

open public libraries be used for promotion of upskilling. Civil service organization can be helpful in developing forums or platform to facilitate multi stakeholder discussions for more ambitions e-mobility action.

Outcome

- The establishment of Electrical (EV) cells and implementation of single window mechanism can consolidate and streamline the process and act as dedicated institutional and governance structure that can serve as a centralized hub for all e-mobility initiative.
- India can implement a battery passport system which would facilitate the traceability of batteries by offering crucial information about their environmental footprints manufacturing source and other pertinent data.

Speaker responding to the query of the participants

Round Table 6:- Alternate Mobility Solutions to Meet Paratransit Demand (Sponsored by USAID (CEEW)

Mobility services range from private vehicle like car/ scooter use, intermediate para-transit to public transport systems. Vehicle segment or size is not a function of the type of service it offers. A bus could operate for private use, be run on flexible, demand driven routes as IPT and as a formal transit service. For cities in the hilly regions a cable car can provide for this gap.

However, many areas in the large cities and several small and medium towns along with regional routes face unviable bus or paratransit operations. A closer inspection suggests a missing 10-18 seater vehicle segment that is efficient for 80-120 km operations. This larger than a tempo (6-8 pax.) but smaller than a mini bus (22-32 pax.) option and is affordable, yet clean. This missing vehicle segment, for the ease of conversation, can be termed as micro-bus serving both the IPT and the PT demand in varying contexts.

The roundtable showcased the study for multiple use-cases and contexts, where a 10-18 seater vehicle segment can offer efficient and affordable mobility. Further, the experts at roundtable elaborated on observed nuances and discussed potential barriers. A related expo section in UMI conference 2023 also showcased a couple of such 10-18 seater vehicles and two prototypes that were recently unveiled.

Opening Remarks - Mr. Soumitri Das, Project Management Specialist (Environment), United States Agency for International Development (USAID)

Moderator - Dr. Himani Jain, Senior Programme Lead, Council on Energy, Environment and Water (CEEW)

Context Presentation - Mr. Krishna Khanna, Research Analyst, CEEW

Speakers -

i. Dr. Sanjeev Kumar Lohia, Sr Advisor (Railway & Urban Mobility Sector), World Bank
ii. Dr. Geetam Tiwari, Emeritus Professor, The Transportation Research and Injury Prevention Programme (TRIP) Centre, IIT Delhi.
iii. Prof. Shivanand Swamy, Professor Emeritus, CoE-UT

iv. Dr. Shalini Sinha, Center Head and Principal Researcher of the Center of Excellence in Urban Transport (CoE-UT)
v. Mr. Mihir Sorti, Transport Specialist, ADB
vi. Mr. Sudhir Badami, Independent Transportation Professional
vii. Mr. Abhijeet Sinha, National Program Director, Ease of Doing Business, NHEV
viii. Mr. A.K.Gupta, Additional Director, Directorate of Urban Transport, Government of UP
ix. Mr. T Srinivas, Global Head - Product Planning & Strategy (Tata Motors, Buses)
x. Mr. Shirish Mahendru, Technical Advisor - Sustainable Mobility - Clean fuels- SUM-ACA, GIZ India
xi. Mr. Inderveer, Founder & CEO of EVage Motors
xii. Dr. Sandeep Gandhi, Ph.D, Principal SGA
xiii. Mr. Sourav Dhar, Senior Programme Lead, CEEW

Highlights of Discussion

- Cleaner air and better health (CABH) is a five year (2021 – 2026) project supported by USAID. It aims to strengthen air pollution mitigation and reduce exposure to air pollution in India by establishing evidence based models for better air equity management.
- Each EV needs more riders to substantially reduce PM 2.5 as emissions are sensitive to vehicle km. A two wheeler with one passenger emit non-exhaust PM 2.5 at 3.6 mg/km auto with 3 passenger 5.2 mg/ km and Bus with 42 passenger 58.1 mg/ km.
- Suitability of particular vehicle is based on volume i.e. number of people per hour per route, road width and level of service. Micro bus are optimal for 140 – 270 people per direction.
- Presently in the market Mini Bus with 30 passenger are ideal for a trip distance of 5-10 km generally used for longer distance with high passenger demand. Auto with a maximum capacity of 3-6 passengers is ideal for a trip distance of less than 5 km. It is generally used for quick short distance with very low passenger demand to integrate larger PT network.

- Of the two one is too big and the other is too small as such micro bus fits in between. There is one good examples in this segment. Volkswagen type 2 microbus introduced in 1950 rose to popularity for its paratransit uses. The 12 – 16 seater vehicle still dominates the public transport system in the global south.
- In the same category there are Jeepneys in the Philippines, Kombi taxis of South Africa and Pesero or Combi in Mexico. In India also similar type of vehicles are plying in various parts of the country such as Bhoonds or Kodukas in Punjab, Travelers in Himachal Pradesh, Maxi Cabs in Kerala and Tamil Nadu and Jugaad in northern India.

Participants interaction in the Round Table

- Demand for such micro buses is more in small and medium towns which together make about 80% of the demand for micro buses across urban India. One of the estimates indicate that urban India needs approximately 6,45,000 micro buses by 2030.
- At city level its uses vary for different purposes. At intra city level 70-75 people use it for 2 – 5 km and 25 – 30 use it for 6 – 10 km at intracity / peri urban areas. It means short distance is 0 – 5 km at intra-city level and medium distance is 6 – 10 km for peri-urban trips.
- In another case 100% people use for a distance of 2 – 5 km at intracity level but mainly as a feeder service for first and last mile trips to mass rapid transit.
- Micro bus based planning for transport system be done to cater to the transport needs of small and medium towns.
- Principles of urban mobility would remain the same irrespective of the size of city or vehicle i.e. frequency, reliability affordability, comfortability, etc. needs to be taken into account.
- Government has to take initiative to promote such type of IPT in small and medium cities. Alwar vahini programme initiated in 2008 is one of the noted and quoted example in this category.
- Alongwith metro system small vehicle including micro buses are equally good as IPT and feeder service for big cities. Bigger challenge in this is the formulation and enforcement of regulatory framework.

- E-Rickshaws, no doubt proved to be useful and serving the purpose of first and last mile connectivity to mass transit system and also good for short distance, but creating problem of congestion on the road and needs to be regulated properly.
- In Agra a route plan for 8 seater tempos was prepared in 1992 which is integrated with other modes of public transport which may be helpful for working out the route plan for micro buses in other cities.

Outcome

- Certain pre-requisite assessments may be required to encourage and just transition to micro buses.
- Pilots and performance evaluations would be necessary to develop specifications for micro buses which could nudge original equipment manufactures (OEM) to fast track research and development.
- For rapidly growing towns to plan micro bus based public transport a new city transport undertaking may be constituted.
- An aggregated demand may be created for micro buses in IPT for quick fleet renewal with planned routes, stands and schedules like the Alwar Vahini Scheme.
- Coordination with other agencies, credit guarantee and scrappage linked incentives would be necessary for replacing old and polluting tempo type vehicles (6 – 8 seater) with micro-buses.

Lively and iteractive discussions in the Round Table

Round Table 7:- Accelerating EV Charging Infrastructure - Innovation and Collaboration (Sponsored by Energy Systems Catapult)

The net zero pathway relies on unprecedented international collaboration, especially on innovation and investment. For the first time, the Innovating for Transport and Energy Systems (ITES) initiative brings together a superpower, international coalition of high-impact innovators, researchers, policy makers, businesses, and investors, to unlock the ideas and action Net Zero needs, at scale and speed.

As the world looks to the G20 in India this year to address global issues such as climate change, ITES serves to demonstrate the superpower partnership of UK and Indian innovation, joining together to realize cleaner seas, skies, roads and railways for people and planet, now and the months and years to come.

ITES is working with a wide array of stakeholders and businesses across a spectrum of transport sectors and is bringing innovators, academia, government and businesses together to support and demonstrate technologies to accelerate India's transport decarbonization transition. This session takes a closer look at one of the areas where ITES is supporting this innovation, electric vehicle charging infrastructure.

This session facilitated the exchange of ideas on how applied and digital solutions for charging infrastructure can be developed and piloted in India. Bringing together Indian and UK based experts, the challenges and opportunities surrounding EV charging infrastructure rollout were discussed. The session shined a light on the role innovative digital and data-based solutions can support India-specific EV use cases, unlocking an accelerated charging network rollout and EV uptake across the country.

Moderator - Professor Ashish Verma, Dept. of Civil Engineering, Indian Institute of Science (IISc)

Context Presentation - Mr. Andrew Stokes, Senior Advisor – Innovator Support & International, Energy Systems Catapult

Speakers -

i. Ms. Lowri Williams, Practice Manager – Transport, Energy Systems Catapult

ii. Mr. Maxson Lewis, Managing Director, Magenta Mobility

iii. Ms. Chaitanya Kanuri, Associate Director –

Electric Mobility, Sustainable Cities and Transport, WRI India

iv. Mr. Prashanth Varanasi, Principal Consultant, Xynteo

v. Ms. Varsha Vasudeva, Co-Founder and CEO, buymyEV

vi. Mr. Sathya Sankaran, Co-Founder and Director, Urban Morph

vii. Mr. Prashant Palani, Haritha Mobility Solutions

Highlights of Discussion

- India's EV charging infrastructure could be accelerated through innovations and international collaboration.
- The net zero pathway may be taken forward with international collaboration especially on innovations and investment i.e. tackling global challenges through coordinated action.
- Global transport challenges be seen in the context of emerging scenario indicting increase of one billion global population since 2010, 43% increase in primary global energy demand since 2000, as much as 400 million global increase in vehicle during 2011 – 1019, 11.7% share of deaths attributed to air pollution in 2019 and 7.3 persons per registered car down from 13 in 2000.
- Another worry some picture adding more challenges in global transport is reflected in some revealing figures such as 16% of global carbon emission caused by transport, 95% of road transport is powered by fossil fuels, estimated 2 billion people will move to cities from rural areas by 2050 and 5 times projected increase in urban land cover by 2050.
- Clean transport is one of the toughest challenges on the road to net zero. Transport accounts for a significant proportion of global greenhouse gas emission second only to the power sector.
- ITES- Innovating for Transport and Energy System is led by Energy Systems Catapult (ESC) and the Indian Institute of science (IISC). It is a vital and visionary UK-India to turbocharge transport decarburization. ITES has been launched as part of landmark MoU between UK and Indian governments in 2023 to have collaboration in science and technology for driving sustainable growth.

- ITES with its research and innovation will embark on delivering cleaner roads, seas and cities for the people and planet. This initiative will support UK-India industry, start-ups, innovation and service providers to lead the clean transport transition.
- The collaboration is likely to have impact in Net Zero innovations, providing unique network, helping innovators to test, fund and grow, unlocking complex challenges and market led practical solutions.
- ITES adopts a unique perspective across the whole transport and energy system to fund solution faster. Its whole system approach considers technology, infrastructure, awareness, government support, policy, business models, supply chain, manufacturing, etc.

Chairperson in the Round Table giving his opening remarks

- In order to give practical and applied solutions it works directly with a large number of stakeholders to understand challenge, increase understanding and visibility and demonstrate and scale practical and applied solutions.
- ITES focus sectors are micro mobility, battery re-cycling, and smart charging shared mobility, grid stability, charging solutions, micro grids, battery swapping, EV fleet management and consumer engagement.
- Several of the above technology areas rely heavily on robust and reliable digitization to bring more benefits to the transition to future Net zero transport and energy system.
- As part of practical solution it has worked alongwith partners and developed a model that utilizes user behavior and electricity network capacity information to optimize location selection for charging points in Bengaluru based on the density of travel, length of travel and the status on the local grid.

Outcome

- By using data and digital modelling a tool could be developed to help stakeholders in better planning for the infrastructure requirements of electric vehicle charging.
- This tool can aid stakeholders in identifying optimal locations for charging stations particularly user preferred locations.

- As helped in Bengaluru, this tool can help city/ state Electric Supply companies in analyzing the grid impacts and the locations where the capacity of the grid needs to be upgraded.
- Digital solutions offer strong potentials for increased awareness and evidence based decision making around net zero transport infrastructure.
- One can engage with ITES for access to innovators, sector leadership, market development and collaboration and Networking by way of as a partner, accelerator programme sponsor, challenge setter and pilot or research sponsor.
- Standardized format for data required for net zero emission analysis is required to be worked out and put in public domain for wider use and reference

Interaction among Speakers and Participants in the Round Table

Round Table 8:- Policy Intervention for Clean Energy Transition in Transportation

Emissions from road transport are a significant contributor to global greenhouse gas emissions. ICCT modelling indicates that an accelerated shift towards zero-emission vehicles provides for the best possible pathway to align transport sector emissions to be compatible with under 2°C climate scenarios. ICCT looks at the life-cycle GHG emissions from various alternative fuels, such as electric, green Hydrogen, biofuels etc., for India.

The study indicates that battery electric passenger cars and 2-wheelers already have the lowest life-cycle greenhouse gas emissions among various alternative fuels and power train options. The benefit is even more with increased clean energy in the grid mix. In order to decarbonise India's road transport sector, MoRTH aims for 30% of private cars, 70% of commercial cars, and 80% of two- and three-wheelers to be electric by 2030.

Each of these sectors will require fiscal and non-fiscal incentives to ensure an effective transition to clean energy sources. State policies and interventions are indispensable for accelerated clean energy transition.

The session brought together State agencies and policy experts to identify policy interventions for accelerating clean energy transition. The session intended to document the key areas of state-wide policy initiatives that have had positive impact on the adoption of clean transport technology

Moderator - Mr. Amit Bhatt, Managing Director, The International Council on Clean Transportation (ICCT), India

Context Presentation - Ms. Revathy Pradeep, Researcher, ICCT

Speakers -

i. Mr. K R Jyothilal, IAS, Additional Chief Secretary, Govt of Kerala
ii. Dr. Hanif Qureshi, IPS, Joint Secretary, Ministry of Heavy Industries
iii. Mr. Ashish Tiwari, Secretary, DOEFCC, Govt. of UP
iv. Mr. Athar Aamir Khan IAS, Commissioner, Srinagar Municipal Corporation and CEO & MD, Srinagar Smart City Limited (SSCL)

v. Mr Narayan Kumar, Associate Director, Shakti Foundation
vi. Mr. Pankaj Kumar Singh, Chief Project Manager (Hydrogen Trainset), Northern Railways
vii. Mr. Anuj Malhotra, General Manager, Srinagar Smart City Limited (SSCL)
viii. Mr. Indradip Mitra, Senior Project Advisor, Indo German Energy Programme, GIZ
ix. Ms. Sarika Panda Bhatt, Director Nagarro and Co-Founder, Raahgiri

Highlights of Discussion

- It is necessary to decarbonize buses, trucks and other heavy vehicles using fossil fuel to have maximum impact. Road transport is almost contributing 90% of overall transport emission, shifting to electric battery will reduce 30% emission. Another option is to go for hydrogen.
- European Union policies in this regard are maximum modal shift to public transport, improving accessibility, accelerating fleet transition, providing charging infrastructure and public awareness.
- ICCT has also launched India zero emission vehicle alliance. In decarbonization campaign all national, sub national and other agencies have to come together.
- Kerala has set target to make the state net zero by 2050. It is planning to have Kochi as solar airport. In this venture infrastructure is the main challenge which need to be incentivized. In this case capital expenditure is high but operational expenditure is low. Fuel cell is another option being tried in Kochi. Having open protocol so as to facilitate seamless transport in all modes. In smart mobility integration is easy. Government departments also going electric. Vehicle will also be electric with charging facility provided at appropriate locations.
- Government has formulated ethanol blending program. As of now petrol has 12% ethanol which will be 25% by 2025. These are all ICE engine which with blending of ethanol will also continue.
- During financial year 2022-23 about 40,000 e-cars were sold as against 40 lakh total cars which shows only 1% penetration of electric cars. In respect of buses it has 1.5% penetration. By 2030 it is expected that electric two wheelers may rise to 70 – 80% while 4 wheelers i.e. cars may be 10%.
- Three major programme such as:-

- FAME incentive to customer
- PLI Auto scheme incentives to manufactures for making E-cars
- PLI advanced cell scheme incentives to make cell in the country will go a long way in promoting the e-vehicles.

- By 2027 with the cells 50 G.W. will be produced in the country which will increase to 100 GW by 2029 – 30. 70% of this energy produced will go to EV and 28% to grid storage. Fairly large proportion will be used for EV and ethanol blending fuel.
- Tamil Nadu has signed MoU with Hundai in this regard. It will incentivize demand side. Wind power generation will be dominating in Regional grid. Here the main challenge is to integrate with grid due to intermittency of wind power. Green ammonia production requires high power and high storage. Electrolyte manufacturing for hydrogen. There are limited supplier and consumption is also a challenge.Transport and Energy coming together, generation and use are on different voltage while forecasting for distribution grid is yet to be done. There is a lot of scope for flexibility of charging station. But smart charging as well as managing the charging are crucial steps.

Moderator initiating the discussion in the Round Table

- In railway 80% electrification is done and 20% is remaining due to accessibility. China has introduced hydrogen locomotives. Hydrogen can also be used in hilly areas where the routes are non-electrified. Pilot scheme regarding hydrogen for heritage areas may be taken up. Railway may retrofit the systems from diesel with hydrogen and fuel cells to run or traction but flame and safety are issues.
- There is a 10 car train running with hydrogen which is the largest in the world. Rs. 19700 crore subsidy is given by MNRE for electrolyser production.
- 35 heritage trains are proposed to run on H2 in hills.

Outcome

- There is need to develop Indian electricity index. E-fast platform should have stringent fuel efficient norms.
- Ethanol blending fuel needs to be enhanced substantially. For promotion of E-vehicles charging infrastructure, battery, etc. need to be provided through policy initiatives.

- Potentials for promotion of wind energy, hydrogen, and electric infrastructure need to be tapped adequately.
- Designated charging points on streets should not encroach upon the cycle track or pedestrian path.
- Low emission zone should be well integrated in the city.
- Various modes of transport like pedestrian path, cycle track and associated infrastructure, E-Bus routes, water transport wherever exist need to be probably integrated in the city for seamless travel.
- Energy, land use and transport be taken in an integrated manner. Safety aspects be given due importance in designing any renewable transport e.g. water metro or hydrogen based transport.
- Solar power generated be used in low voltage use.

Involvement of the participants in the Round Table

F Conclave : India at 75 Mobility For All

The UMI-2023 had organized one Conclave Session on the important aspect of conference theme focusing on "Risk Analysis and Mitigation in Making Urban Transport Resilient. It emphasized on prior analysis of risk involved in making urban system resilient so that mitigation measures could be implored accordingly.

By the hundredth year since India's independence in 1947, the country's transformation from essentially rural-centric to an urban based economy would be largely complete. Almost a billion people will be living in about 200 large and metropolitan cities and urban agglomerations. The coming two decades ought to witness a large pace of urbanization reaching its peak and with it, cities' transport to be self-sufficient to address mobility challenges from vulnerability to anthropocentric disasters and vagaries of nature (earthquake, flood, landslide, etc.), eventualities such as accidents, equipment failures, fire, terrorist/ cyber-attacks and epidemics that may strike at the core of financial stability.

Cities' capability to quickly recover from disruptions will depend on their infrastructure design, fuel/ energy storage and supply, security of IT systems, and trained human resource to respond to the shocks. With traffic control center communication to commuters all over the city in real time, re-direction of traffic streams using technology, and rapid deployment of rescue team's resilience will be greatly facilitated and evaluated time to time. As of now, India does not have benchmarks on resilience of urban transport systems and there is a dearth of data on this aspect in the Indian context.

Achieving resilience needs to be facilitated by analysis of hazards, city specific risks, information of and access to technology, innovation, adaptation, and financial & regulatory provision to be on the right course. Institutionalization if research and data-based analysis must drive the interventions to overcome challenges.

All these issues were discussed in the conclave session by the panelists listed below:-

Chairperson - Mr. R R Rashmi, Distinguished Fellow and Programme Director, Earth Science and Climate Change, The Energy and Resources Institute (TERI)

Panelist -

i. Mr. Loknath Behera IPS (Retd), Managing Director, Kochi Metro Rail Ltd

ii. Mr. Naresh Lalwani, General Manager, Central Railway, Mumbai

iii. Mr. Vikas Kumar, Managing Director, Delhi Metro Rail Corporation (DMRC)

iv. Ms. Carolin Gassner, Director South Asia, KfW Development Bank

v. Mr. Hoe Yun Jeong, Deputy Country Director, Asian Development Bank (ADB)

vi. Mr. Armin Wagner, Senior Advisor, GIZ

vii. Ms. Jen Jungeun Oh, Practice Manager, South Asia Transport, World Bank

Highlights of the Discussion

- In 2018 Kerala cities submerged in severe floods which posed major challenges for the urban transportation systems. Taking lessons from such calamity designing, planning implementation and operation of Kochi metro rail system analyzed the probable risks beforehand.
- Sufficient precautions taken in advance have helped that whenever there is disruption in the system the services are resumed in shortest possible time. Such precautions have also been taken in case of water metro for changing the boats quickly in case of emergency. Cyber security measures are also in position to tackle the unforeseen eventuality.
- In Bombay the sub-urban system which is more than 100 years old with a daily ridership of about 7-8 million often face compulsive disruption of service in certain sections affected by heavy rains or floods. The railways after in depth risk analysis have taken certain measures which help in this regard.

Panelists on the dias sharing their views

- In Delhi Metro Rail system, provision made to accommodate overcrowding on some unprecedented occasions by increasing the frequency of metro services as well as number of coaches on required lines. While designing the system PHPDT considered between 60,000-70,000 to meet such eventuality. In the journey of more than 20 years there has not been any major break or disruption in the operation of the system. There is 99.95% punctuality in running the system and maximum delay is recorded as 59 seconds but very rare phenomena.

- International funding agencies like World Bank, ADB, KfW, etc. do extensive risk analysis and thoroughly check the mitigation measures suggested to meet the emergent eventualities in the DPR of the transportation projects before considering the stipulated financial assistance for Metro rail and other mass transit projects.
- London metro seldom get affected due to heavy rains as precautions are taken after deep analysis of risk factors. Security aspects are considered during construction stage itself.

Outcome

- In view of climate change and its affect in terms of rising temperature, increasing frequency and intensity causing severe flooding as experienced in many cities in the recent years, pandemic, natural disaster calamities, etc. urban transportation system has to be robust taking extra precautions for its sustainability and resilience.
- Apart from risk analysis of natural factors such as topography, slope vulnerability, local weather phenomena, man-made criticalities such as density, congestion, urban form and structure should be analyzed following a scientific approach while planning and implementation of mass transit system.

Chairperson and the panelist interacting with the participants

- For designing of urban transit system integrated approach be adopted taking into consideration urban form and transit system together and not in isolation. Since change in one component affect other part also the risk analysis of all the probable factors need to be attempted in a comprehensive manner so as to make the transit system sustainable and resilient in the long run.
- Special attention be paid for the unforeseen case like terrorist attack, breach of cyber security, economic disruption, etc. Urban transport system to integrate all such features in standard operating procedure. In case of emergency the system should be fully equipped to evacuate the commuters from the transit systems and terminals quickly and effectively.
- Dissemination of information and awareness campaign be launched regularly to make the users and other stakeholders well informed about the do's and don'ts in case of

such emergency. Capacity building programmes be organized from time to time for the officials of transit system agencies and institutions.

- Vertical transit oriented development than unabated horizontal expansion in cities is more climate change friendly. A common umbrella organization like UMTA need to be well structured body involving all stakeholders to address the resilience aspects of transit system

Speaker in the session making a presentation and interacting with the audience

G. Valedictory and Closing Session

The valedictory session of the 16th UMI-2023 conference was held on 29th October, 2023 from 15.30 hours onwards in the presence of a large number of dignitaries, delegates and award winners. Brief outcome of the session is as under:-

Welcome address : Shri Vikas Kumar, Managing Director, Delhi Metro Rail Corporation

Opening Remarks : Shri Manoj Joshi, Secretary, Ministry of Housing and Urban Affairs, Government of India

Distribution of Awards for "Excellence/Best Practice Projects in Urban Transport" by Shri Manoj Joshi, Secretary, Ministry of Housing and Urban Affairs, Government of India

Launch of UMI 2024 by Shri Manoj Joshi, Secretary, Ministry of Housing and Urban Affairs, Government of India

Vote of Thanks : by Shri Jaideep, OSD (UT) & Ex-Officio Joint Secretary, Ministry of Housing and Urban Affairs, Government of India

While welcoming Shri Manoj Joshi, Secretary, Ministry of Housing and Urban Affairs, Government of India and other dignitaries on the dais, scholars, researchers, industry experts, distinguished award winners, senior centre and state government officials, delegates and participants, Shri Vikas Kumar, Managing Director, Delhi Metro Rail Corporation mentioned that 3 days conference ended after thread bare deliberations on various topics and aspects under the main theme Integrated and Resilient Urban Transport. All the Technical Sessions and Round Table Discussions were organized under the day wise focused sub-theme. On first day the focus of various sessions was on Resilient Urban Mobility Systems. Day 2 discussions revolved around the sub-theme on Collaborative Governance in Urban Transport. On third day the sub theme discussions were confined to Pathway towards Digitalization and Energy Transition. In all, apart from Inaugural and Valedictory session the conference had 8 Technical sessions and same number of Round Table Discussions, 2 Plenary Sessions and one Conclave. Organizing the conference was really a challenging task but it went successfully and we had a novel experience. Infect UMI has been a vibrant platform. Deliberations in the conference have brought out the details which will be useful inputs for future strategy and policy framework for integrated and resilient urban transport. About 12 experts across the world and 80 organizations shared their views and experiences. Discussion were thought provoking and presentations gave innovative solutions. Most of prestigious organization in urban transport field participated in the conference and exchange their best practices for wider dissemination.

This has encouraged each one of us to have best lessons and takeaways for use while back in our organization. He thanked the Secretary, MoHUA for his guidance from time to time in organizing this conference. He also thanked Addl. Secretary and OSD (UT) MoHUA for their constant support in the conference. He said that we are eagerly waiting for Award ceremony the results of which will be declared shortly in the valedictory session. He thanked all for their support, involvement and participation to make the conference a successful event.

Shri Manoj Joshi, Secretary MoHUA in his opening remarks stated that 3 days intense discussions on areas of topical interest under the main theme Integrated and Resilient Urban Transport has generated a lot of new and innovative ideas by sharing the best practices world over. Shortly, awards are to be given to the excellence and best practice projects which gives us an opportunity to learn from each other. We can make use of best practices prevailing in the field in other cities such as water transport in Kochi and Srinagar, last mile connectivity provisions in Delhi and bus service in Mumbai, Chennai, Pune and Ahmedabad. Other states/ cities may see that how the dedicated companies are looking after the transport service. It will be a good idea to discuss sector specific problem in various cities and how to address the needs of the transport system and users. As in Metro, use of NCMC and Smart Card may also be used in Bus for ease and comforts of users. Govt. of India gives subsidy for card use. Similarly for generation of additional resources for Metro, provision of higher FSI along metro corridor as in Maharashtra may also be provided by other states/ Metros who have not implemented such provision so far. With the increasing cost of metro rail system, Metro companies have to look for generation of additional resources. Value capture financing, establishment of UMTA have to be taken up on priority. We should make vigorous efforts to capture maximum real estate value for the benefit of citizens and operation of metro system.

Further, he said that although we are pushing concept like TOD but we have to be very clear what actually it intends to do. It is being interpreted differently without much clarity. Urban planning practices need certain reforms for meaningful implementation of TOD approach. It is observed that type of proposal being worked out and sent by some states for consideration of MoHUA lack the comprehensiveness and integrated approach for implementing the TOD principles in right direction. Public transport system and development of TOD are to be seen in an integrated manner. In some cities we have six lanes road but no adequate bus service. We may have densification along Metro corridors by allowing higher FSI. Densification along transit routes in Europe, Japan could be seen a model for replication suiting to Indian conditions. There is a need to have in depth discussion on densification issues. If FSI is increased along the metro corridors what measures are to be taken in other areas. It is seen that NCMC is just picking up but Delhi Metro Card is more successful. Problems in making use of

NCMC popular and the problems of KYC in Banks need to be studied to make its use successful across the country. Under the objective of Make in India we have to make Metro development fastest in India so that it could surpass the largest metro systems in the world in the next 10 years. Various components of the metro system such as station gates, rails, signaling systems, etc. need to be studied for further improvement and to enhance the efficiency of the system. Electric buses need to replace the old fossil fuel run buses regularly. Fare collection system being operated in Indore has helped in good fare collection which can be emulated by others suiting to the local conditions. In conclusion he said that UMI is a good platform to learn from each other and we should keep learning from each other regularly.

After the opening remarks award ceremony started where Secretary gave the awards to the best papers in Research Symposium, best exhibitors in the exhibition and excellence in Urban Transport to the winning cities/ states. Detail for the award ceremony is included in the subsequent section.

- **Award Ceremony**

Awards for "Excellence in Urban Transport" were given by Shri Manoj Joshi, Secretary, Ministry of Housing & Urban Affairs, Government of India to the winning state/ UTs and cities. Ministry of Housing and Urban Affairs had constituted an Awards Selection Committee for the 16th UMI-2023 comprising 11 members under the chairmanship of Dr. Surendra Kumar Bagde, Additional Secretary (H&V) MoHUA. The committee had 2 meetings. All the members attended both the meeting physically except Prof. Ashish Verma who joined online form Bengaluru. A total of 98 entries were received from 39 cities (17 states and 4 UTs) for awards in 8 different categories. Committee deliberated and agreed upon the ground rules to be followed for evaluation and recommendation of entries. Out of 98 entries 16 were found incomplete in terms of project information and non-submission in the prescribed proforma. The committee agreed to exclude such entries from further consideration. Of the remaining 82 entries category wise entries were allocated to respective technical members for further evaluation. The entries for each category were evaluated by the concerned committee members based on the review of the documents received and marks given to shortlist the entries. Evaluation reports of the committee members were presented and discussed in the second meeting of the committee. The best 3 entries in each category were shortlisted by the committee for the next round of selection. The representatives of the States/ Project Authorities of the short listed entries were invited to make presentation before the committee and to highlight their achievements and justification for final selection in the meeting. Based on the presentations made and after due deliberations, the committee recommended the following entries for awards along with necessary justification.

Category 1 - City with the Best Public Transport System

The Committee recommended **Srinagar, Jammu & Kashmir** as the **winner** and has noted the following in respect of this entry:

Srinagar Smart City Limited (SSCL) has taken a comprehensive approach to improve public transport in the city with an integrated public transport plan with rationalized routes for all modes. SSCL financed and contracted the eBus and eBoat on GCC model for creating the trunk and feeder public transport systems. It has one of the comprehensive public transport in the country with the water transport system that competes with the best of the world and being the first elaborate one in the country. A feeder system through Public Bicycle Sharing System, eBicycles and eRickshaws, has been introduced with people-friendly and comprehensive infrastructure for bus, boats, and access infrastructure through large walkways and cycle tracks. As a result of increased public transport acceptance and ridership, high demand from people from all over the city with increased walking and cycling, addition of more than 5 lakh trips in the last 3 months have been achieved. The gradual increase in the NMT- system in the city is projected to reduce GHGs by over 30% and particulate matter by 70%.

Category 2 - City with the Best Non-Motorised Transport System

The Committee recommended **Pimpri Chinchwad, Maharashtra** as the **winner** and has noted the following in respect of this entry:

Pimpri Chinchwad (PCMC) is one of the fastest-growing cities in the state of Maharashtra with a vibrant urban landscape and epitomizes the potential for sustainable development. With a focus on fostering community engagement and connectivity, main aim is to transform the Pimple Saudagar neighbourhood into an NMT-friendly hub and to enhance accessibility, encourage social cohesion, and promote active lifestyles, particularly amongst residents and professionals commuting to the Hinjewadi IT Park. Notable initiatives in Pimple Saudagar include NMT streets, a transformative Linear Garden Street, and inviting place making interventions like the celebrated 8 to 80 Park. Pimple Saudagar serves as a valuable learning ground, driving the formulation of the Harit Setu Master Plan. This comprehensive plan outlines a long-term vision for NMT development, with a pilot project underway in Nigdi, slated for completion by December 2025. With an emphasis on community-driven initiatives, public events and activities, including Azadi Ka Amrit Mahotsav Tactical Urbanism (AKAM TU) place making initiatives and annual Cyclothons, a notable momentum has been achieved.

Category 3 - City with the Most Innovative Financing Mechanism

The Committee recommended **Jabalpur, Madhya Pradesh** as the **winner** and has noted the following in respect of this entry:

In Jabalpur, the intra-city public transport system is essentially road based with semi floor buses, e rickshaws, cycle rickshaw and auto rickshaws. Jabalpur City Transport Services Limited (JCTSL) with its private partner operates 100 buses in the city. The average daily ridership of these buses is about 45,000. To improve the level of service without any excessive burden on public exchequer and maintaining the feasibility of private enterprise a new Hybrid Gross Cost Model was adopted with Viable Gap Funding approach. In this system, when there is surplus between the earnings from fare collection agency and cost paid to the operator, JCTSL gets a profit and when there is insufficiency, a Viable Gap Funding is provided to the operator. With the implementation of this model and fare revision, the earning per KM has increased by 19%. All newly commissioned buses follow BS-VI norms. So emissions are less and environment quality has improved.

Category 4 - City with Best Record of Public Involvement in its Transport Planning

The Committee recommended **East Khasi Hills (Shillong), Meghalaya as** the **winner** and has noted the following in respect of this entry:

Sustainable Transport and Efficient Mobility Society (STEMS) was incorporated to develop and implement modern transport solutions that are safe, sustainable, efficient, and cost-effective. The shared commuter service for school students aims to transform the urban mobility in Shillong by promoting a mode shift from private vehicles to sustainable transportation. The main objective of the project is to provide eco-friendly commuter services, reducing traffic congestion, and minimizing the environmental footprint. The project works collaboratively with 15 schools and successfully received 500+ registrations from students. The project procured 30 midi-buses (30 seats), and developed an IT platform for registration, tracking, notification, and feedback. The project benefits all citizens of the city, who generally spend 70 minutes on an average in traffic snarls daily. It helps to improve the efficiency of parents, especially those who are working class, by making it easier to ensure safe commute of their wards to schools. Moreover, it helps students to have a stress-free journey to schools.

Category 5 - City with the Best Green Transport Initiative

The Committee recommended **Kochi, Kerala** as the **winner** and has noted the following in respect of this entry. :

Kochi Water Metro (KMRL), an environment friendly, sustainable integrated water transport system revolutionizing urban connectivity in the picturesque city of Kochi was inaugurated by the Honourable Prime Minister of India on 25.04.2023 and started revenue operations w.e.f. 26.04.2023. Spanning an impressive 76 kilometres, Water Metro connects 10 islands through a network of 38 water metro terminals and 78 state of the art most modern hybrid electric ferries. The project represents a transformative step towards a greener, more inclusive future. The boat is designed with low wake wash characteristics for efficient commuting compared to alternate road travel. This also helps to avoid damage to river/canal shore line, thereby reducing environmental impacts on aquatic flora and fauna. Kochi Water Metro plans to avail net zero emissions, by meeting energy requirements from its own solar farms. It has saved 548 tons CO_2 emission in 133 days of operation.

Category 6 - Metro Rail with the Best Multimodal Integration

The Committee recommended **Mumbai, Maharashtra as** the **winner** and has noted the following in respect of this entry:

MMRDA Metro Rail project aims to prepare a comprehensive Multi modal Integration (MMI) Plan at each station consisting of station area plans, commuter dispersal plan and feeder system network plan through Public Transport (BEST Buses), shared auto, Public Bicycle Sharing, etc. considering travel demands for improving the overall accessibility of commuters to the Metro Stations. In this plan, the station influence area has been redesigned for efficient & safe dispersal of traffic and commuters. This includes restructuring/ reconfiguration of Right-of-Way (ROW) i.e., carriage ways and footpaths, shifting/ re-routing of ground and underground utilities, street lights, shifting of Bus stops and bringing it closer to station within reach of 50 metre from the entry/exit staircases, providing pickup-drop off bays for Buses/IPT's/private vehicles, dedicated metro feeder through e-vehicles, way finding maps and PBS infrastructure. This infrastructure upgradation has been proposed to be carried out in 250 metre radius of each metro station area, which is the average walking distance for last mile connectivity to Mass Transit Stations.

Category 7 - Metro Rail with the Best Passenger Services and Satisfaction

The Committee recommended **Delhi Metro, Delhi** as the **winner** and has noted the following in respect of this entry:

Delhi Metro Rail Corporation Ltd. has redefined public transportation in India by serving 6 million passengers daily with a remarkable 99.9% punctuality and having a flawless safety record. DMRC adopts holistic approach and gives equal impetus to environment conservation, green energy promotion (35% usage), aesthetic infrastructure (green buildings), digital innovation (QR Ticketing/NCMC), LMC and passenger first approach. DMRC's latest project, i.e. “real-time car wise passenger occupancy displays on PIDS” is another step towards its customer centric approach and very first in India. It helps in guiding passengers towards less crowded coaches which may enhance their travel experience. It facilitates shorter dwell time which further improves line capacity. This facility is available on line-8 which will be extended to other lines. It will also be integrated with the DMRC Mobile App. DMRC as an integrated and resilient urban transport system, has set a global benchmark for exceptional passenger service by providing world class facility.

The Committee also recommended **Lucknow Metro, Uttar Pradesh** as the **winner** and has noted the following in respect of this entry:

Lucknow Metro (UPMRC) practices methodical approach to provide Best of the best passenger services with a view to maximise passenger satisfaction. It has developed and implemented unique approach to engage with passengers and customers through various platforms. Customer relationship management (CRM) system is the combination of practices, strategies and technologies that manage and provide customer interactions. The overarching goal is to improve passenger/customer service relationship. UPMRC Customer relationship management (CRM) system, collects data from customers on quarterly basis related to origin/destination, mode of transport used for first mile and last mile, gender, age, occupation etc. Data collected is analysed to develop dedicated schemes and policies to engage with segmented customers. There is 24% increase in the annual ridership with 18% increase in fare box revenue over last year. Moreover, it has received negligible complaints from passengers.

Category 8 - Running trophy for the State/UT, which has implemented Best Urban Transport Projects during the previous year

The Committee recommended Capital Region Urban Transport (CRUT) **Bhubaneswar, Odisha** as the **winner** and has noted the following in respect of this entry:

Capital Region Urban transport (CRUT) is the flag bearer of changing urban transport scenario in the country. In addition, CRUT has pioneered inclusive public transportation for marginalized communities. CRUT aims to build a sustainable, efficient, smart and inclusive public transport system for urban areas of Odisha. CRUT is constantly focussing on holistic policy decisions that support social and gender inclusivity. At present, 40% of Mo Bus Guides (conductors) are women and 100% of the Sarathis (drivers of Mo E-Ride) are women, transgender and people who are HIV positive. CRUT launched its fleet of E-Bus variant of Mo Bus and Mo E-Ride in July 2022 and this marked the official introduction of the fleet of Electric Vehicles (EV) in the public transport sector of the State. It has proposed induction of 350 electric buses under PM-eBus Sewa Scheme and 500 E-Rickshaws under SUMACA scheme that reinforces its commitment to sustainability and positions Odisha as a pioneer in adopting eco-friendly transportation alternatives.

List of Award Winners

Cat.	Award Category	Winner	
		City	Organisation
1	City with the Best Public Transport System	Srinagar	Srinagar Smart City Ltd.
2	City with the Best Non-Motorized Transport System	Pimpri Chinchwad	Pimpri Chinchwad Municipal Corporation
3	City with the Most Innovative Financing Mechanism	Jabalpur	Jabalpur City Transport Services Limited
4	City with Best Record of Public Involvement in its Transport Planning	East Khasi Hills (Shillong)	Sustainable Transport and Efficient Mobility Society
5	City with the Best Green Transport Initiative	Kochi	Kochi Metro Rail Ltd.
6	Metro Rail with the Best Multimodal Integration	Mumbai	Mumbai Metropolitan Region Development Authority
7	Metro Rail with the Best Passenger Services and Satisfaction	Delhi	Delhi Metro Rail Corporation Ltd.
		Lucknow	Uttar Pradesh Metro Rail Corporation Ltd.
8	Running trophy for the State / UT, which has Implemented Best Urban Transport Projects during the previous year	Bhubaneswar	Capital Region Urban Transport

The exhibition is a special feature of UMI to propagate and showcase the latest development in urban transport technology and systems, implementation of best transport projects and dissemination of innovative ideas, presentation of research in the topical areas of interest in urban transport and exchange of good urban transport initiatives and practices in the field.

In all 16 Sponsors and exhibitors participated in the exhibition and unveiled their products, technology, projects and transport system for winder dissemination. The list of sponsors, exhibitors, knowledge partners and media partners are attached at annexure…. respectively. The exhibition was inaugurated by Shri Hardeep Singh Puri, Hon'ble Minister for Housing and Urban Affairs and Petroleum and Natural Gas on 27th October, 2023. The latest technology particularly digital payment system in Metro by National Payment Corporation of India, Paycraft solutions, latest progress in Metro system by various Metro Companies, water Metro, etc. were of special interest to the esteemed guests, participants and visitors. Exhibitors received many specific quarries from the delegates to solve urban transport problems in their respective cities.

On the whole the expo was well received both by the participants and the visitors.

Awards for best exhibitors were given to the following promoters.

Prize	Company
First Prize	Coral Telecom Ltd. And Sparsh
Second Prize	Bharat Electronics Ltd.
Third Prize	Kochi Metro Rail Ltd.

After the Award ceremony Secretary, MoHUA launched the theme and dates of UMI-2024. He said that 17th UMI Conference 2024 will be held at Gandhinagar, Gujarat from 25 – 27 October, 2024 on the theme "Standardization and Optimization of Urban Transport Solutions"

Vote of Thanks

At the end of Valedictory session, Shri Jaideep OSD (UT) & Ex. Officio Joint Secretary, MoHUA proposed a note of thanks. He said that UMI team is thankful to the Hon'ble Minister, Ministry of Housing and Urban Affairs and Petroleum and Natural Gas, Govt. of India who had taken time out of his extremely busy schedule to inaugurate the conference and exhibition and to deliver inaugural address. He said that UMI is a unique forum for networking and exchange of ideas and experience among policy makers, city managers, researchers, transport engineers/ planners, entrepreneurs, manufacturers, etc. UMI has been envisioned as a

platform for focusing attention on critical challenges and key issues in the urban transport sector and to disseminate best practices from India and across the world.

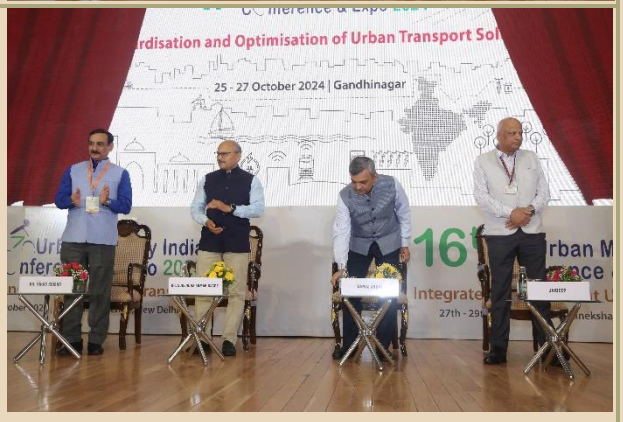
He expressed his thanks to Secretary, MoHUA Shri Manoj Joshi for his guidance and support in all matters in preparation for the conference. He thanked GIZ, ADB, World Bank, WRI India, TERI and ICCT India for their collaboration and active participation as knowledge partners in the conference. He expressed his thanks to all the Chairpersons and Speakers in the Plenary, Technical and other sessions for sharing their expert views in the deliberations in the conference. He thanked IIT Delhi and its team for organizing the Research Symposium in a methodological and efficient manner. He gave special thanks to various state and city authority for their entries for Awards and congratulated the winners. He made a special mention of Shri Vikas Kumar, MD DMRC and his team for their support and cooperation in organizing this mega event successfully. He extended his thanks to all the Managing Directors Metro Companies and their respective teams for sparing their valuable time in attending the conference and contributing to the deliberations.

He said that our thanks are due to all the media persons, sponsors, exhibitors for taking active part in the conference. He thanked Col. Harpreet Manchanda, Manekshaw Center and M/s Chime the Event Manager for their cooperation and support. Last but not the least he thanked all his colleague in the Ministry for their valuable support, IUT team for active involvement in

organizing this mega events.

Dignitaries in the valedictory session

Glimpse of the Valedictory Session



H. Research Symposium

Research Symposium, as part of 16th Urban Mobility India Conference 2023, was held during 28 – 29 October, 2023 at Manekshaw Centre, Delhi. The event was held under the aegis of the Ministry of Housing and Urban Affairs, Government of India and was coordinated by the Indian Institute of Technology Delhi (IITD) in Collaboration with Institute of Urban Transport (India), Dr. M. Manoj coordinated the organization of the Research Symposium. The symposium is a platform to highlight the current research activities in urban transport carried out by academic and research institutes, especially by young researchers. Eligible participants were either existing or recently passed out (Not earlier than May, 2022) students of PG/ Ph.D. The purpose of the Research Symposium was to encourage young researchers working on various aspects of urban transport to present their research work and provide them with an opportunity for networking with fellow researchers and professionals, enhance the capacity in the field of urban transport and contributing towards building up of research data base, dissemination and identification of research thrust in the country.

In line with the theme of UMI – 2023 conference "Integrated and Resilient Urban Transport" Abstracts for the papers under Research Symposium were invited on the following broad topics.

- Integrated & Resilient Urban Transport
- Sustainable Transportation Planning & Policy
- Public Transport and Non-Motorized Transport
- Urban Freight/ Transportation Engineering
- Land Use (LU) and Transportation Planning
- Vulnerable Road Users (VRUs) and Inclusive Mobility
- Electric and Smart Mobility
- Travel demand/Transport Planning

Participation

In all 122 abstracts were received pertaining to different urban mobility themes as mentioned above. Out of 122 abstracts received, 97 were accepted by the Peer Review Committee. After acceptance of abstracts, 71 full papers were received. Peer Review Committee finally accepted 53 papers. Subsequently 49 revised full papers were received and finally 46 papers were presented in the Research Symposium. A double-blind review process, which is followed by most of the peer reviewed journals, was adopted throughout and it was made sure that all the papers were reviewed by at least two reviewers. The review scores and comments for the full papers were sent to the authors. The selected papers were presented in 8 session with 4-5 papers presented in each session.

Accordingly, the Research Symposium was conducted in eight sessions which were moderated by a chair/ co-chair as detailed out below:

Session 1 : Integrated & Resilient Urban Transport **Chair: Prof. Bhavathrathan, Associate Professor, Indian Institute of Technology, Palakkad** **Rapporteur: Mr. Mustansir Farooq**	
Authors/ Presenter	**Paper Title**
Almas Siddiqui, Veera Manikanda Prabhu and Ashish Verma	Exploring Connectivity of Indian Road Networks Patterns and its Classification using Deep Learning
Gaurav Raheja, Divyang Purkayastha, Suyash Rahariya and Santhosh Malothu	Issues and Challenges of Persons with Disabilities in the Suburban Rail Mobility Context of Mumbai
Maneesha B and Ashish Verma	The Resilience of Transportation Infrastructure in India: Are We There Yet?
Nilkanti Gurav and Dr. Chetan R Patel	A Gis-Based Approach To Solve Sustainable Port-Hinterland Connectivity by Proposing Optimal Locations of Dry Ports Using A Location-Allocation Model
Dimple Maria, Kiran Kumar S, Anjali G R, Ardra S Babu, Vincy Vijayan, Veena R S, Dr. Priyanjali Prabhakaran and Dr. Shailaja Nair	Evaluating Accessibility of a Multimodal Transportation Hub – A Case Study of Vyttila Mobility Hub, Kochi, India
Aaditya Bhamidipati, Rahul T M and Navdeep Asija	Using urban topology to identify critical links of the road network: a Centrality based approach
Session 2 : Sustainable Transportation Planning & Policy **Chairperson: Prof. Sanjay Gupta, Professor, School of Planning and Architecture (SPA), New Delhi** **Rapporteur: Ms. Poonam Rajaram Adsule**	
Authors	**Title**
Rohit Singh Nitwal, Hemanthini Allirani and Ashish Verma	Methodological Framework for Evaluating Sustainable Transport Measures Towards Achieving Sustainable Development Goals
Vikas Meena, Shahiq	Reimagining Urban Mobility: Analyzing the Relationship

Ahmad Wani and Ranju Mohan	between Mode Choice and Trip Chaining Behavior in Kota City
Harsh Rabdiya, Rohit Rathod, Aninda Bijoy Paul, Gaurang Joshi and Shriniwas Arkatkar	Travel Behavior Modeling: Exploring Household Characteristics as Predictors
Poonam Adsule, Akshay Sonavane and Dr. B Raghuram Kadali	Identifying the attitude of users' preference towards sustainable transport modes
Dilawaiz Ali, Shahiq Ahmad Wani and Mohammad Shafi Mir	Empowering Mobility: Investigating the Mode Choice of Women Commuters in Developing Countries Using Multinomial Logit Modelling
Punyabeet Sarangi and Malayath Manoj	Evaluating the variations in discretionary activity episodes before and during lockdown among urban Indian university students

Session 3: Urban Freight/ Transportation Engineering

Chairperson: Prof. Ashish Verma, Professor, Indian Institute of Science (IISc) Bangalore

Rapporteur: Mr. Vamsi Krishna G

Authors	Title
Mayank Bhandari, Suraj Prajapat and Abhinav Kumar	Impact of Geometric Characteristics on Capacity of Hill Road.
Yash Dhawade, Sreedevi Kurur, Anuja Kothawala and Anirudh Badarinath	Station Area Planning for Mass Transit in India: Discussions for the Indian Context
Harish Kumar Saini, Ankit Kathuria and Ashoke Kumar Sarkar	Safety Evaluation of Exclusive Motorcycle Lanes on Non-Urban Highways Using Extreme Value Theory
Supriya Bhutani and Naina Gupta	Unraveling the Urban Symphony: A Holistic Investigation of Traffic Noise in Vijayawada City
Vaishvi Kikani, Gaurang Joshi, Shriniwas Arkatkar and Agnivesh Pani	Modelling Freight Trip Generation in Restaurants Across Three Indian Cities: A Comparative Analysis of OLS Regression and Machine Learning Models

Adarsh Yadav, Manoranjan Parida, Pushpa Choudhary and Brind Kumar	Analysis of Traffic Noise Annoyance at Intersections in Mid-Sized Indian Cities

Session 4: Land Use (LU) and Transportation Planning

Chairperson: Prof. P. K. Sarkar, Vice President, IUT and Former Director, Asian Institute of Transport Department

Rapporteur: Mr. Yogi Shastri

Authors	Title
Ashish Makanadar and Samit Shahane	Covid-19`s Impact on Transportation Space and Abandoned Urban Design Practices
Sneha and Ashok Singh Rajpoot	Implementing Access-Controlled footpaths in urban roads with consideration for universal design principals
Bala Eswari Macha and Debapratim Pandit	Need for a Context-Sensitive Approach to TOD in India
Puneet Mishra and Uttam Kumar Roy	Exploring The Commercial Performance of Self-Organized Mixed-Use Streets in Delhi
Kritika Sharma, Aditya Pitale and Shubhajit Sadhukhan	How regional rapid transit system will impact the development along Delhi-Ghaziabad-Meerut Corridor? A stakeholders' perception study
Somnath Bhui and Preety Saini	Effect of City size on Mode-choice behaviour: Before and After COVID-19

Session 5: Vulnerable Road Users (VRUs) and Inclusive Mobility

Chairperson: Prof. Mohd. Shafi Mir, Professor, National Institute of Technology, Srinagar

Rapporteur: Mr. Mustansir Farooq

Authors	Title
Karthika P Sobhana and Ashish Verma	Modeling the natural "pause-and-go" walking behaviour of pedestrians in bidirectional flow
Arpita Saha, Chayan Julaniya, Prajwal Manoj Madghe and Suryawanshi Shridhar	A study on pedestrian behaviour in different road traffic facilities in Indian traffic scenario

Animesh Jain and Bivina G R	Understanding the Utilization Patterns of Pedestrian Crossing Facilities: Evidence from Bhopal City
Parth Parikh, Mehraab Nazir, Aayushi Barot and Pankaj Prajapati	Road Environment Factors Affecting Fatal Crashes of Vulnerable Road Users – A Case Control Study
Anuj Bhardwaj, Shalini Rankavat and D Sai Kiran Varma	Exploring Pedestrian Dynamics at Metro Station for Effective Transportation Planning: Jaipur case study
Parth Jhaveri, Rohit Rathod, Shriniwas Arkatkar, Gaurang Joshi and Rajesh Pandya	Identifying accessibility over space through trip length distribution using Smart Card: A case study of Surat City, India
Ravi Kant and Mukti Adwani	Pedestrians' Behavioral Analysis Through Critical Gap At Un-Signalized Unmarked Midblock Crossing In Delhi

Session 6: Public Transport and Non- Motorized Transport (NMT)

Chairperson: Prof. Shalini Sinha, Professor, CEPT University

Rapporteur: Ms. Poonam Rajaram Adsule

Authors	Title
Apoorva Rao and Dr. Yogeshwar Navandar	Analyzing User Satisfaction for BRTS through IST and Sentiment analysis : A case study of Hubbali Dharwad BRTS
Saroj Kanta Behera and Abhisek Mudgal	Diurnal PM2.5 exposure at a busy traffic intersection of a tier – II city: A case study of Varanasi, India
Akshaya Paul and Himanshi Sharma	Examining the Travel Pattern and Behaviour of Women in Delhi
Rohit Rathod, Darshan Gheewala, Pankaj Prajapati and Gaurang Joshi	Identifying Dependency of Service Quality on Perceived Transit Accessibility – A Latent Variable Causal Analysis Approach
Athira J, Sumit Aggarwal, Dr. Yogeshwar Navandar, Dr. Krishnamurthy Karuppanagounder and Dr. Velmurugan S	Traffic Impact Analysis of On-Street Parking Near Signalized Intersections

Shahiq Ahmad Wani and Ranju Mohan	Exploring the Challenges and Demographics of Public Transport Drivers - Insights through Descriptive Analysis into Well-being and Urban Mobility
Session 7: Electric and Smart Mobility **Chairperson: Prof. Pramesh Kumar, Assistant Professor, Indian Institute of Technology (IIT) Delhi** **Rapporteur: Mr. Vamsi Krishna G**	
Authors	**Title**
Furqan Bhat and Ashish Verma	Intention to Adopt Electric Vehicles Among Young Adopters in a Developing Economy: An Oaxaca-Blinder Decomposition approach to evaluate the effect of socio-demographics
Rupesh Kumar Yadav, Akshay Gupta, Pushpa Choudhary and Manoranjan Parida	Service Quality Assessment of Electric Buses: A PLS-SEM Approach
Rohan Singh Rawat, Aishree Boruah, Chandrashekhar C, Dr. Digvijay S. Pawar and Dr. Pritha Chatterjee	Real-World Emission from BS-VI Diesel Bus in Indian Urban and Sub-urban Traffic Environment
Ashish Makanadar and Samit Shahane	Smart Mobility and Cities 2.0: Advancing Urban Transportation Planning through Artificial Intelligence and Machine Learning
Nipun Choubey, Vaibhav Patil and Ashish Verma	Private SUV or Carpooling? – investigating impact of choices on Indian roads.
Shaurya Mall and Ramesh Anbanandam	Exploring the Influence of Socio-Demographic Factors on Electric Vehicle Type Preferences
Session 8: Travel demand/Transport Planning **Chairperson: Prof. Manoj M, Associate Professor, IIT Delhi** **Rapporteur: Mr. Yogi Shastri**	
Authors	**Title**
Anurag Swarnkar, Bhola Ram Gurjar and Hemant Suman	Development of a GIS-based Approach for Spatial Disaggregation of Emissions from Road Traffic
Sanya Guleria	Passenger Demand Prediction For Metro Station Using Probabilistic Model

Sneha Nirannanilathu and Naina Gupta	Viability of water transport for passenger movement in Kochi
Shipra Verma, Ravi Kant and Shubhajit Sadhukhan	Measuring Shoppers' Perceived Satisfaction Towards Pedestrianized Urban Commercial Market Spaces In Delhi
Samruddhi Gujar and Mohit Dev	Quality and Performance of Passenger Ferry Service
Savita Lakra and Mayank Dubey	Parameters for Assessing Public Transport Accessibility of Indian Cities

- All the sessions were well received and interactive. The presentations were judged by a Jury and the following papers were adjudged first, second and third. The awards were given away by the Secretary, MoHUA in the Valedictory session on 29th October, 2023.

Details of the best paper awardees

First Prize :

Author: Aishree Boruah
Co-Author: Rohan Singh Rawat, Chandrashekhar C, Dr. Digvijay S. Pawar and Dr. Pritha Chatterjee
Affiliation: IIT Hydrabad
Title: Analyzing speed-related emission trends and VSP distributions from BS-VI Diesel Bus in Indian Urban and Sub-urban Traffic

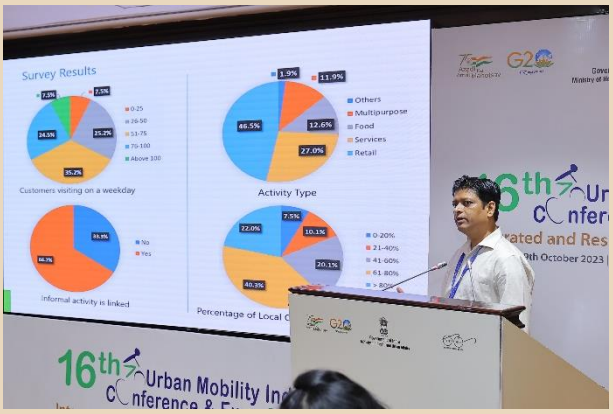
Second Prize :

Author: Karthika P S
Co-Author: Ashish Verma
Affiliation: IISc Bangalore
Title: Modeling the natural "pause-and-go" walking behaviour of pedestrians in bidirectional flow

Third Prize :

Author: Dilawaiz Ali
Co-Author: Shahiq Ahmad Wani and Mohammad Shafi Mir
Affiliation: NIT Srinagar
Title: Empowering Mobility: Investigating the Mode Choice of Women Commuters in Developing Countries Using Multinomial Logit Modelling

Winners in the Research Symposium



THURSDAY - 14:00 to 18:00 hrs	REGISTRATION	26.10.2023

Day ONE – FRIDAY	RESILIENT URBAN MOBILITY SYSTEMS	27.10.2023
09:30 – 11:30 (Exhibition / Reception Hall)	Registration	
11:30 – 12:00 (Exhibition Ground)	Inauguration of the Exhibition	
12:00 – 13:05 (Zorawar Hall)	**Inaugural Session** by **Shri Hardeep Singh Puri**, Hon'ble Minister of Housing and Urban Affairs and Petroleum and Natural Gas, Government of India	
12:00 – 12:05	**Lighting of Lamp**	
12:05 – 12:10	**Welcome & Opening Address** by **Shri Manoj Joshi**, Secretary, Ministry of Housing and Urban Affairs, Government of India	
12:10 – 12:20	**Key Note Address** by **Shri Pradeep Singh Kharola,** Chairman & Managing Director, India Trade Promotion Organisation	
12:20 – 12:30	**Release of Publications and Inaugural Video** by **Shri Hardeep Singh Puri**, Hon'ble Minister of Housing and Urban Affairs and Petroleum and Natural Gas, Government of India	
12:30 – 12:40	**Inaugural Address** by **Shri Hardeep Singh Puri**, Hon'ble Minister of Housing and Urban Affairs and Petroleum and Natural Gas, Government of India	
12:40 – 12:45	**Vote of Thanks** by **Shri Vikas Kumar**, Managing Director, Delhi Metro Rail Corporation	
12:45 – 13:05	**Press Conference** by **Shri Hardeep Singh Puri**, Hon'ble Minister of Housing and Urban Affairs and Petroleum & Natural Gas, Government of India	
13:05 - 14:30 (Rxn Area)	Inaugural Lunch	
14:30 – 16:00 (Ashoka Hall)	**Conclave** **Risk Analysis & Mitigation in Making Urban Transport Resilient** **Chairperson & Moderator: Mr. R R Rashmi**, Distinguished Fellow and Programme Director, Earth Science and Climate Change, The Energy and Resources Institute (TERI) **Panelists:** 1. **Mr. Loknath Behera IPS** (Retd), Managing Director, Kochi Metro Rail Ltd 2. **Mr. Naresh Lalwani**, General Manager, Central Railway, Mumbai 3. **Mr. Vikas Kumar**, Managing Director, Delhi Metro Rail Corporation (DMRC) 4. **Ms. Carolin Gassner**, Director South Asia, KfW Development Bank 5. **Mr. Hoe Yun Jeong**, Deputy Country Director, Asian Development Bank (ADB) 6. **Mr. Armin Wagner,** Senior Advisor, GIZ 7. **Ms. Jen Jungeun Oh,** Practice Manager, South Asia Transport, World Bank	
16:00 – 16:30 Exhibition Ground	**Tea Break & Networking**	
PARALLEL SESSIONS		
16:30 – 18:00 (Ashoka Hall)	**Technical Session 1** **Embedding Resilience in Urban Transport Systems (Metro Session)** *(Supported by ADB)*	**Session Chair & Moderator: Dr. Mukund Kumar Sinha,** Senior Transport Specialist, Asian Development Bank (ADB) **Speakers** 1. **Mr. P. Uday Kumar Reddy,** General Manager, Metro Railway Kolkata and Chairman, Kolkata Metro Rail Corporation Ltd (KMRCL) 2. **Mr. K V B Reddy,** Managing Director & CEO, L&T - Metro Rail (Hyderabad) Limited 3. **Dr. Klaus Liebig**, Head of Division, Climate Finance and Mobility South Asia, KfW Development Bank 4. **Mr. D K Sinha,** CEO, Mumbai Metro Line 3 (O&M) 5. **Ms. Rashmi Bhardwaj,** Additional General Manager Architecture, Delhi Metro Rail Corporation (DMRC) 6. **Mr. Sandeep Fuller,** Senior Vice President (Systems), Systra MVA India Ltd., Faridabad 7. **Prof. Gaurav Srivastava,** Associate Professor, Civil Engineering, IIT Gandhinagar
16:30 – 18:00 (Shamsher Hall)	**Technical Session 2** **Strategies for Meeting Challenges in Multi-modal Integration of Urban Transport**	**Moderator: Mr. Shravan Hardikar IAS,** Managing Director, Maharashtra Metro Rail Corporation Limited (Maha Metro) **Speakers** 1. **Mr. Loknath Behera IPS** (Retd), Managing Director,

	Systems	Kochi Metro Rail Limited (KMRL) 2. **Mr. Vinay Kumar Singh**, Managing Director, National Capital Region Transport Corporation (NCRTC) 3. **Dr. Shalini Sinha**, Professor, Centre for Environmental Planning and Technology (CEPT) University 4. **Mr. Guido Bruggeman**, Senior Urban Transport Expert, Netherlands 5. **Mr. Daniel E. Moser**, Director Transport India, GIZ 6. **Mr. Antonio Lleras**, Coordinator of Accessibility, Exteriors and Signage, Metro Madrid 7. **Mr. Hans - Jörg Gisler**, Head, HESS's international OEM partners and customers Carrosserie HESS AG, Bellach, Switzerland 8. **Ms. Aditi Singh**, Principal Consultant, Mott MacDonald Pvt Ltd
16:30 – 18:00 (Talwar Hall)	**Round Table 1** **Compact Cities: Pathways toward India's Sustainable Future** *(Sponsored by ITDP)*	**Session Chair: Mr. Jaideep,** OSD (UT), Ex-Officio Joint Secretary, MoHUA **Moderator: Ms. Aswathy Dilip,** South Asia Director, The Institute for Transportation and Development Policy (ITDP) **Context Presentation: Ms Vaishali Singh**, Deputy Manager, The Institute for Transportation and Development Policy India (ITDP) **Speakers** 1. **Mr. Shekhar Singh IAS,** Commissioner, Pimpri Chinchwad Municipal Corporation 2. **Mr. Gerald Ollivier,** Lead Transport Specialist, World Bank, India 3. **Ms. Anantha Paladugula,** Head of Mobility India, C40 4. **Mr. Sharif Qamar,** Associate Director, The Energy and Resources Institute (TERI) 5. **Mr. Theirry Desclos,** Project Director, Cerema 6. **Ms. Shelley Bontje,** Project Manager, Dutch Cycling Embassy 7. **Mr. Jacob Mason**, Research and Impact Director, Institute for Transportation and Development Policy (ITDP)
16:30 – 18:00 (Taber Hall)	**Round Table 2** **Urban Mobility India Innovation Challenge** *(Sponsored by GIZ)*	**Expert Jury** 1. **Dr. Laghu Parashar**, Senior Transport Specialist, World Bank 2. **Mr. Prashanth A.,** Vice President, Mobility Platform & Services, Bosch India 3. **Mr. Armin Wagner,** Senior Advisor, GIZ 4. **Mr. Shishir Maheshwari**, Managing Director, Eversource Capital **Moderator: Ms. Lena Kliesh,** GIZ **& Mr. Narendra Verma,** GIZ **Thematic Areas** 1. Digitalization in Public Transport: 2. Mobility Data Analytics & Management 3. Urban Freight & Logistics 4. Road Safety
19:00 onwards (Rxn Area)	**Dinner**	

Day TWO – SATURDAY		**28.10.2023**
COLLABORATIVE GOVERNANCE IN URBAN TRANSPORT		
09:30 – 11:00 (Ashoka Hall)	**Research Symposium 1** **Integrated & Resilient Urban Transport**	**Chairperson: Prof. Bhavathrathan,** Associate Professor, Indian Institute of Technology, Palakkad **Rapporteur: Mr. Mustansir Farooq** **Authors** **1. Almas Siddiqui**, Veera Manikanda Prabhu and Ashish Verma **2.** Gaurav Raheja, **Divyang Purkayastha**, Suyash Rahariya and Santhosh Malothu **3. Maneesha B** and Ashish Verma **4. Nilkanti Gurav** and Dr. Chetan R Patel **5. Dimple Maria**, Kiran Kumar S, Anjali G R, Ardra S Babu, Vincy Vijayan, Veena R S, Dr. Priyanjali Prabhakaran and Dr. Shailaja Nair

		6. **Aaditya Bhamidipati**, Rahul T M and Navdeep Asija
09:30 – 11:00 (Shamsher Hall)	**Research Symposium 2** **Sustainable Transportation Planning & Policy**	**Chairperson: Prof. Sanjay Gupta,** Professor, School of Planning and Architecture (SPA), New Delhi **Rapporteur: Ms. Poonam Rajaram Adsule** **Authors** **1.** **Rohit Singh Nitwal**, Hemanthini Allirani and Ashish Verma **2.** **Vikas Meena**, Shahiq Ahmad Wani and Ranju Mohan **3.** Harsh Rabdiya, Rohit Rathod, **Aninda Bijoy Paul**, Gaurang Joshi and Shriniwas Arkatkar **4.** **Poonam Adsule**, Akshay Sonavane and Dr. B Raghuram Kadali **5.** **Dilawaiz Ali**, Shahiq Ahmad Wani and Mohammad Shafi Mir **6.** **Punyabeet Sarangi** and Malayath Manoj
09:30 – 11:00 (Taber Hall)	**Research Symposium 3** **Urban Freight/ Transportation Engineering**	**Chairperson: Prof. Ashish Verma,** Professor, Indian Institute of Science (IISc) Bangalore **Rapporteur: Mr. Vamsi Krishna G** **Authors** **1.** Mayank Bhandari, **Suraj Prajapat** and Abhinav Kumar **2.** **Yash Dhawade**, Sreedevi Kurur, Anuja Kothawala and Anirudh Badarinath **3.** **Supriya Bhutani** and Naina Gupta **4.** **Adarsh Yadav**, Manoranjan Parida, Pushpa Choudhary and Brind Kumar
09:30 – 11:00 (Talwar Hall)	**Research Symposium 4** **Land Use (LU) and Transportation Planning**	**Chairperson: Prof. P. K. Sarkar,** Vice President, IUT and Former Director, Asian Institute of Transport Department **Rapporteur: Mr. Yogi Shastri** **Authors** **1.** **Ashish Makanadar** and Samit Shahane **2.** **Sneha** and Ashok Singh Rajpoot **3.** **Bala Eswari Macha** and Debapratim Pandit **4.** **Puneet Mishra** and Uttam Kumar Roy **5.** **Kritika Sharma**, Aditya Pitale and Shubhajit Sadhukhan **6.** Somnath Bhui and **Preety Saini**
11:00 – 11:30 (Exhibition Ground)	**Tea & Networking**	
PARALLEL SESSIONS		
11:30 – 13:00 (Ashoka Hall)	**Technical Session 3** **Financial Sustainability of Mass Transit Projects** *(Supported by ADB)*	**Session Chair & Moderator: Mr. Sharad Saxena,** Principal Transport Specialist, Asian Development Bank **Speakers** 1. **Mr. Anjum Parwez, IAS,** Managing Director, Bangalore Metro Rail Corporation Limited (BMRCL) 2. **Ms. Namita Mehrotra,** Director Finance, The National Capital Region Transport Corporation (NCRTC) 3. **Ms. Niti Kothari,** Director Finance, Madhya Pradesh Metro Rail Corporation Limited (MPMRCL) 4. **Mr. Anil Kumar Kokate,** Director (Strategic Planning), Maha Metro 5. **Mr. Saurabh Singhal,** Managing Partner, StrategyTech Ventures 6. **Mr. Junkichi Kano,** Director, Urban Renaissance Agency (UR), Japan 7. **Mr. Nikhil Mittal,** Consultant, Asian Development Bank
11:30 – 13:00 (Shamsher Hall)	**Technical Session 4** **Facilitating Implementation of TOD – Case Studies for Replication** *(Supported by World Bank)*	**Session Chair & Moderator: Ms. Ashwini Bhide IAS,** Managing Director, Mumbai Metro Rail Corporation Limited (MMRCL) **Context Setting: Mr. Gerald Ollivier,** Lead Transport Specialist, World Bank, India **Speakers** 1. **Mr. Shankar C Deshpande,** Chief, Town & Country Planning Division, Mumbai Metropolitan Region Development Authority (MMRDA) 2. **Dr. Sanjeev Kumar Lohia,** Sr Advisor (Railway & Urban Mobility Sector), World Bank

		3. **Mr. Ajit Sharma,** Director Finance, Delhi Metro Rail Corporation Limited (DMRC) 4. **Mr. Mukut Sharma**, Chief TOD Expert, The National Capital Region Transport Corporation (NCRTC) 5. **Ms. Lise Breuil,** Country Director, The Agence Française de Development (AFD) India 6. **Mr. Guido Bruggeman,** Senior Transport Consultant, Netherlands 7. **Prof Jignesh Mehta,** Centre for Environmental Planning and Technology (CEPT) Ahmedabad 8. **Ms. Namrita Kalsi,** Chief Architect, Haryana Mass Rapid Transport Corporation Limited (HMRTC) 9. **Mr. Alok Jain,** CEO & Managing Director, Trans-Consult Ltd.
11:30 – 13:00 (Taber Hall)	**Round Table 3** **Integrating Technologies in Metro Rail Projects: Lessons and Innovations** *(Sponsored by Spanish Embassy)*	**Opening Remarks**: **Lucía Paternina**, Chief Economic & Commercial Counsellor, Embassy of Spain **Keynote: Dr Nina Fenton**, Head of Regional Representation, South Asia, European Investment Bank **Moderator: Mr Om Hari Pande,** Director, Delhi Metro Rail Corporation Limited (DMRC) **Session Chair: Mr. Antonio Lleras**, Coordinator of Accessibility, Exteriors and Signage, Metro Madrid **Panelists** 1. **Mr. Vinay Kumar**, Commercial Director, CAF India 2. **Mr. Alberto Gonzalez Galvez**, International Director, Ardanuy 3. **Mr. Enrique Huertas García**, Director, Colin Buchanan 4. **Mr. Edwin Cruz**, Sales Manager – ASEAN, Teltronic 5. **Mr. Luis Jimenez Redondo**, CEO, Cemosa 6. **Mr. Ashish Dasgupta**, Director, Business Development (Infra), India & SE Asia, Ayesa 7. **Mr. Gonzalo-Alfonso Navarro Hernández,** Economic & Commercial Counsellor, Embassy of Spain, New Delhi 8. **Mr. Anoop Rai,** Chief Scientist - Central Research Laboratory, Bharat Electronics Limited 9. **Mr. K N Ramesh,** Executive Director, BEML
11:30 – 13:00 (Talwar Hall)	**Round Table 4** **Uniting India's Mobility Ecosystem With NCMC** *(Sponsored by CHALO)*	**Session Chair: Mr. Anurag Jain IAS**, Secretary, The Ministry of Road Transport and Highway (MoRTH) **Moderator: Ms. Priya Singh**, Co-founder and Director, Chalo Mobility Pvt Limited **Panelists** 1. **Adv M Anil Kumar**, Mayor, Kochi Municipal Corporation 2. **Mr. Loknath Behera IPS** (Retd), Managing Director, Kochi Metro Rail Ltd 3. **Mr. Arun Bothra, IPS,** Managing Director, Capital Region Urban Transport (CRUT) 4. **Mr. Sushil Kumar,** Managing Director, Uttar Pradesh Metro Rail Corporation Ltd. 5. **Mr. Rahul Chandra Das,** Managing Director, Assam State Transport Corporation 6. **Mr. Mohit Dubey,** Founder and CEO, Chalo Mobility Pvt Limited 7. **Mr. Abhijit Sengupta,** Country Director, APSCA India 8. **Mr. Naveen Chaluvadi,** Chief Digital Officer, Yes Bank 9. **Mr. Denny Thomas**, Head – Transits, NPCI 10. **Mr. C.K. Goyal,** Senior Vice President, Delhi Integrated Multi-Modal Transit System (DIMTS) Ltd.
13:00 – 14:30 Rxn Area	**Lunch**	
PARALLEL SESSIONS		
14:30 – 16:00 (Ashoka Hall)	**Technical Session 5** **Roadmap for Scaling Up E-Buses: Vision 2030**	**Session Chair: Mr. Vishal Kapoor,** CEO, Energy Efficiency Services Limited (EESL) **Moderator: Mr. Gerald Ollivier,** Lead Transport Specialist, World Bank, India

	(Supported by World Bank)	**Speakers** 1. **Mr. Bhanu Pratap Singh Bhadoria,** Director (Urban Transport), Ministry of Housing and Urban Affairs (MoHUA) 2. **Mr. Daniel E. Moser,** Director Transport India, GIZ 3. **Ms. Veronika Pliats,** Principal Portfolio Manager, Climate Finance and Mobility South Asia, KfW 4. **Ms. Malavika Pillai**, Principal Investment Officer, Infrastructure & Natural Resources, IFC
14:30 – 16:00 (Taber Hall)	**Technical Session 6** **Gender Mainstreaming in Urban Mobility** *(Supported by GIZ)*	**Session Chair: Ms. Ashwini Bhide IAS,** Managing Director, Mumbai Metro Rail Corporation Limited **Moderator: Dr. Laghu Parashar**, Senior Transport Specialist, World Bank **Speakers** 1. **Ms. Laura Ballesteros Mancilla,** Alternate Senator, Founding member of Mujeres en movimiento, Mexico 2. **Ms. Krishna Desai,** Gender Focal Point- Mobility Practice, SUM-ACA, GIZ 3. **Ms. Swati Khanna,** Senior Sector Specialist, Urban Development & Mobility, KfW Development Bank 4. **Mr. Chris Bruntlett,** Communications Manager, Dutch Cycling Embassy 5. **Dr. Aanchal Jain,** CEO, PMI Electromobility Solutions 6. **Ms. Mitali Nikore**, Transport Specialist (ETC), World Bank
14:30 – 16:00 (Shamsher Hall)	**Round Table 5** **Institutional and Governance Frameworks for E-Mobility Action** *(Sponsored by WRI India)*	**Session Chair: Dr. Surendra Kumar Bagde IAS,** Additional Secretary, MoHUA **Moderator: Ms. Chaitanya Kanuri**, Associate Director – Electric Mobility, Sustainable Cities and Transport, WRI India **Context Presentation: Ms. Diksha Choudhary,** Lead - Electric Mobility, WRI India **Speakers** 1. **Mr. Amit Sharma, IAS,** Secretary (Transport) Transport Department, Govt. of Ladakh 2. **Ms. Shilpa Shinde IAS,** Managing Director, Delhi Transport Corporation, Government of Delhi 3. **Mr. Shahzad Alam, IAS,** Special Commissioner, Transport Department, Government of Delhi 4. **Mr. Pramoj Sanker, IOFS,** Additional Transport Commissioner and Joint Managing Director, Kerala State Road Transport Corporation (KSRTC) 5. **Mr. Rajneesh Rana,** Head, Convergence Energy Services Limited 6. **Mr. Vijay Saini,** Manager, ICLEI 7. **Mr. Jaideep Saraswat,** Senior Manager - Clean Power, Electric Mobility & Green Hydrogen, Vasudha Foundation 8. **Mr. Mohammad Athar Saif**, Partner & Leader, CP&I and Industrial Development, PWC 9. **Ms. Sunitha Anup,** Researcher, The International Council on Clean Transportation (ICCT) India 10. **Mr. Kuldeep Sharma**, Project Manager - Solar Projects & Component Leader, E-Mobility GIZ India 11. **Mr. Kuhan Madhan**, Policy Analyst, Guidance TN
14:30 – 16:00 (Talwar Hall)	**Round Table 6** **Alternate Mobility Solutions to Meet Paratransit Demand** *Sponsored by USAID (CEEW)*	**Opening Remarks: Mr Soumitri Das,** Project Management Specialist (Environment), United States Agency for International Development (USAID) **Moderator: Dr. Himani Jain,** Senior Programme Lead, Council on Energy, Environment and Water (CEEW) **Context Presentation**: **Mr. Krishna Khanna**, Research Analyst, CEEW **Panelists** 1. **Dr. Sanjeev Kumar Lohia,** Sr Advisor (Railway & Urban Mobility Sector), World Bank 2. **Dr. Geetam Tiwari**, Emeritus Professor, The Transportation Research and Injury Prevention Programme (TRIP) Centre, IIT Delhi. 3. **Prof. Shivanand Swamy,** Professor Emeritus, CoE-UT

		4. **Dr. Shalini Sinha,** Center Head and Principal Researcher of the Center of Excellence in Urban Transport (CoE-UT) 5. **Mr Mihir Sorti,** Transport Specialist, ADB 6. **Mr Sudhir Badami**, Independent Transportation Professional 7. **Mr Abhijeet Sinha,** National Program Director, Ease of Doing Business, NHEV 8. **Mr A.K.Gupta,** Additional Director, Directorate of Urban Transport, Government of UP 9. **Mr. T Srinivas**, Global Head - Product Planning & Strategy (Tata Motors, Buses) 10. **Mr. Shirish Mahendru**, Technical Advisor - Sustainable Mobility - Clean fuels- SUM-ACA, GIZ India 11. **Dr. Sandeep Gandhi,** Ph.D, Principal SGA 12. **Mr. Sourav Dhar**, Senior Programme Lead, CEEW
16:00 – 16:30 (Exhibition Ground)	**Tea Break**	
16:30 – 18:00 (Ashoka Hall)	**Plenary Session 1** **The Role of Local Governance in Sustainability of Transport (Mayoral Session)** **Session Chair: Mr. Manoj Joshi IAS,** Secretary, Ministry of Housing and Urban Affairs **Co-Chair & Moderator: Dr. I. P. Gautam IAS** (Retd), Former Member, Lokpal of India **Panelists** 1. **Adv. M Anil Kumar,** Mayor, Kochi Municipal Corporation 2. **Mr. Dirk de Jager,** Deputy Mayor, Ouder-Amstel, Amsterdam, Netherlands 3. **Mr. Junaid Azim Mattu,** Mayor, Srinagar Municipal Corporation 4. **Mr. Pushyamitra Bhargav,** Mayor, Indore Municipal Corporation	
18:30 – 19:00 (Rxn Area)	Networking Break	
18:30 – 19:00 (Ashoka Hall)	**Special Session: ONDC Mobility – A Catalyst for Collaboration** **Moderator: Mr Nitin Nair,** Vice President, Open Network for Digital Commerce (ONDC) **Panelists** 1. **Mr. Shan M.S,** Chief Growth Officer**,** Juspay Technologies 2. **Mr. Manish Rathi,** Chief Executive Officer, Intrcity SmartBus 3. **Ms. Priya Singh,** Co-founder and Director, Chalo Mobility Pvt Limited 4. **Mr. Tapan Gosaliya,** Co-founder & Board Director of Maventech Labs	
19:30 onwards (Rxn Area)	**Dinner**	

Day THREE - SUNDAY		**29.10.2023**
PATHWAY TOWARDS DIGITALIZATION AND ENERGY TRANSITION		
09:30 – 11:00 (Ashoka Hall)	**Research Symposium 5** **Vulnerable Road Users (VRUs) and Inclusive Mobility**	**Chairperson: Prof. Mohd. Shafi Mir,** Professor, National Institute of Technology, Srinagar **Rapporteur: Mr. Mustansir Farooq** **Authors** **1. Karthika P Sobhana** and Ashish Verma **2.** Arpita Saha, Chayan Julaniya, **Prajwal Manoj Madghe** and Suryawanshi Shridhar **3. Animesh Jain** and Bivina G R **4.** Parth Parikh**, Mehraab Nazir**, Aayushi Barot and Pankaj Prajapati **5. Anuj Bhardwaj**, Shalini Rankavat and D Sai Kiran Varma **6. Ravi Kant** and Mukti Adwani
09:30 – 11:00 (Shamsher Hall)	**Research Symposium 6** **Public Transport and Non-Motorized Transport (NMT)**	**Chairperson: Prof. Shalini Sinha,** Professor, CEPT University **Rapporteur: Ms. Poonam Rajaram Adsule** **Authors** **1. Apoorva Rao** and Dr. Yogeshwar Navandar **2. Saroj Kanta Behera** and Abhisek Mudgal **3. Akshaya Paul** and Himanshi Sharma **4. Rohit Rathod**, Darshan Gheewala, Pankaj Prajapati and Gaurang Joshi **5.** Athira J, **Sumit Aggarwal**, Dr. Yogeshwar Navandar, Dr. Krishnamurthy Karuppanagounder and Dr. Velmurugan S

		6. **Shahiq Ahmad Wani** and Ranju Mohan
09:30 – 11:00 (Taber Hall)	**Research Symposium 7** **Electric and Smart Mobility**	**Chairperson: Prof. Pramesh Kumar,** Assistant Professor, Indian Institute of Technology (IIT) Delhi **Rapporteur: Mr. Vamsi Krishna G** **Authors** **1.** **Furqan Bhat** and Ashish Verma **2.** Rupesh Kumar Yadav, **Akshay Gupta**, Pushpa Choudhary and Manoranjan Parida **3.** Rohan Singh Rawat, **Aishree Boruah**, Chandrashekhar C, Dr. Digvijay S. Pawar and Dr. Pritha Chatterjee **4.** Ashish Makanadar and **Samit Shahane** **5.** **Nipun Choubey**, Vaibhav Patil and Ashish Verma **6.** **Shaurya Mall** and Ramesh Anbanandam
09:30 – 11:00 (Talwar Hall)	**Research Symposium 8** **Travel demand/Transport Planning**	**Chairperson: Prof. Manoj M,** Associate Professor, IIT Delhi **Rapporteur: Mr. Yogi Shastri** **Authors** **1.** **Anurag Swarnkar**, Bhola Ram Gurjar and Hemant Suman **2.** **Sanya Guleria** **3.** **Sneha Nirannanilathu** and Naina Gupta **4.** **Shipra Verma**, Ravi Kant and Shubhajit Sadhukhan **5.** **Samruddhi Gujar** and Mohit Dev **6.** **Savita Lakra** and Mayank Dubey
11:00 – 11:30 (Exhibition Ground)	**Tea & Networking**	
PARALLEL SESSIONS		
11:30 – 13:00 (Ashoka Hall)	**Technical Session 7** **Shaping the Future of Mobility with Digitalization** *(Supported by GIZ)*	**Session Chair: Mr. Anjum Parwez, IAS,** Managing Director, Bangalore Metro Rail Corporation Limited (BMRCL) **Moderator: Mr Vivek Ogra,** Partner, Transport Consulting, EY **Speakers** 1. **Mr Sajeev Maheshwari,** Executive Director IT and AFC, Delhi Metro Rail Corporation 2. **Mr Nitin Nair**, Vice President, ONDC 3. **Mr. Alok Jain,** CEO & MD, Trans-Consult Ltd 4. **Ms. Priya Singh,** Cofounder and Director, Chalo Mobility 5. **Mr. Prashanth A.,** Vice President, Mobility Platform & Services, Bosch India 6. **Mr. Vivekanand Kotikalapudi**, Transport, Infrastructure Advisor, GIZ
11:30 – 13:00 (Shamsher Hall)	**Technical Session 8** **Integrated & Sustainable Urban Freight and Logistics** *(Supported by TERI)*	**Session Chair & Moderator: Mr. Sudhendu J Sinha**, Advisor (Infrastructure Connectivity – Transport and Electric Mobility), NITI Aayog **Context Presentation: Ms. Viral Joshi,** Research Associate (Transport and Urban Governance Division), TERI **Speakers** 1. **Dr. Gitakrishnan Ramadurai**, Professor (Transportation Engineering Division), IIT Madras. 2. **Prof. Sanjay Gupta**, Dean Research and Professor of Transport Planning, The School of Planning and Architecture (SPA) Delhi. 3. **Mr. Shalendra Gupta,** CFO & Co-founder, AltiGreen 4. **Mr. Sharif Qamar,** Associate Director, The Energy and Resources Institute (TERI) 5. **Ms. Priti Shukla,** Project Manager (Electric Mobility Program), Shakti Sustainable Energy Foundation
11:30 – 13:00 (Taber Hall)	**Round Table 7** **Accelerating EV Charging Infrastructure - Innovation and Collaboration** *(Sponsored by Energy Systems Catapult)*	**Moderator: Professor Ashish Verma,** Dept. of Civil Engineering, Indian Institute of Science (IISc) **Context Presentation: Mr. Andrew Stokes**, Senior Advisor – Innovator Support & International, Energy Systems Catapult **Panelists** 1. **Ms. Lowri Williams**, Practice Manager – Transport, Energy Systems Catapult 2. **Mr. Maxson Lewis**, Managing Director, Magenta Mobility 3. **Ms. Chaitanya Kanuri**, Associate Director – Electric Mobility, Sustainable Cities and Transport, WRI India

		4. **Mr Prashanth Varanasi**, Principal Consultant, Xynteo 5. **Ms. Varsha Vasudeva**, Co-Founder and CEO, buymyEV 6. **Mr. Sathya Sankaran**, Co-Founder and Director, Urban Morph 7. **Mr. Prashant Palani,** Haritha Mobility Solutions
11:30 – 13:00 (Talwar Hall)	**Round Table 8** **Policy Intervention for Clean Energy Transition in Transportation** *(Sponsored by ICCT)*	**Moderator: Mr. Amit Bhatt,** Managing Director, The International Council on Clean Transportation (ICCT), India **Context Presentation: Ms. Revathy Pradeep**, Researcher, ICCT **Panelists** 1. **Mr. K R Jyothilal, IAS**, Additional Chief Secretary, Govt of Kerala 2. **Dr. Hanif Qureshi, IPS,** Joint Secretary, Ministry of Heavy Industries 3. **Mr. Ashish Tiwari**, Secretary, DOEFCC, Govt. of UP 4. **Mr. Athar Aamir Khan IAS,** Commissioner, Srinagar Municipal Corporation and CEO & MD, Srinagar Smart City Limited (SSCL) 5. **Mr Narayan Kumar,** Associate Director, Shakti Foundation 6. **Mr. Pankaj Kumar Singh**, Chief Project Manager (Hydrogen Trainset), Northern Railways 7. **Mr. Anuj Malhotra,** General Manager, Srinagar Smart City Limited (SSCL) 8. **Mr. Indradip Mitra,** Senior Project Advisor, Indo German Energy Programme, GIZ 9. **Ms. Sarika Panda Bhatt**, Director Nagarro and Co-Founder, Raahgiri
13:00 –14:30 (Rxn Area)	**Lunch Break**	
14:30 – 15:30 (Ashoka Hall)	**Plenary Session 2** **India's Roadmap of Action towards Decarbonizing Transportation** **Moderator: Ms. Anumita Roychowdhury,** Executive Director, Centre for Science and Environment **Panelists:** 1. **Mr. K R Jyothilal IAS**, Additional Chief Secretary, Government of Kerala 2. **Mr. Sudhendu J Sinha**, Advisor (Infrastructure Connectivity – Transport and Electric Mobility), NITI Aayog 3. **Mr. Manish Gupta,** Executive Director – Electrical Energy Management, Railway Board (Ministry of Railways) 4. **Mr. Sharad Saxena,** Principal Transport Specialist, Asian Development Bank 5. **Mr. Madhav Pai**, CEO, World Resources Institute (WRI) India	
15:30 – 16:00 (Exhibition Ground)	Coffee Break	
16:00 – 17:00 (Zorawar Hall)	**Valedictory Session**	
16:00 – 16:05	**Welcome Address** by **Shri Vikas Kumar**, Managing Director, Delhi Metro Rail Corporation	
16:05 – 16:10	**Opening Remarks** by **Shri Manoj Joshi,** Secretary, Ministry of Housing and Urban Affairs, Government of India	
16:10 – 16:45	**Distribution of Awards** for "Excellence/Best Practice Projects in Urban Transport" by by **Shri Manoj Joshi,** Secretary, Ministry of Housing and Urban Affairs, Government of India	
16:45– 16:46	**Launch of UMI 2024** by **Shri Manoj Joshi,** Secretary, Ministry of Housing and Urban Affairs, Government of India	
16:46 – 16:50	**Vote of Thanks** by **Shri Jaideep**, OSD (UT) & Ex-Officio Joint Secretary, Ministry of Housing and Urban Affairs, Government of India	
17:00 onwards (Rxn Area)	High Tea	

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AI	-	Artificial Intelligence
ADB	-	Asian Development Bank
AFD	-	Agence Francaise de Developpement (Frence Development Agency
AFCS	-	Automatic Fare Collection System
AMIL	-	Artificial Intelligence Mae up language
BEE Rating	-	Bureau of Energy Efficiency Rating
BMRCL	-	Bengaluru Metro Rail Corporation Ltd
BMS	-	Battery Management System
BRTS	-	Bus Rapid Transit System
B2B	-	Business to Business
B2C	-	Business to Consumer
CCTV	-	Closed Circuit Television
CEO	-	Chief Executive Officer
CEMS	-	City Electric Mobility Strategy
CEPT	-	Centre for Environment Planning & Technology
CEEW	-	Council on Energy, Environment and Water
CNG	-	Compressed Natural Gas
COP	-	Conference of the Parties
CRUT Bhubaneshwar	-	Capital Region Urban Transport
DC	-	Direct Current
DDA	-	Delhi Development Authority
DMRC	-	Delhi Metro Rail Corporation
D2C	-	Direct to Consumer
ETM	-	Enterprise Technology Management
E.V.	-	Electric Vehicles
ECBC Compliant	-	Energy Conservation Building Code
FAR	-	Floor Area Ration
FAME Scheme	-	Faster Adoption and Manufacturing (Hybrid) and Electric Vehicle Scheme
GCC	-	Gross Cost Contract
GDP	-	Gross Domestic Product
GHG	-	Green House Gas

GIZ	-	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)
HMRTC	-	Haryana Mass Rapid Transport Corporation Limited
HOG Compliant	-	Head on Generation System in Indian Railway
HV	-	Heavy Vehicle
ICCT	-	International Council on Clean Transportation
ICE	-	Internal Combustion Engine
ICLEI	-	International Council for Local Environmental Initiatives
IISc		Indian Institute of Science
IIT	-	Indian Institutes of Technology
IPT	-	Intermediate Public Transport
ISBT	-	Inter State Bus Terminus
ITM	-	Interactive Teller Machine
ITDP	-	Institute for Transportation and Development Policy
ITMS	-	Intelligent Transport Management System
JLN Stadium	-	Jawaharlal Nehru Stadium
KfW	-	Kreditanstalt für Wiederaufbau (German Promotional Bank)
KMRCL	-	Kolkata Metro Rail Corporation Limited
KSRTC	-	Karnataka State Road Transport Corporation
LED	-	Light-emitting diode
LIFE Mission	-	Lifestyle for Environment
LRT	-	Light Rail Transit
LTE	-	Long Term Evaluation
L&T	-	Larsen & Toubro Company
MDR	-	Managed Detection and Response
MMR	-	Mumbai Metropolitan Region
MMRCL	-	Mumbai Metro Rail Corporation Ltd.
MMRDA	-	Mumbai Metropolitan Region Development Authority
MNRE	-	Ministry of New and Renewable Energy
MPMR CL	-	Madhya Pradesh Metro Rail Corporation Ltd.
MRT	-	Metro Rail Transit
NCMC	-	National Common Mobility Card
NEBP	-	National Electric Bus Programme
NCRTC	-	National Capital Region Transport Corporation

Niti Aayog	-	National Institution for Transforming India
NMT	-	Non-Motorised Transport
NPCI	-	National Payment Corporation of India
NUTP	-	National Urban Transport Policy
OCC	-	Operation Control Centre
OEM	-	Original Equipment Manufacturer
ONDC	-	Open Network for Digital Commerce
OSRTC	-	Orissa State Road Transport Corporation
O&M	-	Operation and Maintenance
PBS	-	Public Bicycle Sharing
PCS	-	Preventive Control System
PHPDT	-	Peak Hour Peak Direction Traffic
PPP	-	Public Private Partnership
PSD	-	Passenger Safety Device
PwC	-	PricewaterhouseCoopers
R & D	-	Research and Development
ROI	-	Return on Investment
ROW	-	Right of Way
RRTS	-	Regional Rapid Transit System
STUs	-	State Transport Undertaking
SPA	-	School of Planning and Architecture
SPV	-	Special Purpose Vehicle
TERI	-	The Energy and Resources Institute
TOD	-	Transit Oriented Development
TRIP	-	The Transportation Research & Injury Prevention Programme
UMTA	-	Unified Metropolitan Transport Authority
UPSRTC	-	Uttar Pradesh State Road Transport Corporation
USAID	-	United States Agency For International Development
VCF	-	Value Capture Financing
VGF	-	Viability Gap Funding
WHO	-	World Health Organization
WRI	-	World Resources Institute

UMI Team

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