Proceedings of the

12th Urban Mobility India Conference & Expo 2019

Accessible & Liveable Cities

15-17 November 2019 I Lucknow, Uttar Pradesh

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, 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 12th Urban Mobility India (UMI) Conference was held by the Ministry in collaboration with the Government of Uttar Pradesh from 15th to 17th November, 2019 at the Indira Gandhi Pratishtan, Lucknow. The theme of the conference was "Accessible and Liveable Cities". The conference and exhibition was inaugurated by Shri Yogi Adityanath, Hon'ble Chief Minister of Uttar Pradesh in the august presence of Shri Hardeep Singh Puri, Hon'ble Minister of State (I/C) for Housing and Urban Affairs, Government of India, Shri Girish Chandra Yadav, Hon'ble State Minister of Housing and Urban Planning of Uttar Pradesh, H.E. Mr. Walter J. Lidner, German Ambassador to India, other dignitaries, national and international speakers and delegates from India and abroad. Mr. Jose Luis Irigoyen, former Senior Director of Transport and ICT (Global Practices) in the World Bank delivered the keynote address. The Institute of Urban Transport (India) provided the technical and logistics support in organizing the conference along with the U.P. Metro Rail Corporation Ltd.

It was attended by more than 1,000 delegates, including foreign delegates from 10 countries and international organizations, students, urban transport experts, practitioners, resource persons, researchers, scholars and senior government officials from 30 States and Union Territories across India.

IUT coordinated the Research Symposium, which was organized on the 16th and 17th November, 2019 in which selected research work related to the theme of the conference was disseminated through 22 presentations. The Ministry engaged 5 professional knowledge and media partners to promote and bring value to the event.

An exhibition was also organized as part of the event in which 19 exhibitors, metro rail and manufacturing companies participated to showcase their best practices, latest technologies & state of the art products on urban transport.

An Awards Selection Committee was constituted by the Ministry to select best practice projects / excellence in urban transport submitted by the States / UTs / city level authorities in 6 categories, namely best Non-motorized Transport, City Bus Service, Urban Mass Transit, Intelligent Transport System, Road Safety and City with best Transport Initiatives. The Committee recommended 2 best projects and 14 commendable initiatives, which were accepted by the Ministry for conferring awards during the UMI 2019 conference.

After 3 days of deliberation, knowledge sharing and exchange of ideas through a conclave, 2 plenary sessions, 8 technical sessions and 11 round table discussions, the conference concluded on 17th of November, 2019. The valedictory session was addressed by Shri Durga Shanker Mishra, Secretary (HUA), Government of India, Shri Ashutosh Tandon, Hon'ble State Minister of Urban Development and Dr. Dinesh Sharma, Hon'ble Deputy Chief Minister of Uttar Pradesh in which the following announcements were made:

i) 12 categories of awards for best practices / excellence in urban transport to be considered on performance basis from next year onwards;

ii) study of urban transport in 100 cities; and

iii) next UMI 2020 conference to be held from 30th October to 1st November, 2020 in Delhi on the theme of 'Emerging Trends in Urban Mobility.'

The session concluded with the much-awaited awards being given for best practice projects / excellence in urban transport in six categories and an additional new category, best research papers and best exhibitors. The following events made the conference attractive and lively:

i) Poster making session by school children on the problems they face in mobility;

ii) transport quiz contest; and

iii) cultural program.

The Conference and Expo was well received 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 cum Expo (UMI), 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 their views and experiences on urban transport development issues, innovations and best practices at national and international levels. This year the 12th UMI-2019 conference was held during 15 – 17 November, 2019 at the Indira Gandhi Pratishthan, Lucknow with focus on the theme "**Accessible and Liveable Cities**". The conference was structured into one Conclave, 2 Plenary Sessions, 8 Technical Sessions, 11 Round Table Discussions and 6 Research Symposiums. As part of the conference, an exhibition was also organized where exhibitors disseminated and showcased the latest products and innovations which are shaping the future of public transportation systems. The conference was supplemented by an interesting program on transport quiz for delegates and students and on the spot poster making competition for school children. Theme based specific urban transport topics were deliberated on Public Transport for All, Walkability Policy, Public Transport System in Small and Medium Towns, Impact of Shared Mobility on Public Transport, New Concept of Metro Lite, Electric Mobility, Application of ITS and MIS in Public Bus System, Role of State Government in Improving City Bus Service, Empowerment of Women through Public Transport, National Public Transport Investment Program, Child Friendly Mobility, Accessible Mobility, Parking Management in Small and Medium Towns, Transport and Climate Change, Technology to leverage services for Improved Mobility, Training Needs Assessment for E-buses, Moving Ahead on National Common Mobility Card, Avenues for Increased Revenue and Cost Cutting Methods in Metro Rail Systems, etc. About 1,000 delegates registered in the conference from 30 States and Union Territories, including about 100 students. A total of 10 foreign countries and international organisations participated in the conference. The conference had participation of high-level officials from central and state governments, city and metro authorities, national and international experts from the field, academia and professionals who shared their experiences and best practices in the cities across the globe. All the sessions had presentations from eminent experts in the field and revolved around live case studies, both national and international. The sessions were lively and interactive. The outcome of this annual event is summarized below:

General Outcomes

- Conference lauded the newly introduced concept of Metro Lite by the Ministry of Housing and Urban Affairs. It should be adopted, particularly in Tier II and III cities, where the plan is to develop metro rail in the near future.

- It was the consensus view of the conference that metro rail travel should not be free of cost, as is being contemplated by some states.

- Conference was of the view that in this digital era when innovations and disruptive technologies are changing how we choose to travel, the need is to optimize the efficiency of transport system, mobility apps and shared mobility services.

- In mega cities, the focus should be on improving the access to opportunities like jobs within one hour by public transport and that the transport system needs to be integrated with whole trip principle from origin to destination.

- The emerging trends in shaping the future transport systems, like automated driving, connected system and networks, shared mobility (as a service) electric vehicles, etc., need to be promoted in a systematic and phased manner.

- Outdated and fragmented regulatory framework should be updated to accommodate innovations that could make urban transport more sustainable in the long run.

- Conference felt that the MoHUA should also look at ways and means of supporting the bus funding program apart from metro rail projects to promote the city bus service.

Specific Outcomes

Public Transport for All

- Authorities involved in rendering mobility services should be mandated and self-motivated in providing all citizens with equal opportunities.
- The need is to develop integrated transport systems instead of standalone modes. Efforts should be made to connect the metro rail of the core city with the surrounding cities in the immediate vicinity.
- Nagpur Metro model for non-fare box

revenue is a novel method and needs to be emulated in other metros. For example, 1 % cess is levied on stamp duty, empowerment of the Municipal Corporation, etc.

- Development of micro mobility is the key to make the public transport accessible for all.
- Metro stations are required to be integrated with other transport modes like walking, cycling, public transport, feeder services, IPT and other private transport.
- The motive of making public transport effective for all, needs extra intervention to shift the users from private modes to public transport in tier II and tier III cities.
- For tier II and tier III cities where cost / ridership of metro cannot be justified on EBL, BRTS should be planned with proper first and last mile connectivity and integrated well with the system.

Accessible Mobility

- Accessible mobility should be developed in such a way that it meets the needs of all sections of the society to move freely, including children, elderly, differently abled, women, etc.

- Approach for accessible mobility should be facilitated through urban planning interventions, reformulation of public transport policies, launching of mobility and education campaigns.
- Seamless journeys between modes of transport should be planned and provided to reduce transit travel, e.g. metro station platform adjacent to the railway station.

Increasing Revenue and Cost Cutting Methods in Metro Rail System.

- Floor Area Ratio (FAR) should be increased along transit corridor / around metro station to tap the potential of land development in TOD.

- As is the practice in Japan, land readjustment projects / land pooling schemes should be leveraged as a business model for rail and road development. Expansion of urban development along railways should be done through bus network.

- Kochi Metro example for improving the last mile connectivity through E-Auto, E-Bike, E-Van, single ticketing, co-branding of stations, property development, interconnected bridges and unit cell (like using metro pillars for telecom tower) could be emulated to increase the non-fare box revenue.
- Metro stations should have dedicated connectivity to commercial enterprises, nearby bus stands / railway stations, malls through elevated walkways.
- Project cost rationalization could be achieved through PPP model for construction, land acquisition using transfer of development rights as a mechanism, standardization of cost estimates for elevated / underground structures and equipment standardization.
- In order to rationalize the operational cost, emphasis should be on optimization of manpower operational cost, automation of ticketing system, flexible approach for keeping headways during peak and off-peak hours, using renewable source of energy, etc.

Walkability Policy

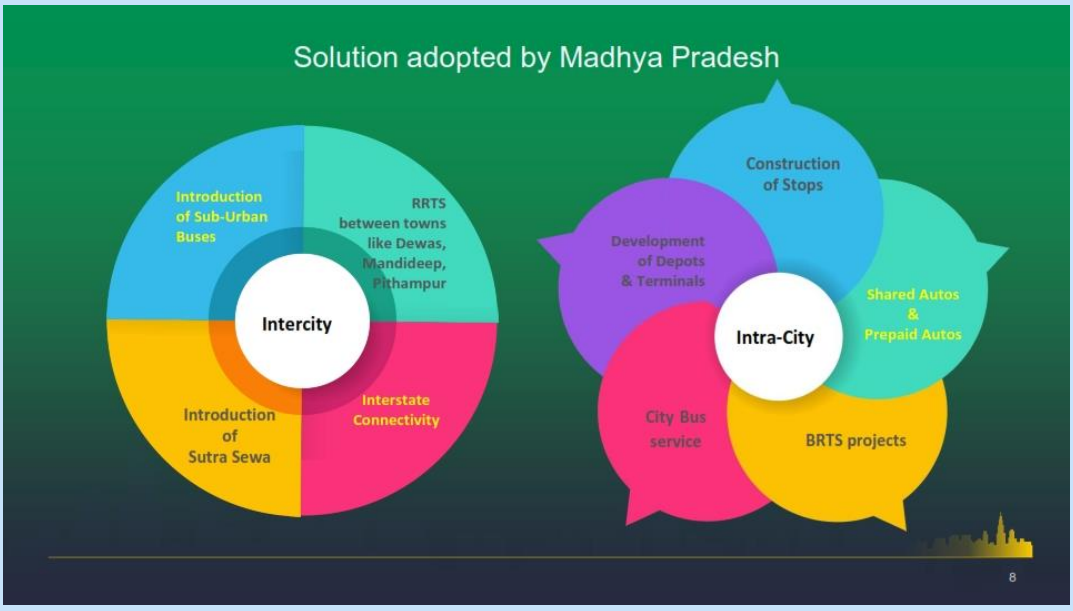
- Efforts should be made by local authorities to combine a walkable environment with public transport as it will help to discourage the use of cars, reduce vehicular pollution and traffic accidents in cities.
- With increasing number of motorized vehicles on urban roads, widening of roads alone cannot solve the problem. Steps are required to improve the urban design.
- Pedestrian walkways developed in busy Karol Bagh, a commercial area in Delhi, has emerged as a successful example, which could be emulated in other cities suiting to the local conditions.

- In such an exercise of pedestrianization, off street parking lots should be identified and on street parking may be made costlier. If possible, local market associations could be assigned the job of parking management. The concept of street for all may be followed.

- Successful pedestrian walkways could be achieved by making the street lively, as nobody wants to walk alone on the roads. It should be based on wider stakeholder consultation, well chalked out policy framework and wide media coverage.

Public Transport System in Small and Medium Towns

- In small and medium towns below one million population, there is a better scope to undertake systematic approach towards their planning at an early stage for development of sustainable form of land use and mobility system around which they may grow and thrive economically in future.
- With a shorter trip length of about 5 km, city bus system with bicycle sharing system ensuring last mile connectivity along with IPT would prove to be a better option of public transport system.
- The concept of multimodal integration, complete network, last mile connectivity, inclusive habitat, mixed land use, NMT network, traffic calming, informal sector integration needs to be followed for development of public transport system in small and medium sized towns.
- Sutra Sewa plan followed in Madhya Pradesh with combination of intercity profit and intracity non-profit services by formulation of cluster-based modal with emphasis on hub and spoke is a successful operational model to address the mobility challenges and needs of small and medium sized towns.



Improving City Bus Service

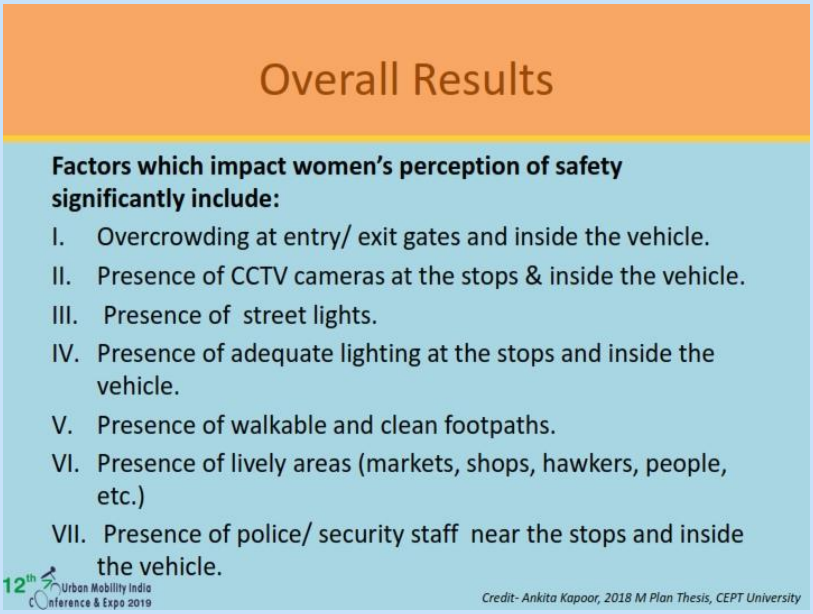
- Sustainable Development Goal No. 11.2 states that by 2030 access to safe, affordable, accessible and sustainable transport system for all shall be provided. It also calls for improving road safety notably by expanding public transport with

special attention to the needs of those in vulnerable situation, women, children, persons with disability and older persons.

- As has been done in Bhubaneswar, urban transport reach is to be expanded by systematizing the information with real time technologies and improving customer experience by creating bi-directional communication channel.
- For effective quality bus service, delivery chain should be reviewed by identifying the areas of weakness in service delivery.
- There is a need to develop sustainable urban transport index at the state level by taking performance of urban transport in cities, plans and policies to improve urban transport. Indicators may be taken from transport system, social, economic and environmental domain.
- Implementation of mobility strategies and plans should be on increasing accessibility, integration of services and fare, integrated transfer stations.
- Strengthen the capacity of different layers of government to implement planning, management and governance of city bus service.

Women Empowerment through Public Transport

- Key variables like affordability, availability and accessibility play a big part in decision making by women for travel. Now the fourth dimension of safety is added, which could affect womens' economic opportunities.



- In Germany, 15 percent women are employed in public transport system where majority of the commuters are women. Companies are reviewing their employment polices to give preference for employment of women. Such practices may be encouraged in Indian cities also.
- Safety in public transport is important for encouraging the women to travel by public transit for their employment destination. It is required at four levels, i.e. journey to stop, waiting at the stop,boarding and inside the vehicle.

- Gender sensitization should be conducted periodically with public transport employees. By making public transport safe, the chances are that more women would go to work.
- Behavioral planning and infrastructure issues are to be addressed to improve the safety in public transport.

Child Friendly Mobility

1. City planning should incorporate the required design elements for safety of children by institutional arrangements, education, enforcement, road design, policies and legislation, encouragement and advocacy and measures to improve the overall quality.
2. A network of connected child friendly streets and public spaces enable childrens' ability to move safely by foot or bycycle in the neighborhood without being accompanied by adults.

Electric Mobility

- Current bid for EVs is affected by state of economic development, availability of energy resources, technological capabilities and political will, which need to be addressed to promote electric mobility in the country and to achieve the set objectives by 2030.
- The time is ripe to make all out efforts to give boost to the e-vehicle as the running cost of e-vehicle is almost one-third the cost of petrol and diesel vehicles.
- For charging facility, collaborate with charging service provider. Install the charging points at the key terminals with several bus lines, parking areas, markets, commercial streets, etc.
- For a large-scale shift to e-scooter / e-bike policy options comprising phasing out of petrol two wheelers, incentives for e-bike, road infrastructure, support fleets,

behavioral change and ban on traditional vehicles are required.

- A comprehensive long-term e-mobility policy at city / state level should be framed in consultation with stakeholders for promotion of e-vehicle in a phased manner. It should be integrated with town planning provisions.
- A cell at city level is required to coordinate with different entities to solve problems of e-vehicles. It may have single window clearance for e-vehicle registration. If possible, relaxation in the procedure may be provided.
- Training and short-term courses / programs for imparting the latest skill in various components of electric vehicle technology and logistics are essential to promote the electric vehicle system.

Reducing Air Pollution in Urban Transport

- Parameters like population of a city, per person trip generation, volume of daily travel trip, average trip length by various modes of transport, share of different modes in all motorized trips, level of vehicle technology and fuel quality, etc. determine the particulate emission load from urban commuting, which have to be considered while mitigating the air pollution in urban transport.
- Key intervention areas for having low Carbon Mobility Plans in the cities should give emphasis on integrated land uses, public transport, compact development, intermediate transport, parking, new mobility trends like shared, connected and electric mobility.
- Car centric road design which locks in enormous pollution should be avoided. Link funding strategies with reforms in public transport sector.

Technology for Improving Mobility Services

- Instead of managing transport system in silos, the need is to have connected mobility corridor through a holistic approach focusing on moving the people.
- Digital revolution by deploying V2X (vehicle to everything) technology will improve safety, efficiency, reliability and resilience of transport network.
- Autonomous vehicles, connected corridors, electrification and shared mobility are to drive a change in the urban mobility.
- SARAL (Safe, Accessible, Reliable, Advance and Low Carbon) type plan as prepared by Surat City will provide leverages in transportation.
- Big data opportunities through ticketing system, GPS in taxis and private buses, radars, traffic light controller, cameras and CCTV could be used by the public transport agencies for finding solutions.

Impact of Shared Mobility on Public Transport

- Shared mobility like OLA, UBER have reduced some load on public transport, which are some of the notable examples of App based shared mobility.
- In cities like Delhi, 44% of the shared mobility users opt for it because of door to door connectivity followed by 33% use for convenience of booking.
- There is a significant shift from personal vehicle to shared service and much lesser impact on P.T. services. It is also serving the purpose of last mile connectivity.
- Users of shared bike have shifted more from the public transport than private transport.
- There is a need for specific legal framework and policy guidelines for regulating shared mobility in India at city level. The Motor Vehicle Act should be amended to include shared mobility policies. Capping of number of vehicles city-wise is required.

Metro Lite and Metro Neo

- It was the general view that Metro Lite should act as a feeder system to high capacity metro rail.

- Metro Neo, with exclusive right of way, is a good option for public transport in smaller cities.
- Metro Neo has many advantages in terms of easy availability of sub-system worldwide, its adaptability to the city, workable solution, lesser cost and world wide availability of equipment required for the new system.
- Metro Lite is the best mobility solution for Indian Tier – II cities being cost effective for PPP.

City Bus Service

- There is a need to provide central support for augmentation of city bus service and increase uptake of buses from manufacturers to meet this requirement.

- Delegates welcomed the city bus service scheme introduced by the MoHUA, Govt. of India, which will support the deployment of new buses for the city transit system.
- It was felt that funding pattern of the proposed city bus service scheme needs to be considered carefully, including capex or apex or combination of both, before zeroing on bus specification, i.e. type / mode / propulsion.

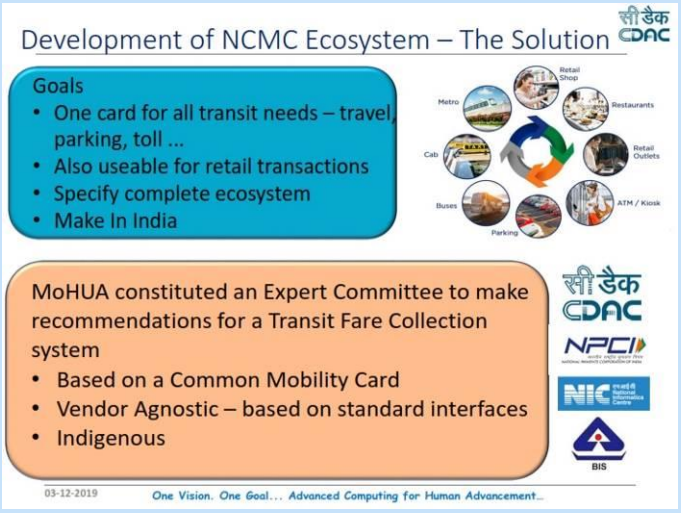
- Multilevel depots could be considered as one option to address the land issue.
- With the changing requirements and rapid advancement of technology, the traditional GCC and NCC models would need to be re-looked and more of a disruptive model like PPP model may be considered on the pattern of Assam State Transport Corporation.
- Powers and functions of the state authority or regional transport authority need to be clearly demarcated in terms of operation of service, fare fixation, bus routes, common bus infrastructure, collaboration with other agencies, etc.

Parking Management for Small and Medium Towns

- Parking management and development of parking norms should emphasize on controlling the increasing parking demand and encouraging people to shift from private mode to public transport so as to make the urban areas more livable.
- Parking charges should be progressive. It should be higher in city zones where demand and occupancy are high, such as commercial areas. Charges should be moderate in medium demand and occupancy areas, such as passive commercial zone and it should be lower in low demand and occupancy areas.
- Legalize the enforcement of parking in parking areas to make enforcement more effective.

National Common Mobility Card

- One Nation One Card based on National Common Mobility Card launched by the MoHUA in 2019 to enable people to pay multiple kind of transport charges, including metro services and toll tax across the country was welcomed by the delegates.



- Distribution of cards and the economics and logistics related to it need to be addressed between operators and banks through committed discussions.
- Interest of the commuters, operators and acquirers should be addressed by the MoHUA for the pilot project to be truly implemented on a commercial scale.

A. Inauguration of the Exhibition

The Exhibition is a special feature of the UMI conference to disseminate and showcase the latest developments in urban transport technologies, systems, best transport projects and propagation of innovative ideas. The exhibition was jointly inaugurated by Shri Yogi Adityanath, Hon'ble Chief Minister of Uttar Pradesh and Shri Hardeep Singh Puri, Hon'ble Minister of State (I/C) for Housing and Urban Affairs, Government of India. The latest technologies, particularly the metro rail projects in operation in Lucknow, Delhi, Nagpur, etc., YULU e-bike, non-motorized transport and intelligent transport system for traffic management were of special interest to the delegates and visitors. There were a total of 19 exhibitors.

B. Inaugural Session

Hon'ble Chief Minister of Uttar Pradesh, Union Minister of State(I/C) for Housing and Urban Affairs, State Ministers, His Excellency, the German Ambassasdor to India, senior policy makers from central and state governments, national and international delegates graced the inaugural session. The august gathering was enlightened on the theme of "Accessible and Liveable Cities" and the importance of the annual international mega event on Urban Mobility India Conference cum Expo. An outcome of the inaugural session is discussed in the following section.

- Welcome address by Shri Rajendra Kumar Tiwari, Chief Secretary, Government of Uttar Pradesh.

- Opening address by Shri Hardeep Singh Puri, Hon'ble Minister of State (I/C), Ministry of Housing and Urban Affairs.

- Keynote address by Mr. Jose Luis Irigoyen, Former Senior Director, Transport and ICT (Global Practices), The World Bank.

- Inaugural Address by Shri Yogi Adityanath, Hon'ble Chief Minister of Uttar Pradesh

- Presence of :

  Shri Girish Chandra Yadav, Hon'ble State Minister of Housing and Urban Planning of Uttar Pradesh

  His Excellency, Mr. Walter J. Lindner, German Ambassador to India

  Shri Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs, Government of India

  Shri Manoj Kumar, Principal Secretary (Urban Development), Government of Uttar Pradesh

- Launch of short film on “Journey of Urban Transport in India”
- Release of “Standard Specifications of Light Urban Rail Transit System- Metro Lite”
- Vote of Thanks by Shri K. Sanjay Murthy, Additional Secretary, Ministry of Housing and Urban Affairs, Government of India

Welcome Address by Chief Secretary, GoUP

The inaugural session commenced with welcome address by Shri Rajendra Kumar Tiwari, Chief Secretary, Government of Uttar Pradesh. While welcoming the dignitaries, delegates and participants, he gave a brief background of the Conference and Expo being organised by the Ministry of Housing and Urban Affairs in collaboration with the Government of Uttar Pradesh. He highlighted the significant progress made in Uttar Pradesh in the urban transport sector, enumerating the construction of 3 express roads, improving connectivity, implementation and operation of metro rail service in 3 cities of the state namely Lucknow, Ghaziabad, Noida and Greater Noida. Under the Fame India Scheme, 600 electric buses were plying in 11 cities. In addition, 1,525 CNG buses were plying in 15 cities. An Urban Metropolitan Transport Authority is being set up in the state. Uttar Pradesh has committed to provide “State Sugam Mobility”.

Opening Address by Hon’ble Minister of State (I/C), MoHUA

In his opening address, Shri Hardeep Singh Puri, Hon’ble Minister of State (I/C) Ministry of Housing and Urban Affairs said that organising the 12th UMI-2019 Conference in this historic city of Lucknow was of special significance. The State has made significant economic progress and setting the trends in development. Lucknow Metro Rail has been completed and made operational in a record time of two and a half years. The first phase was opened on 3rd Sept, 2017. The construction of Kanpur Metro Rail, being inaugurated today immediately after this program, is expected to be made operational in a record time. At the national level, a network of 680 km. of metro rail is already operational in 18 cities and another 900 km. is in the pipeline. First phase of metro rail development was highly successful and now the Ministry of

Housing and Urban Affairs has introduced the concept of Metro Lite and Metro on tyres (Metro Neo) for smaller cities to make the traveling comfortable. The emphasis is on ease of living in the cities and Uttar Pradesh is making progress in leaps and bounds in this area. He stated that all the efforts at central and state level are for making the urban mobility world class. Since 2002, Delhi has developed a metro rail network of 380 km to improve the situation, without which it would have been impossible to manage the transportation in the city. World class safety and economic vaibility in metor rail are being given equal importance. Fare is fixed in a rational manner by a professional body. In fact, metro rail should not be free, as is being contemplated by some states. He appreciated the paradigm shift in the governance of Uttar Pradesh under the leadership of the Hon'ble Chief Minister. Before it was customary to inaugurate the project before proper planning and now there is a sea change in implementing the development projects, including metro rail not only in record time, but with proper planning and vision.

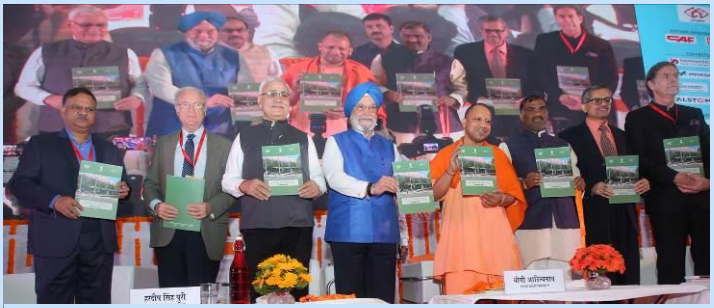
Address by Key Note Speaker

In his keynote address, Mr. Jose Luis Irigoyen, Former Senior Director, Transport and ICT (Global Practices), the World Bank, elaborated on the vision for sustainable mobility by 2030 in the context of accessible and liveable cities. He said that the cities are at the core of the development agenda world wide. Rapid and radical changes are transforming urban transport landscape, impacting how accessible and liveable the cities would become. He narrated that the cities are not only the drivers of economic growth and climate change, but are also home to the poor. Delhi will be one of the 13 most populous cites in the world by 2030. In this era, digital innovation and disruptive technologies are changing how we choose to travel. Technology allows to optimise efficiency of transport system and engage intelligently with users, particularly intelligent transport system, mobility apps and shared mobility services. Growing population in cities could be accomodated by increasing density and TOD planning. The need arises to manage the demand rather than continuously enhancing the supply of road space. In large mega cities, the focus should be on improving the access to opportunities like jobs within one hour by public transit. Transport systems need to be integrated with whole trip principles from origin to destination. The emerging trends in the future transportation are automated driving, connected systems and networks, shared use (mobility as a service) electric vehicles, etc. New mobility concepts are

bringing a transformation in the way government service providers and citizens interact among themselves. In this emerging scenario, greater coherence and integration of policies and institutions are required within and across the sectors. The need is to update outdated and fragmented regulatory framework to accommodate innovations that could make urban transport more sustainable in the long run. A national policy framework should give directions to do downstream planning functions, support long term solutions and develop local capacity at scale.

Hon'ble Chief Minister of Uttar Pradesh delivering the Inaugural Address

In his inaugural address, Shri Yogi Adityanath, Hon'ble Chief Minister of Uttar Pradesh expressed his happiness to be part of this conference. He thanked the Ministry of Housing and Urban Affairs for holding the 12th UMI Conference and Expo in Lucknow on the important theme "Accessible and Liveable Cities". He said that with 23% urban population, Uttar Pradesh is having low level of urbanisation, as compared to the national level index. It, however, has as many as 652 towns with some form of urban local body. Under the Smart City Mission, 10 cities have been selected. Four cities namely Lucknow, Ghaziabad, Noida and Greater Noida are having metro connectivity. In this background, the state is moving forward on the path of sustainable development. Highlighting some of the important developments in the state, he mentioned that Lucknow Metro Rail was made operational in a record time of two and a half years. Kanpur Metro Rail being inaugurated today itself, would also be completed in a record time followed by the Agra Metro. In six other cities, namely Agra, Meerut, Prayagraj, Varanasi, Gorakhpur and Jhansi, DPRs were ready and once cleared by the Central Government, Metro Lite would be constructed. In addition, emphasis was on CNG and electric buses in large cities to tackle the problem of pollution and making the cities better liveable. He hoped that the outcome of the conference would be useful in improving the urban mobility in the cities of Uttar Pradesh. Earlier, he inaugurated the Exhibition organised as part of the conference. In this



Dignitaries releasing the guidelines of MoHUA on Standard Specifications of Metro Lite

session he also launched the film on “Journey of Urban Transport in India” and released guidelines of the Ministry of Housing and Urban Affairs on Standard Specifications of Light Urban Rail Transit System- Metro Lite.

Vote of thanks by Additioanl Secretary, MoHUA

The session concluded with a vote of thanks by Shri K. Sanjay Murthy, Additional Secretary, Ministry of Housing and Urban Affairs. He thanked the Hon’ble Chief Minister of Uttar Pradesh, Hon’ble Minister of State (I/C) for Housing and Urban Affairs, Hon’ble State Minister of Housing and Urban Planning of Uttar pradesh, H.E. the Ambassador of Germany, Secretary, Ministry of Housing and Urban Affairs, Govt. of India, Chief Secretary, Principal Secretary (Urban Development), Govt. of Uttar Pradesh. Keynote Speaker, all other dignitaries, delegates and participants, as well as the teams of the Ministry, U.P. Metro Rail Corporation Ltd. and IUT.

C. Conclave

The opening session of the conference was a conclave on "Public Transport for All" in which senior policy makers, eminent experts from India and abroad deliberated. Mobility is a right for all. It is, thus, mandated that all authorites involved in rendering the mobility services should be committed to self in providing all citizens with equal opportunities. Lack of it is equivalent to denying the vulnerable population, i.e. the poor, the elderly, and the disabled – of their basic needs and aspirations. Public transport is crucial to the liveablity index of any city. It could transport many more people in much less space and time than individual automobiles. It helps to keep traffic congestion lower, which in turn reduces air pollution and helps the riders to avoid the stress that comes from daily driving in highly congested areas.

An inclusive system of mobility could create greater opportunities for advancement to commuters, while promoting the overall economic health of the communities. This would entail both the public and private sectors to play a leadersip role when it comes to the challenges of mobility, social inclusion and sustainability. The session dwelt on a holistic system, duly complemented with an affordable and accessible essence to fulfil the mobility needs of one and all.

Panelists on the dias

Moderator and Presenter : Dr. O.P. Agarwal, Chief Executive Officer (CEO), World Resources Institute (WRI)

Panelist:

- Shri Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs, Government of India
- Shri Keshav Varma, Advisor, Government of Uttar Pradesh
- Shri Prasanna Patwardhan, Managing Director, Prasanna Purple
- Dr. Axel Friedrich, Former Head of Transport and Noise Division, German Environment Agency
- Shri Brijesh Dixit, Managing Director, Maha Metro Rail Corporation Ltd.
- Shri R.K. Misra, Cofounder and President, Yulu Bikes

Rapporteurs: Shri Vivek Varma
Shri Pradeep Kumar Verma
Shri Chetan Tyagi
Shri Vishal Chaudhary

Highlights of Discussion

- Every citizen in one way or the other pays for the construction of public transport whether it is rail based or road based and as such it should serve all.
- The prevalent transport planning approach in some cities is retrofit type. First and last mile connectivity is missing in tier II cities like Lucknow, Kochi and Nagpur.
- Mobility is the backbone of the economy. City will not grow without mobility. It is noted that metro in some cities is being planned as per land availability despite the need for connectivity of commuters.
- Now emphasis is being shifted to constant cost-effective public transport systems like Metro Neo. It is without signaling system and its construction cost is one fourth of the current metro rails system. It is also energy efficient.
- Initially, public transport was designed for poorer people, but now there is a shift in approach and design aspects take into consideration richer people also.

Speaker interacting with audience

- The need is to develop integrated transport system instead of standalone mode. Efforts should be made to connect the core metro cities with the surrounding cities in the immediate vicinity.
- Public transport definition needs to be broad-based to include App based systems.
- Nagpur Metro model for non-fare box revenue is a novel and needs to be emulated, e.g. 1 percent cess on stamp duty, empowerment of the Municipal Corporation, etc.
- Public transport for all has to be accessible, affordable and quality service. It cannot be free, otherwise operation cost would increase and be made a mode of choice for all.
- In major Asian cities, during 1980 – 2015, human population increased by 2 times, GDP by 5 times, transport demand increased by 8 times and registered vehicles recorded a significant growth of 40 times, i.e. 5.4 million in 1981 to 210 million in 2015, which clearly shows the increasing importance of developing public transport.

- With substantial increase of vehicle population, Mumbai tops the list of 403 worst traffic congested cities, while Delhi is at fourth place, which calls for strengthening of public transport.
- Public transit supply in major Indian cities is at par with global cities. However, accessibility to the system and availability of integrated and shared mobility is not up to the mark.

Outcome

- Seamless first and last mile connectivity should be promoted along with construction of metro rail to improve ridership and accessibility. It reduces congestion and saves travel time.
- Metro stations are required to be integrated with other transport modes like walking, bicycling, public transport, feeder services, IPT and other private transport.
- Access friendly multi model drop off planning should have ideal access as per type of mode. In respect of NMT, access length should be less than 50 m, for P.T. stop less than 100 m, for autorickshaw less than 150 m. and in case of personalized parking it should be less than 250 m.

Participants in the Conclave

- One card and one app, as followed in Nagpur, would help the user to find out the nearest scooter through mobile App, get access to vehicle through Bluetooth and OTP based, drop off point becomes the pickup point for the next user. Such practice needs to be widely disseminated.
- Metro rail companies should sign MoU with operators for different feeder services as has been done by Nagpur Metro.
- Multimodal design should preferably have the following features, namely 100 percent segregated and accessible NMT facilities, pick up and drop off bays, integrated approach to planning, due consideration towards needs of differently abled, planned cycle parking, junction improvement, etc.

- To make the motive of public transport for all effective, extra intervention is needed to shift users from private modes to public transport in tier II and tier III cities.

Panelist sharing his view

- Provide dedicated and accessible parking space for shared mobility vehicles at all metro stations, including retrofitting at the existing metro stations.
- Provide VGF support in tier II cities to make shared mobility available and viable.
- For tier II and tier III cities, where cost / ridership of metro cannot be justified, EBL / BRTS should be planned with proper first and last mile connectivity and integrating well with the system.
- Provide an electric bike as an accessible and affordable micro mobility solution in Indian cities.

D. Plenary Sessions

The UMI – 2019 hosted two plenary sessions to initiate and provide a platform for discussions on "Accessible Mobility" a core issue of sustainable urban transport and avenues for "Increased Revenue and Cost Cutting Methods in Metro Rail System" a theme of topical area of interest in the context of rapid growth of metro rail system across the major cities in the country. These plenary sessions concentrated on the important issues of accessibility and metro rail development. Moderators and presenters in these sessions, while having interactive discussions, apprised the delegates and participants about improving the accessibility and how to reduce the increasing cost of metro rail system.

Plenary Session 1:- Accessible Mobility

An integrated transport strategy encompassing accessible public transport, public transport infrastructure and a barrier free pedestrian environment are fundamentally important to provide a universally accessible mobility solution. Accessible Mobility is to meet the needs of all sections of the society to move freely, including children, elderly, differently abled persons, women, etc. In most Indian cities, mobility is hindered by lack of safe infrastructure, road amenities, improper public transport and absence of seamless connectivity. In order to enhance the mobility, there is a need to improve the accessibility and usability of public transport, non-motorised transport with seamless connectivity and supporting infrastructure. In fact, sustainability and inclusiveness are the important aspects to be factored into while planning for urban mobility. UN Sustainable Development Goals (SDG) target 11.2 focusing on urban access also envisages to achieve universal access objective by 2030. It acknowledges that transport should leave no-one behind by that time. It provides for access to safe, affordable, accessible and sustainable transport system for all.

Approach for accessible mobility could be facilitated through urban planning interventions, reformulation of public transport policies, taking up of required mobility and education programs and by launching of campaigns. Although the existing agencies may not have explicitly involved in policy making for inclusive mobility, they have a vital enabling role to play in terms of encouraging walking, cycling, use of public transport, increasing pedestrian areas, launching road safety programs, implementing road calming measures, education and training programs. The approach in this regard has to be holistic, multilevel, including local-regional-national levels, inclusive and integrated.

The session highlighted the best practices across the cities in the world focusing on mobility for all, discussed new initiatives promoting inclusivity in national, state and city level planning so as to move towards an accessible mobility and equitable city.

Panelists on the dias

Chairperson Dr. O. P. Agarwal, CEO, WRI

Moderator -

Shri Jaideep, OSD (UT) & Ex. Officio Joint Secretary, MoHUA

Panelists -

- Prof. Shivanand Swamy, Executive Director, CEPT, Ahmedabad
- Shri Janardan Prasad, Director, MRTS-II, MoHUA
- Shri Pankaj Kumar Bansal, Managing Director, Chennai Metro
- Mr. Matsumura Shigehisa, Nikken Sekkei Research Institute, Tokyo

Rapporteurs - Shri Ankit Kant and Shri Vishal Chaudhary

Highlights of Discussion

- While discussing metropolitan structure and concept of transit-oriented development in Japan it was highlighted that the expansion of cities in Japan is along railway lines, around underground / elevated metro stations.
- Urban development is mainly environment friendly and energy saving matters involving all the stake holders particularly in case of TOD.
- Presenters emphasized that seamless journey between different modes of transport should be planned and provided to reduce transit travel e.g. metro station platforms adjacent to the railway station.
- Panelists reiterated that integration of public transport is of utmost importance to improve the accessibility.

- Local areas need to be planned along metro / rail lines to have user friendly mobility.
- State governments have to take a lead in systematic planning of urban mobility, multi-model transport system and integration of all modes with metro in the major cities.
- Historical evolution of station area development in Japan has passed through various stages from symbolic station building during 1870-1900 to an integrated station area development during 1970s.

Audience at the session

Outcome

- In order to improve the accessibility to metro rail, metro station platform should preferably be provided adjacent to railway station platform wherever possible.
- Accessible mobility has to be safe, clean and energy saving.

Plenary Session 2:- Avenues for Increased Revenue and Cost Cutting Methods in Metro Rail Systems

Metro rail systems are operational in various cities across the country. However, to provide adequate transit facilities and to operate and maintain the system, large scale investment is required. Revenue strategy for metro rail network generally includes fare box revenue and non-fare / secondary revenues. In fare box revenue, the emphasis is on maximizing the revenue balancing with affordability for all passengers, the non-fare / secondary revenues focus on optimizing the existing assets or create new assets for generating new streams of revenue.

Non-fare box revenue sources, including land based tool comprising increased joint development, TDR and air right development, impact fee, etc. are being explored by various cities. Tools such as integrated ticketing, higher parking charges, auctioning of vehicle ownership rights in TOD are also being tapped. Other revenue sources being tapped optimally are advertisement, metro ambulance, station naming, joy rides, sale of solar energy. All such provisions are available in the National Urban Transport Policy, Metro Rail Policy, National TOD Policy and Value Capture Finance Policy issued by the Ministry of Housing and Urban Affairs.

Parallelly, there is also a need to reduce the operation and maintenance cost by resorting to introduction of driverless car / rail, automation, analyzing the movement of people across models throughout the city, sharing of ticket data to third parties for advertisement and sale of products, new tax and infrastructure reforms, restructuring transport funding, rationalization of construction and outsourcing activities, reducing the length of metro stations and size of viaduct, improvement in AFC machines, more use of solar energy, using standardized and indigenized metro technology, reducing costs of civil, electrical and track system, encouraging PPP component, smart maintenance, reducing time and cost overruns.

The session discussed the current practices of additional revenue generation and cost cutting methods by various metro rail corporations in India and abroad and also suggested how to popularize such models in future.

Chairperson - Shri Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs

Moderator - Shri Kumar Keshav, Managing Director, UP Metro Rail Corporation Ltd.

Panelists -

- Shri Mangu Singh, Managing Director, Delhi Metro Rail Corporation Ltd.
- Shri Brijesh Dixit, Managing Director, Maha Metro Rail Corporation Ltd.
- Shri Alkesh Kumar Sharma, Managing Director, Kochi Metro Rail Ltd.
- Shri P.K. Bansal, Managing Director, Chennai Metro Rail Ltd.
- Shri Ajay Seth, Managing Director, Bangalore Metro Rail Corporation Ltd.
- Mr. Matsumura Shigehisa, Nikken Sekkei Research Institute, Tokyo

Rapporteur - Shri Hemant Kumar & Shri Pradeep Verma

Highlights of Discussion

- Panel was of the view that transport taxation may be introduced. Public transport and NMT mode need to be strengthened.

- Electric energy consumption should be used economically and use of solar energy be promoted.
- Floor Area Ratio needs to be increased along transit corridor / around metro station to tap the potential of land development in TOD.
- In a typical example of Himachal Pradesh Road Transport Corporation, feasibility of development of centralized bus software for state transport corporation is being examined to increase the demand for bus service.
- In Japan, land readjustment projects are used as business development models for railroad development. Expansion of urban development along railways is done through bus network.
- By attracting famous universities, as well as large scale facilities, various types of mechanism are developed to facilitate the flow of people to the suburbs, which help in improving the railway operation efficiency and encourage the use of railways in the reverse direction.
- Private sector use TOD and land value capture approach in the following manner. Large scale supply of land early in the development stage followed by improvement in the brand value of the city. It results in additional increase in the number of railway passengers.

Participant posing question

- Expansion of area along railway line with feeder bus network makes the residential area highly convenient for walking to the station. Business model for suburban development revolve around integration of urban development and railway construction.
- Kochi Metro has emphasized on last mile connectivity in the form of E-Auto, E-Bike, E-Van, Single ticketing; co-branding of stations property development with unique mixture of food, entertainment and shopping; advertisement inside / outside station, trains, pillars and median; inter connected bridges and unit cell (telecom towers on metro pillars) to increase the non-fare box revenue.
- Other avenues being tapped include advertisement approach to change from static to dynamic segmentation of the retail area as per the customer preferences in the

catchment area and as per the geography of the metro station, delivery / pick up points for on-line e-commerce companies and food companies, client exclusive promos and events on the metro train.

- It also promotes dedicated connectivity to commercial enterprises, bus stands, railway stations, malls through elevated walkway. It encourages schools to use metro as the main mode of transport, pick up and drop to nearest metro stations and follows pricing strategy for non- peak hours. It has taken up extensive promotion of Kochi one card and started group booking for schools / colleges and tourists.
- Motto of Kochi metro is not just about running trains, but also create markets that will fill those trains for which it found TOD as the solution.
- Maha metro is boosting ridership on vacation and holidays by developing 1 km. long Ambagari lake viewing gallery just below the viaduct, which will motivate the people to travel via metro on weekends, admire the captivating view and promote eco-tourism.
- Development of 400 m. long heritage walk connecting places of historical importance where people from all over the city can come via metro and enjoy themselves.
- Maha metro is constructing a 20 storey metro station with platform on 5th level at zero mile as part of non-fare box revenue initiative.

Participants during the session

Outcome

- Revenue generation operations through potential of land development rights and PPP for area development in the metro influence area should optimally be utilized.
- For project cost rationalization the following approach may be followed.
    - PPP for construction of station in consideration of co-branding. This will reduce the project investment relating to stations.
    - Land acquisition using transfer of development rights with alternative low value land and higher FAR as incentive.
    - Standardization of cost estimates across metros for elevated structures / underground structures to facilitate ease of comparison and standardization.

- Equipment standardization across Metro organizations to attain economies of scale – pooled procurement by Metros.

- Applying novel design and innovation construction methodologies of strategies to save cost and time and improve quantity and functionalities mainly in civil infrastructure department, rationalizing signaling requirement, rolling stock, traction, etc. as is being done by MAHA Metro.
- In respect of operation cost rationalization, emphasis should be on the following aspects.
    - Optimization of manpower operational cost through judicious implementation of task-based outsourcing of activities.
    - Automation of ticketing to reduce customer facilitation and ticketing manpower.
    - Flexible headway between trains during peak and off-peak hours to reduce the operating cost especially energy cost.
    - Energy cost savings through renewable power sources on RESCO model.
    - Cooperation with other organizations to consolidate the energy requirements and create better bargaining position to further reduce the PPA costs.
    - Creation of funding sources of MoHUA for raising funds at optimal costs.
- Energy cost saving through LED lighting, outsourcing of O&M.

E. Technical Sessions

In all, 8 technical sessions covering a wide array of transport aspects and related issues were part of the conference structure. The sessions provided a platform to the experts, professionals and policy makers to share their experiences, best practices, issues and trends in urban transport with the distinguished participants and delegates. All the technical sessions were interactive and lively.

Technical Sessions 1:- Walk the Talk on Walkability Policy

Cities across the global level are increasingly recognizing the importance of walkable environments because of their positive social, health and environmental implications. Consequently, various governments across the globe are attempting to make their cities and neighbourhood more pedestrian friendly. In India, even today, walk continues to be a predominant mode of travel for the urban poor and those relying on public transport. Combining a walkable environment with public transport can help discourage the use of cars, reduce vehicular pollution and the number of traffic accidents in our cities.

Panelist interacting with audience

Identifying the positive impacts of walkability, many cities in the country are taking initiatives to create a conducive environment for pedestrians. A step in this direction has been the formulation of Walkability Policy or NMT Policy by various cities. The session discussed these policies and action taken by cities to implement the policies.

Chairperson -	**Shri Tarun Kapoor, Vice Chairman, Delhi Development Authority**
Co-Chair -	**Shri Keshav Varma, Advisor, Government of Uttar Pradesh**
Speakers -	
- Ms. Mariana Alegre, General Coordinator, Lima Cómo Vamos Citizen Observatory, Perú - Dr. Geetam Tiwari, Professor, IIT Delhi - Ms. Varsha Joshi, Commissioner, North Delhi Municipal Corporation - Shri Mukesh Meshram, Divisional Commissioner, Lucknow	

Rapporteur -	Shri Hemant Kumar

Highlights of Discussion

- Trends show that of late walking has become a pleasurable mode. In Delhi, within a distance of 4 Km. about 50% people go by walking to metro station. To promote the walking in Delhi, 14 places have been identified for improving the walking infrastructure. In this project, P.W.D., Urban Local Bodies, Police, DDA are the main stakeholders.
- Six bio-diversity parks are being developed to promote green environment for walking.
- International experience shows that in Peru, 60 percent trips are less than 4 km where walking mode is popular. Of late, urban disobedience has been noted in Lima, Peru and efforts are being made to save the cities from such attitude.
- In Lima, Peru, roads are developed for the children to reach their school safely. Squares in commercial areas are integrated for walking safely. Few rainbow projects taken up in this respect show how the pedestrian walkway are being developed.

Speaker sharing his view

- Through all such examples in various cities of Peru, quality of urban life is being improved by reducing inequality, by activation and development of small-scale urban interventions in public spaces using tactical urban planning techniques and promoting citizen centric urbanism.
- Lima encourages the practice of walking around the crosswalk. In some areas even though pedestrian bridge exists, people who do not want to cross it, need to walk around 20 meters and use the cross walk, but not cross bypassing cars.
- Laws, which are not useful and do more harm than good, need not be respected and are changed in Peru. This is called urban disobedience in Peru.
- In India also, 60 – 70 % are walking trips. The problem is from creative users to choose users because there is lack of standards in the construction of walking infrastructure.
- There is more than 370 km network of metro rail in Delhi, but not a single Km connecting the Metro is easily accessible.

- With increasing number of motorized vehicles on urban roads, widening of roads are not going to solve the problem. Steps are required to improve the urban design.
- Addressing the issue in Karol Bagh commercial area of Delhi, pedestrian walkways have been created by the North Delhi Municipal Corporation, which have emerged as a successful model. It has also taken care of the parking management by following the concept of reverse engineering.
- Surveys done for making plans for road crossings, pedestrian movement and identification of surrounding areas for car parking to make the pedestrianisation attempt successful.
- Situation of urban roads and activities on the roads in Lima and Delhi are almost similar as there is no space where one could walk safely and conveniently.
- In Karol Bagh commercial area, pedestrianisation and parking management project has been implemented as part of the plan for decongesting Delhi. Pedestrianisation plan includes one-way circulation and off-street parking.
- In the implementation exercise, one-way trial run was conducted successfully. Off street parking lots identified, on street parking fee doubled, perpendicular to parallel orientation of parking were made. Market federation was assigned the job of parking management.
- Tactile urbanism method was employed for implementation of the project, which included road markings (C/L, MUZ, NMV), junction geometry markings, no stopping zones, night sweeping, potted trees installed for effect and shade, street furniture at strategic locations.
- Stages involved in project formulation and implementation included surveys and planning, approvals and pilots, stakeholder consultation, policy reforms, tactile implementation, full implementation and longevity.
- Topographic survey, traffic survey, parking survey and junction studies were carried out for the project planning.
- Survey findings are very interesting. For example, on Ajmal Khan road, for every 250 people in cars, there are 4,000 people who walk. Four percent of car users occupied 34 percent space. One-way circulation system used the existing grid network in the area to its advantage to relieve congestion.
- Metro station in the area is a major driver for pedestrians. The project focused on the concept of streets for all. Off street parking is provided within 4 – 5 minutes of walking distance. Market federations turned out to be champions of the project.
- Vendors are recognized as an important part of the experience of the market, who need to be accommodated in a nonobtrusive manner.

- Parking policy changed by including doubling of on-street parking fee, converting perpendicular parking to parallel parking.
- To popularize the pedestrianisation, market federation agreed to run free e-rickshaw services and take up maintenance, lighting, electric vehicle charging points, valet, etc.

Participants in the session

- Interesting feature of the project is that most of the implementation was completed during night time. Vehicles and e-rickshaws are allowed only between 9 PM to 11 AM. Installation of benches in the pedestrianized area proved to be an instant hit and game changer as toddlers and elderly could enjoy the pedestrian street. The exercise has made transferring between modes easy and comfortable in and around the station area.

Outcome

- The need is to develop live street as nobody wants to walk alone on the roads. The concept of TOD has to be followed in letter and spirit.
- Pedestrians should feel safe while walking, particularly on well-designed pathways.
- All the stakeholders must be guided to follow the guidelines on walkways.
- Strategy for successful provision of pedestrian areas in busy commercial centers should have wider stakeholder consultation, well chalked out policy framework and wide media coverage.
- Karol Bagh Pedestrianisation and Parking Management project was awarded the best commendable initiative NMT project by the MoHUA in the ongoing UMI 2019 Conference Awards for Best Practice Projects and is worth emulating, particularly in busy commercial areas of the cities.

Technical Session 2:- Problems for Small and Medium Towns & Introduction of Public Transport Systems

India had an urban population of 377 million as per Census 2011 of which 42% lived in 53 million plus cities. The remaining 58% of India's urban population lived in urban centers with population less than 1 million, often referred to as 'small and medium towns'. During the past decade, these small and medium towns recorded a generally higher rate of growth than the million plus cities. With increasing rate of population and economic growth in small and medium towns, the travel demand is bound to increase. In the absence of any organized public transport system, this increase in travel demand results in increased personal vehicles ownership and proliferation of para-transit vehicles. Further, in the absence of provision of transport infrastructure, traffic congestion will increase leading to rapid deterioration of accessibility within the town.

These cities, however, provide a rare opportunity to undertake a systematic approach towards their planning at this early stage of their development so as to establish sustainable forms of land use and mobility systems around which they may grow and economically thrive in the future. The session thus aimed to identify the initiatives taken by various cities to alleviate mobility demands in these cities, with special emphasis on public transport.

Panelists' discussion in progress

Chairperson - Dr. M. Ramachandran, Former Secretary, Ministry of Urban Development

Speakers -

- Ms. Janna Piorr, Director of Strategy and Portfolio, Deutsche Bahn International Operations GmbH (Sponsored)
- Ms. Paola Tapia, Former Minister of Transport and Telecommunications, Chile
- Shri Prasanna Patwardhan, Managing Director, Prasanna Purple
- Shri Sanjay Dubey, Principal Secretary, Urban Development and Housing Department (UDHD) and Managing Director, Madhya Pradesh Metro Rail Company

Rapporteur - Shri Pradeep Verma

Highlights of Discussion

- Larger million plus cities are having intra-city and intercity transport system like RRTS, BRTS, Metro rail, shared auto, city bus, etc. which are being integrated.
- In Madhya Pradesh, real estate development policy is to be designed proactively by taking care of multimodal integration, mixed land use, interconnected street network, "Sutra Sewa" as a successful model for implementation in various cities of the state.
- With the significant increase in cars and scooters, there is a need to have ecological, economical and sustainable solutions.
- In Germany, the new public transport projects, particularly rail projects, are being assessed in terms of its quality and long-term success.
- Where as in Chile public transport projects are considered for improving the safety and convenience of women by deploying women in public transport system.
- Prasanna Purple Transport Company focus is on bus terminals, including van and auto terminals. Shared public transportation is being promoted through aggregator or regulator, which shall connect all types of public transport. Their policy is to "Catch them Young", i.e. the cities which are presently growing fast. Big cities shall be connected to smaller cities in their vicinity.
- The trends show rising number of private cars and motorized two wheelers and decreasing share of public transport in medium sized cities.
- In many cities, quite often, authorities, which have no past track record in operation, try to operate the public transport system.
- System readiness and operational readiness make the operation of the transport system sustainable.
- Small and medium towns are governed in a unique manner because of its size, site, demography, social ecology and economy. They are more akin to cities than to small towns in respect of growth pattern.
- Public transport share in various sizes of small and medium towns vary from 9 to 13 percent. In towns with population of 50,000 to 1 lakh it is 11%, while in towns 1 to 5 lakh, it is 13 percent and in cities with a population of 5 to 10 lakh, it is just 9%.
- Average trip length also varies from 2.4 km to 3.5 km depending upon population and terrain of the town. Larger the size, longer is the trip length.
- The major challenges of small and medium towns are :-
    - Lack of organized paratransit mobility.
    - No or limited intra-city operations

- Public transit usage is low
- Increase in 2-wheeler usage
- Lack of walkway, foot paths, flyovers, bus stops
- Focus is always on large cities and metro towns.

- In the 3 cities of Bhopal, Indore and Jabalpur, with the development of the city bus system, there has been modal shift from private vehicle ranging from 23% to 45% during the last 5 years.
- In these cities, public bicycle sharing scheme ensures the last mile connectivity to the public transport and well-integrated with BRTS.

Outcome

- For smaller towns and cities, sustainable transport system focusing on bus system, IPT should be provided. Big cities should be well connected to nearby small cities.
- Sutra Sewa of Indore is a good example in this regard, which other cities could also follow.
- Women safety has to be the prime concern and efforts should be made to employ more women in public transport system.
- The concepts of multimodal integration, complete street network, last mile connectivity, inclusive habitat, mixed land use, NMT network, traffic calming, informal sector integration need to be followed for development of public transport system in small and medium cities.

Audience in the session

- Sutra Sewa plan, as followed in Madhya Pradesh, combining intercity profit and intra-city non-profit services by formulating cluster-based modal with emphasis on hub and spoke is a successful operational model to address the mobility challenges of small and medium towns. It is a cluster-based model with government subsidy as viability gap funding (VGF) to the operators.
- Call auto tele-rickshaw services initiated by Indore could be adopted for organizing the E-rickshaw, shared auto, taxi in small and medium towns.

- In medium towns, bus depot and bus stops, shared organized para transit solution via aggregator may be promoted. Projects like RRTS + E-mobility be taken up.
- First and last mile connectivity should be provided through Public Bicycle system, city bus, feeder bus, e-auto rickshaw, battery operated vehicle, walkways, etc.

Technical Session 3:- Role of State Government in Improving City Bus Service

India is a vast country extending over an area of 3.29 million sq.kms. Given its vast area and huge population and a wide network of roads, there is an immense need for increasing the supply of public transport infrastructure and also to strengthen the existing public transport modes and services. A good public transport system promotes mobility & reduces social isolation of the people living in the remotest villages, propel the engine of national economy, overcome pollution, congestion & road accidents and integrate our vast country.

The public bus transport in India is mainly operated by State Road Transport Undertakings (SRTUs) — created under Section 3 of the Road Transport Corporations (RTC) Act, 1950 and private operators. At present, 55 SRTUs are operating nearly 1,47,000 buses. These SRTUs operate about 8 million kms per day and provide gainful employment to 7 lakh employees. In addition, there are buses operated by the private sector and city specific SPVs.

At present, India has a very less bus penetration, i.e., 1.29 buses per population of 10,000 as against 2.93 of United Kingdom, 2.77 of USA, 1.83 of Japan, 1.35 of France, 10.03 of Brazil, 6.50 of South Africa, 3.14 of Mexico, 2.37 of Malaysia and 1.84 of China. This indicates that India lags behind most of the developed and developing countries and thus, there is a need for cohesive efforts to improve the supply of public transport in the country. The session discussed the actions taken by state governments in improving public transport in the cities.

Panelists releasing the publication in the session

Chairperson - Dr. Surendra Kumar Bagde, General Manager, BEST Undertaking

Speakers -

- Mr. Robin Kaenzig, Transport Economist, UK
- Mr.Gerald Ollivier, Lead Transport Specialist, the World Bank
- Shri Rakesh Jain, Vice President – Business Development & Transportation Technology Solutions, DIMTS
- Dr. Madan Regmi, United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
- Shri Arun Bothra, Managing Director, Capital Urban Region Transport (CRUT), Bhubaneswar
- Shri R.S. Bal, GM (Projects and Finance), PIDB Amritsar

Rapporteur - Shri Hemant Kumar

Highlights of Discussion

- Important aspects require for effective delivery of bus operation and the quality of public transport needs to be identified taking the case of Lagos BRT, Ahmedabad BRT as the successful examples.
- Growth of bus fleet is not keeping pace with the bus sector challenges. Bus service of London is one of the noted and quoted pillars of success.
- Solution of effective bus service requires engagement of many stakeholders in the bus market.
- The state govt. is very important in establishing the capacity of critical requirements of bus service.
- For improvement of bus service, state govt. has to spell out a clear vision plan for long term financing and funding of buses and building new skills in this sector.
- Constitutional provisions, Motors Vehicle Act provisions, provision of article 243 (W) need to be referred for identifying the role of national, state and local government in improving the bus services in terms of financing, service and capacity building.
- Bhubaneswar has emerged as a successful story in revival of the public transport in Bhubaneswar by Capital Region Urban Transport agency. It has increased the ridership significantly in a short-term plan. On an average it has 80,000 – 1,00,000 ridership per day in its city bus service.
- They have renamed the bus driver and conductor as captain and guide and fares have also been kept normal.
- Amritsar BRTS is another key system known as Amritsar metro bus system, which is a unique model. Existing bus stops are retrofitted. There is an edge to edge development.

Special provisions have been made for differently abled persons. Emission of CO2 is much lower.

- In Lagos, state government recognized transport as a most pressing issue facing its citizens. It developed a multi – modal transport system to better serve the people. BRT lite commenced operation within a period of less than 2 years from planning to operation.
- The delivery chain linking the roles, path from strategic vision to effective delivery is needed for effective delivery of bus operations.
- On similar pattern, Ahmedabad BRT was developed and is being operated by Ahmedabad Janmarg Ltd.
- An effective delivery chain for Quality Bus Transport should have a system owner – strategic focus and political ownership followed by network planning regulation and management leading to bus operator service delivery.
- In cities like Paris, Singapore and Hong Kong, modal share, including public transport and NMT, is 61%, 72% and 88% respectively. In these cities, per capita availability of urban public transport is low as compared to international benchmark of more than 100 buses per lakh population.
- In comparison, situation in India is rapidly deteriorating leading it on an unsustainable path.

Speaker making presentation

- Bus sector challenges, include major supply gap, which is one-third to one-fourth of the needs in cities. There is low quality of service in terms of ageing fleet with limited customer focus, low fleet growth at half of the competing needs, limited public resources for scale up, as the public operators are on survival mode.
- Other challenges are fragmented institutional responsibilities, bus network not responsive to customer demand, licensing and regulatory regimes not encouraging, costly service by public operators, low fare and insufficient investments, congested roadways for buses, poor capacity, etc.
- Contracts for bus service in India are not reliably honored by either side in terms of late payments, deduction without rationale, operators failing in contracts, lack of dialogue between STUs / operators, lack of trust, etc.
- The division of role between various tiers of government is governed by the Constitution of India. The subject of urban transport specifically has not been dealt with in the Constitution of India.

- Internationally, in the ESCAP region, Tokyo, Singapore, Seoul, Hong Kong are some of the good examples of public transport.
- The United Nations' Sustainable Development Goal no 11.2 states that by 2030 access to safe, affordable, accessible and sustainable transport system for all shall be provided. It also calls for improving road safety notably by expending public transport with special attention to the needs of those in vulnerable situation, women, children, persons with disability and older persons.
- New Urban Agenda – 2016 also calls for promoting public transport access for all, i.e. safe, affordable and sustainable.
- Vision of public transport revival in Bhubaneswar operated by Capital Region Urban Transport, is to expand the reach of public transport, systematize the information with real time technologies and improve customer experience by creating bi-directional communication channel.
- Some of the operational measures to promote bus service, include introduction of night-out schedule, holiday schedule, special service for corporate sector, service and fare optimization.
- MO Bus App has been designed to allow commuters to get journey planning, live tracking, routes information, electronic ticket and special on-line pass.
- Communication strategy covers preparation of new routes maps in BQs, customer friendly initiatives, social media outreach.
- Capital Region Urban Transport has partnership with Bhubaneswar Smart City Ltd. (BSCL) and GIZ of Germany.
- As a way forward, it will double the fleet to achieve 20% mode share and open up transit data for third party application and public scrutiny.
- Unique feature of Amritsar BRTS is that it was conceived after site visits to several domestic and international BRT projects and being operated by a special purpose vehicle (PBMS), which is a society.
- First time retrofitting of elevated roads was attempted to suit BRT requirements in Asia. It covers 40% of the total city's core road network. On certain roads, it has covered edge to edge development.
- It has made provisions for differently abled persons in terms of tactile paving, level boarding and alighting, outsource ramps to stations, buses with uniform floor level, designated spaces for wheel chair inside buses and automated doors.
- Fares are competitive with the existing IPT (Shared Auto).
- Measures for sustainability of BRTS, include PBMS handholding and supporting Amritsar BRTS, urban transport fund set up at state level through the Act, sharing

advertisement revenue between the Municipal Corporation of Amritsar and PBMS, initiating public bike sharing scheme for ensuring last mile connectivity and shared mobility. Second phase of BRTS is being considered for extension in view of the success story.

Outcome

- For effective quality bus service, delivery chain should be reviewed for identifying the areas of weakness in service delivery.
- Each actor in the delivery chain should have necessary political, financial, legislative, and resourceful support to enable effective city bus operation.
- For transforming bus transport, an effective network plan is required considering passenger data, analysis of passenger demand, operating cost estimation and modal passenger benefits, as well as to leverage the private capital for investment.
- Pillars of success are service planning, service monitoring and performance management with focus on customer relationship.
- Successful contracting models should have focus on customers, service planning, procurement, quality contract and operator market.

Participants in session

- Key to success is a clear vision and plan, building capabilities in new skills, leveraging best practices in India and internationally and parties working together.
- This should be supported by institutional funding and financing, private sector effectiveness and improved infrastructure.
    - State nodal department be designated for city bus sector – to decide on the supply and managing the resource requirements at the sector level.
    - Nodal agency be designated at the city level with the responsibility for planning and organization of city bus service.
    - Dedicated sources of funding be earmarked to support city bus services (UTF with assigned flows)
    - Planning approaches to be formalized and standardized at the state and city level (e.g. CMP).
    - Quantity and quality benchmarks may be adopted.

- Only the projects that got planned and executed in a defined manner to get funding support. Cost benchmarking may be undertaken by the state through independent authority / professional body.
- City bus operation (by operators) to be separated from the responsibility for organization of city bus service (city nodal agency).
- PTAs / City Nodal Agencies need to be compensated for the overall cost incurred by them in providing / organizing the city bus services.
- Strengthening the PTAs / Nodal agencies through deployment of quality human resources and capacity building.
- Funding be tied up to reform measures taken by PTAs to ensure adequate and efficient city bus service.

- There is a need to develop sustainable urban transport index by taking into consideration the progress towards SDG target 11.2, performance of urban transport in cities, plans and policies to improve urban transport. Indicators may be from transport system, social, economic and environmental domains.
- Implementation of mobility strategies and plans should be on increasing accessibility, integration of services, fares and integrated transfer stations.

Technical Session 4:- How Women can be empowered through Public Transport?

It is being increasingly recognized across the world that men and women have different mobility patterns. In general, women make more (multi-stop) trips, and rely more on public transport. Key variables like affordability, availability, and accessibility play a big part in decision making by women for travel. In many cities, the fourth dimension of safety is added which can affect women's economic opportunities. These variables are a challenge for many cities, which need to be addressed to empower women.

To address these worldwide, South Asia and the Middle East and North Africa are leading the way in enacting laws aimed at ensuring safety in public places. Delhi Government has also provided public transport facilities free for women. In the Odd-Even Scheme implemented, women drivers (alone or with children) were exempted. The ladies' coach in metro systems provides a private space for women. Availability of public transport may change her relationship to the city and make her see herself differently. The session thus discussed availability, accessibility and affordability to safe public transport and how it can empower women in cities.

Chairperson - Shri M L Chotani, Consultant – IUT & Former Director AMDA

Speakers -

- Dr. Axel Friedrich, Former Head of Transport and Noise Division, German Environmental Agency
- Ms. Daniela Coimbra Swiatek, Expert Consultant for Mobility Innovation, Sao Paolo, Brazil
- Mr. Christian Vosseler, Senior Project Manager, KFW
- Dr. Nitika Bhakuni, Associate Professor, CEPT University

Rapporteur - Shri Pradeep Verma

Highlights of Discussion

- Women are vulnerable to sexual harassment in public transport.
- There are laws to stop it, but it does not deal with the procedures of punishment because it is difficult to prove the crime. This calls for promoting gender equity.
- In Brazil, people are being motivated to use public transport by education, creating awareness and having mobility check after every 5 years.
- Social security and physical security are given importance in public transport.

- In Germany, 15 percent women are employed in public transport system where majority of the commuters are women. Companies are reviewing their employment policies to give preference for employment of women.
- Walking infrastructure is being improved so that women feel safe not only in public transport, but also while walking on roads.
- It was observed that lady conductor inside a bus makes the environment safer.
- Research in Sao Paulo based on Origin & Destination survey (1977-2007) shows that women walk more than men, children walk more than adults, women make more trips per day than men, women use public transport more than men, men make more trips and are sole user of the car than women.
- Access to work, drop to less than one third when comparing a single man with car and no children and women with children and no car.
- Safety in public transport is required at four levels, i.e. journey to the stop, waiting at the stop, boarding and alighting the vehicle and inside the vehicle.
- 34% women in Delhi, commute to work using buses as compared to 25% men (2017).
- 27% of working women and 13% non-working women in Delhi see mobility and safety concerns as a major constraint to participate in the workforce (ILO – 2011).
- Almost 45% molestation cases take place in public buses (Police – 2014).
- In a study of New Delhi areas (2017), factors which impact safety perception of women, significantly include the following:
    - Overcrowding at entry/ exit gates and inside the vehicle.
    - Presence of CCTV cameras at the stops & inside the vehicle.
    - Presence of street lights.
    - Presence of adequate lighting at the stops and inside the vehicle.
    - Presence of walkable and clean footpaths.
    - Presence of lively areas (markets, shops, hawkers, people, etc.)
    - Presence of police/ security staff near the stops and inside the vehicle.
- The study found that waiting at the stops was most unsafe. Journeys to and from stop to destination are safest.
- Impact of public transport on women's social and economic opportunities is reflected in restricted timing of travelling, difficult to travel alone, limited work / study areas.

Outcome

- Gender sensitization should be conducted periodically with public transport employees. Children at young age should be made aware about the women safety in public transport. The need is to work in league with public transport agencies.

- By making public transport safe, the chances are more women would go to work.
- Waiting area for bus transport should be made safer so as to encourage the women for working outside their homes. Government must take the lead in understanding the vulnerability of women and improve public transport and police efficiency.
- There is a need for cultural change that goes far beyond public transport to an issue of respect towards women and gender equality in all aspects of life, including reviewing social roles.
- Behavioral, planning, infrastructure issues are to be addressed to improve the safety in public transport.

Technical Session 5:- Child Friendly Mobility

The right to education has been recognized as a human right in a number of international conventions, including the International Covenant on Economic, Social and Cultural Rights. The Government of India also recognizes the same and in August, 2009 enacted the Right to Education Act (RTE).

As per the recommendations of the UN, the fulfilment of the right to education can be assessed using the 4As framework, which asserts that for education to be a meaningful right it must be available, accessible, acceptable and adaptable. All children should have equal access to school services, regardless of gender, race, religion, ethnicity or socio-economic status. Efforts should be made to ensure universal access to education, i.e. access to all. Schools must be within a reasonable distance for children within the community, otherwise transportation should be provided to students. School bus is undoubtedly the most convenient means of student transportation. But unfortunately, there are a number of school bus safety issues faced by students while travelling by school vehicles. Hence, there are a number of laws in place for ensuring safety. However, incidences of accidents of school buses due to overcrowding, negligent driving, non-compliance with the guidelines of the Supreme Court, etc. are repeatedly noted.

The session discussed the existing regulations in the mobility of school children, identified problems being faced and proposed solutions for better compliance.

Chairperson - Shri Mukesh Meshram, Divisional Commissioner, Lucknow

Speakers -

- Shri B. I. Singal, Former Director General, Institute of Urban Transport (India)
- Shri Amit Bhatt, Director (Integrated Urban Transport), World Resources Institute
- Shri Kasinath Anbu, Technical Advisor, GIZ

Rapporteur - Shri Hemant Kumar

Highlights of Discussion

- Rules opted by the CBSE as per Supreme Court directions (1997) are included in school education. The Delhi Government passed an order in 2012 for regulating auto-

rickshaws, cycle rickshaws, bye-laws regarding overloading, over speeding and disembarking children away from the school / entrance.

- Number of school children below 12 years shall not exceed one and half time the permitted capacity of the vehicle while children above 12 years will be given one complete seating in the vehicles.
- The major issue in child friendly mobility is lack of infrastructure, i.e. no safe roads walkway and pedestrianisation.
- Cycle tracks are occupied by two wheelers. There is weak enforcement of safety regulations, no speeding control and lack of safety.
- Stakeholder consultation with sustainable source of funding and analysis of existing conditions are the pre-requisites for planning for child friendly mobility.
- In a study on safer commute for children in Rohtak city (Haryana), travel safety by walking, by cycling or by some transit vehicle, reduction of risk factor is of prime concern.
- With an objective to reduce crash risk for children, child specific mitigation measures, participatory design development and use of safety installations are considered important.
- In the study, the researchers had several rounds of consultations with local police, government officials, school authorities and the community at large.
- Data was analyzed and focused discussions held with students, parents and teachers.
- Trip and mobility mapping was done for validation and locating high risk nodes / areas.
- In yet another study on mobility from children perspective, school children transport in terms of regulation and existing conditions of an NMT network plan was suggested for safe children mobility to schools.

Outcome

- City planning should incorporate the required design elements for safety of children by institutional arrangement, education, enforcement, road design, policies and legislation, encouragement and advocacy and measures to improve the living quality.
- It has to be evidence-based planning with strict enforcement of rules and regulations and dedicated institutional arrangement.
- A network of connected child friendly streets and public spaces enable children's ability to safely move by foot or cycle in their neighborhood without an accompanying adult.

- Develop self -explaining and self- enforcing roads incorporating geometric elements that discourage high speeds, such as narrow lanes, narrow shoulders chicanes (artificial turns created to slow traffic) and sharp turning radii.
- Encourage the use of sustainable modes of transport such as walking, cycling and public transport.

Technical Session 6:- Introduction of Electric Mobility: Challenges in Implementation

Government of India has announced its ambitious plans for a mass scale shift to electric vehicles (EVs) by 2030. While the transformative push for electric vehicles has become a cause célèbre for India and the world, it presents various challenges. The Indian EV industry has the lowest level of penetration rates in the world. Of the current 200 million vehicles, which currently ply on Indian roads, less than one percent is electric.

The countries' response to the current bid for EVs is affected by its state of economic development, availability of energy resources, technological capabilities and political will to address climate change issues on a priority basis. The session discussed these issues and present initiatives taken by various stakeholders to address the challenges in implementing electric mobility across the country.

Chairperson - Shri Ajay R. Charthankar, Joint Managing Director, Pune Mahanagar Parivahan Mahamandal Ltd. (PMPML)

Speakers -

- Shri Shirish Mahendru, GIZ
- Mr. Weimin Zhou Sr. Transport Specialist, the World Bank, China
- Mr. Stefan Bakker, Team Leader, GFA Consortium Group, the Netherlands
- Shri Mohit Dubey, CEO, Chalo

Rapporteur - Shri Pradeep Verma

Highlights of Discussion

- China is running 25,000 electric buses (2018). Main challenge is new technology and its maturity. It has two types of charging system, i.e. slow charging but with large capacity and long run, fast charging with small capacity and charge at terminals.
- Petrol to E-bus running cost is in the ratio of 3:1 As such, government shall adopt purchase + lease + buy back model.
- In the Netherlands, electric two wheelers are popular as they are economical, flexible, reliable and easy to park. Bicycles are getting popularity due to zero emission and noise. These are also with zero street level pollution.

- The govt. has a policy to gradually ban the petrol driven vehicles. Govt shall provide subsidy to e-vehicles and develop safe and convenient road infrastructure.
- In India, e-mobility is minimal. Battery in e-rickshaw affects the mobility due to lead acid type. As such, the policy is to opt for Li-Pan-Battery E-buses to be made available in few selected cities instead of all cities. E-buses shall run on gross-cost-model and terminals for bus charging are being constructed.
- There are about 23,000 autos in Ernakulam district including Kochi. E-autos are suitable in the narrow streets of Kochi having low density, which are functioning as feeder service. It can replace the two wheelers and Co2 emission may be reduced by shared mode.
- Under integrated sustainable urban transport system for smart cities, Kochi Municipal Corporation formulated e-auto project, which is suitable for Kochi narrow streets, supplement other modes like Metro as feeder, can be a substitute for a two-wheeler and solution to reduce emission.
- In this project, Kochi Municipal Corporation, Auto Driver Society, GIZ, e-auto manufacturers, beneficiary drivers, passengers, government and general public are the stakeholders.
- Autos are to be seen in a loop or point to point service in fort Kochi island with charging and modal points at two locations in a gap of 5- 6 km. The route is proposed to provide last mile connectivity, accessibility in the unserved areas by public transport within 500 meters radius.
- Auto Driver Society will own the autos as the aggregator. The ICE Auto drivers will double their income by switching to e-autos. Vehicles to be owned by the society and purchased using GIZ assistance.
- Shenzhen achieved 100% e-bus fleet by the end of 2017 with a total of 16,759 e-buses and facing the challenges of new technology and its maturity in terms of communication with industry and follow up with the latest e-bus technology.
- Another challenge is high price of e-bus and the charging facility.
- Preparation in respect of training of drivers, maintenance staff, optimization of bus lines considering characteristics of e-bus, is required before operation of buses.
- Variety of electric two wheelers are available in the market having speed of about 25-30 kmph. Pedelec with no throttle and E-Bike with throttle. E-scooter and electric motor cycle also available having 45/50 kph. World over, petrol two wheelers are being phased out.
- In the Netherlands, as per climate change agreement, there will be only zero emission moped sale by 2025 and only zero emission scooter sale by 2030.

- Taiwan Action plan is to ban sale of non-electric motor cycles by 2035.
- Sri Lanka will also phase out these vehicles by 2040.
- Since 1996, Chinese cities have been banning motor cycles citywide as well as in certain areas.
- Amsterdam air quality policy stipulates only E2W from 2025.
    - Taiwan: 25% subsidy for e-scooter
    - Paris: subsidy up to EUR 500 for e-bike
    - Austria: subsidy up to EUR 500 for e-cargo bike
    - Oslo: 25% subsidy for e-cargo bike
    - Scotland: interest-free loan
    - India: FAME II subsidy of INR 10,000 per kWh
- Nepal: reduced vehicle tax, road improvement tax, waive annual tax.
- Japan: with little bicycle infra but safe streets, a shift to e-bikes from motorcycles and bicycles is taking place.
- Pune Mahanagar Parivahan Mahamandal Ltd. (PMPML) has ordered for 150 electric buses, both standard 12m and midi buses 9m.

Outcome

- Parking and e-vehicle challenges need to be addressed in a phased manner to make e-mobility popular in India. Behavioral change is also required for the growth of e-vehicles.
- The time is ripe to make all out efforts to give boost to the e-vehicles as the running cost of e-vehicle is almost one-third that of petrol and diesel vehicles.
- E-Auto can serve as a feeder to trunk lines like Metro, can operate in shared arrangement, e.g. Hop on Hop off service for tourists, point to point service and in a corridor.
- For charging facility, collaborate with charging service provider. Install the charging points at the key terminals with several bus lines.
- Governments at various levels to consider the public transport as a semi-public service, devise effective / efficient ways to mitigate congestion, pollution and take it as an image of a nice city.
- Policies at local level should focus on travel demand management, car purchase quota, low emission zone.
- For a large-scale shift to e-scooter / e-bike policy options comprising phasing out of petrol two wheelers, incentives for e-bike, road infrastructure, support fleets, behavioral change and ban on traditional vehicles are required.

- Local and global rationale to promote electric two-wheelers is necessary in terms of
    - Accessibility and liveability.
    - Climate change.
- Different types of E- two wheelers could cater to different user groups and may vary by region. As such, the same be promoted.
- A combination of polices will be required, including limiting alternatives for popularizing e-vehicles.

Technical Session 7:-Clean Air Action Plan: Mitigations in Urban Transport Sector for Reducing Pollution

India is severely affected by air pollution. It led to 1.24 million or 12.5% of the total deaths recorded in the country during 2017 alone. The Government of India, thus, launched the National Clean Air Program (NCAP) early this year which provides a roadmap to prevent, control and reduce unhealthy air pollution. The NCAP focuses on development of city specific actions that can help the country achieve cleaner air. Under the NCAP, city-specific action plans will be developed for all 102 cities that exceed national air quality safeguards. One of the key sectors identified for mitigation under the program is the transport sector. The session focused on initiatives taken by various cities under this sector in reducing pollution.

Speaker interacting with audience

Chairperson - Mr. Stefan Bakker

Speakers -

- Ms. Anumita Roy Chowdhury, Executive Director, CSE
- Dr. Axel Friedrich, Former Head of Transport and Noise Division of German Environmental Agency
- Shri Harish Chandra Nayak, Additional Commissioner - Enforcement, Bhubaneswar Development Authority

Rapporteur - Shri Hemant Kumar

Highlights of Discussion

- European Union has developed air quality standards for mitigation of pollution, which have legal basis for taking action on ambient air quality.
- In Germany, situation of yearly average of No2 of selected stations is studied for further development action. Specific environmental zones to measure traffic related black carbon particles have been identified.
- According to studies by the European Environment Agency (EEA) more than 4,20,000 people died prematurely from the consequences of particulate matter air pollution throughout Europe in 2015.
- Poor air quality causing damage to human health are responsible for economic costs of the value between 330 and 940 billion Euros, which is equivalent to 3 to 9% of GDP in the EU 28.

- Achieving air quality ambience requires continuing efforts to reduce vehicle emissions.
- New diesel cars in Europe are still emitting many times above the official limits for polluting nitrogen oxides.
- In Germany, driving bans on certain diesel vehicles are legally possible to comply with the limit values as quickly as possible.
- National Clean Air Programme (NCAP) targets to reduce 20-30% air pollution by 2024 to meet the clean air standards (PM-10).
- There are many sources of pollution, but vehicles are a special problem because till 2040, the transport sector in India will continue to record the highest growth in energy consumption and high exposure from vehicle would be responsible for air pollution.
- How close we are to the pollution source, what are we inhaling, time we spent close to the pollution source, are some of the factors affecting human health.
- In 129 cities, as part of NCAP, action plans are being implemented to meet reduction targets. Transportation and mobility strategies are an integral part of this plan.
- It is a city-based action plan covering public transport modernization, bus reforms, multi-modal integration, integrated FAR policy to keep journey cost affordable, introduction of parking policy as a vehicle restraint measure, state level street design guidelines, adoption of compact urban form code, etc.
- Parameters like population of a city, per person trip generation and volume of daily travel trip, average trip length by modes of transport, shares of different modes in all motorized trips, level of vehicle technology, fuel quality, etc. determine the particulate emission load from urban commuting.

Participant posing question

- A smaller city may have lower overall pollution, but emissions per trip may be higher due to polluting mode, which is a better indicator to plan remedied measures.
- As part of an integrated sustainable urban transport system for smart cities, low carbon mobility plan for Bhubaneswar has been prepared to address the unsustainable growth trend leading to congestion, unorganized parking, road safety issues and pollution.
- Vision of CMP is to have compact development, child friendly city, transit-oriented development, economic hub, accessibility and mobility liveable city with diverse choice and focus on local heritage.
- In a focus group discussion, road safety, universal accessibility, lack of public space and pollution emerged as the key issues.

- Key intervention areas of LCMP are integrated land use, public transport and intermediate transport, parking, new mobility trends like shared parking, electric mobility, energy and environment, non-motorized transport mobility network and travel behavior.
- GHG emissions due to LCMP plans will drop by 20-30% in 2040 from the present GHG emission.

Outcome

- Considerable reduction in nitrogen oxide emission from diesel vehicles is necessary to improve air quality and comply with limit values for pollution.
- The need for mitigating air pollution is to shift from concentration management to exposure management because ambient concentration does not analyze well the present human exposure.
- Smaller metropolitan cities like Bhopal can take advantage of early action in mitigating or reducing air pollution.
- An early action be taken to build bus and bicycle program with enhanced fleet, BRTS and public bike sharing scheme.
- Clean air action plan requires multi modal integration and last mile connectivity.

Audience in the session

- Ahmedabad, Lucknow, Vijayawada, Pune are at an inflection point as their per trip emissions are in the middle of the spectrum. They have started renewal of bus fleet, BRT, street design, etc. to address the issue of pollution level.
- Car centric road design locks in enormous pollution, which should be avoided.
- Engineering changes once made cannot be reversed easily. It permanently decides our travel choice and hence needs to be planned carefully.
- Clean air action plan requires complete street management for all road users. In car-free Ajmal Khan road in Delhi, exposure to P.M.2.5 on nearby heavy traffic road is 35% higher than pedestrian street.
- Public transport should not only be mandated, but also regulated. There is no Act mandating the provision of public transport in cities at any level.
- Link funding strategies with reforms in public transport sector.

Technical Session 8:- Technology to Leverage Services for Improved Mobility

Traditionally, transport systems have been managed in silos. The need is to have connected mobility corridor through a holistic approach focusing on moving the people. Transport managers must look for technology to maximize system performance. Digital revolution has to play a prominent role in mobility planning than ever before by deploying V2X (vehicle to everything) technology. This can improve the safety, efficiency, reliability and resilience of transport network. In the long run, leveraging the emerging technologies like connected and automated vehicles, car sharing and ride sourcing present both a remarkable opportunity and challenge for transport systems. Robots that can regulate traffic are emerging examples of technology that have already made inroads into urban mobility using sensors, cameras, algorithms, etc.

The increasing availability of real time data, expanded communication technology, emerging travel demand management models, autonomous vehicles, electric powertrains, vehicle sharing and other advances are transforming urban mobility. The need is to capture the benefit of the shift from cleaner air to easier journey. The four major disruptions known as ACES meaning autonomous vehicles, connected corridors, electrification and shared mobility would ultimately drive a change in the urban mobility. This also calls for altering the urban landscape to enhance mobility by congestion pricing and demarcating low emission zones. Integrated and connected infotainment system by proving direct communication in terms of V2N (vehicle to network) V2V (vehicle to vehicle), V21 (vehicle to infrastructure) and V2P (vehicle to pedestrian) have to be strengthened to improve the efficiency of mobility. Creation of complete trips, curb side management, promoting accessibility and inclusivity, understanding the travel behavior changes, mobility as a service (maas) and encouraging data sharing are some of the technological trends that help in transforming mobility.

Speakers on the dias

The session dwelt upon the status of emerging mobility technologies, case studies using the latest technologies across the world and a phased program to deploy and leverage the technology to improve the mobility.

Chairperson - Dr. Sanjay Gupta, Head of Department (Transport Planning), School of Planning &Architecture, Delhi

Speakers -

- Dr. Rajesh Pandya, Deputy Municipal Commissioner, Surat Municipal Corporation
- Ms. Daniela Coimbra Swiatek, Expert Consultant for Mobility Innovation, Sao Paolo, Brazil
- Shri Ankur Mohan Agarwal, General Manager, Technical, CAF India Pvt. Ltd.
- Shri T V Shrinivas, Senior General Manager, Tata Motors, Pune

Rapporteur - Shri Pradeep Verma

Highlights of Discussion

- In Surat city, rapid growth of population, rapid growth of vehicles, high city mobility, inadequate road network, increasing congestion and travel time are some of the important mobility issues.
- Surat has prepared Saral (Simple) Mobility Plan, 2046 implying easy, convenient and accessible through five strategic goals.
- Improving quality of life of people by providing for a safe and sustainable transport system.
- Saral, 2046 is to support economic growth in the city by enhancing accessibility for people and goods to major activity centers.

Speaker sharing his views

- Ensuring efficient connections by providing multi-modal travel options.
- Optimizing transport system operations and enhancing travel experience of people through advanced technological applications in transport.
- Contributing to the environment by promoting low carbon mobility.
- SARAL (Safe, Accessible, Reliable, Advance and Low Carbon Mobility in Surat) will provide leverages in transportation.
- Integration between BRTS, city Bus and HMC services.
- City will have increased network from 10 km in 2014 to 430 km in 2019.
- Information integration in terms of timetable, tariff, route maps, etc.
- It will use technology comprising control center, GPS, ETM, POS, vending machine.
- It will have analytics in terms of analysis of ITMS and AFCS data to improve the efficiency of P.T. service.

- Intelligent Transport System (ITS) leveraging is adopted in automatic fare collection system, intelligent control system and intelligent transport management system.
- Conference noted that new concept of Metro Lite is the better mobility solution for Indian Tier – II cities. This is cost effective for PPP model with 25 – 30 years of life cycle.
- Innovation in urban mobility is growing fast, but the moot question is how governments are availing the opportunities. Startups lead to creativity, which in turn creates big companies. It requires regulation by the governments.
- In Brazil, the Mobi Lab started game changing by taking three-fold action, namely contracting and fostering startups, opening data and relationship with new services and then regulating new innovative services.
- Mobi Lab is creative to provide low cost and agile solutions in the area of technological innovations, shared knowledge, transparency, open data and startups.
- Developed solutions for modernization and atomization of bus operation and control system for traffic lights.
- Fostering solutions for the citizens that are created, developed and commercialized by startups.

Participant posing a question

Outcome

- ITS project benefits the citizen in faster ticket issuance, shift from private vehicle to public transportation, improved operations in automation of fare calculation / collection and SMC / SSDL in data driven decision making.
- ITS integration for P.T. SMC services includes integrated fare, integrated schedule, passenger information system, passenger announcement system, general transit feed specification, departmental vehicle and emergency vehicle integration.
- Create an innovative environment with government startups, academia, third sector and civil society.
- Big data opportunities through ticketing system, GPS of taxis and private buses, radars, traffic light controller, cameras and CCTV can be availed by the government for finding solutions.

F. Round Table Discussions

A total of 11 Round Table Discussions, covering a wide range of transport related issues focusing on the theme of Accessible and Livable Cities, were conducted as a 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, both in India and abroad. 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:- Impact of Shared Mobility on Public Transport

Increasing level of mobility in urban areas to access places in recent times is becoming more and more difficult in terms of convenience, cost and time. This, coupled with poor & unreliable public transport service, has resulted in growth of young and dynamic businesses, leveraging technology to improve last-mile connectivity and deliver more innovative mobility solutions. The emergence and success of ride sourcing services, like Uber, Ola are clear evidence that personal mobility is undergoing a trans- formative shift moving away from public transport towards models that provide people with a range of service options.

In view of the growing popularity of ride sourcing services, the objective of the session was to assess the status of growth in shared mobility and its impact on public transportation in urban areas. It identifies and analyses complementing and competing factors of shared mobility over public transport system. It emulates provisions for development of common mechanism incorporating shared mobility and public transport efficiencies so that they complement one another instead of competing among themselves.

Panelists on dias

Chairperson - Shri B. I. Singal, Former Director General, IUT

Moderator - Ms. Sonia Arora, Urban Transport Expert, IUT

Presenter - Shri Ankit Pachauri, Transport Planner, IUT

Panelists -

- Dr. Vinay Maitri, Professor, School of Planning and Architecture, New Delhi
- Dr. G. J. Joshi, Associate Professor, SVNIT Surat

Highlights of Discussion

- Shared mobility, like OLA, UBER, Zoomcare have some impact to reduce the load on public transport and these are some of the notable examples of APP based shared mobility.
- IUT has undertaken a study on Impact of Shared Mobility on Public Transport in 12 cities across the country.
- Study is based on primary data, user opinion survey and stakeholder consultation covering socio-economic parameters, user attributes, factor affecting user choices, expenditure and trip purpose for daily trip willingness to shift and factors accentuating shared mobility system.
- The secondary data for the study culled out from Comprehensive Mobility Plans, polices, DPR's in terms of city characteristics, existing mode share, socio-economic character, traffic and transport characteristics, policy guidelines on shared system and identification of survey locations.
- In these cities most of the people are in the income bracket of Rs. 20,000-50,000 per month with a daily expenditure of Rs. 50 – 150 on travel.
- Some interesting findings of the study throw light on a number of aspects for using the shared mobility. In Delhi, about 44% of the shared mobility users opt for it because of door to door connectivity followed by 33% who use it for the convenience of booking.
- Similarly, in Chandigarh, about 38% use it due to door to door connectivity and 22% use for convenience of booking and almost equal number for want of fare and reliability.
- About 31% users opt for App based cab / bike service as a mode of travel on an all India basis.
- There is a significant shift from personal vehicle to shared services with much lesser impact on P.T. services.
- In Delhi, shared mobility is mainly used for emergency (non-official) travel, where as in Chandigarh, most often trips are via shared mobility.
- In most cases shared mobility is serving the purpose of last mile connectivity.
- The study revealed that most of the shared mobility users, particularly on bikes, have shifted more from the public transport than private transport.

- Shared mobility enables users to have short term access to a mode of transportation on need based.
- The prevalent ride share models include car / taxi sharing are OLA, UBER, MERU Cabs, BlaBla car, Mega Cabs, Quick Ride, Bono, Zoomcar.
- Auto Rickshaw includes Ola, UBER Auto, Jugnoo.
- Bike sharing comprises Bounce, VOGO and UBER Moto.
- Bus share covers Shuttle, Zip Go.
- The existing regulatory framework for covering some of the shared mobility aspects include MoRTH Taxi Policy Guidelines, 2016, The Motor Vehicle (Amendment) Bill, 2019. However, there is no specific legal framework or policy guidelines for regulating shared mobility in India at national level.
- Chandigarh and Bengaluru cities have aggregator polices while Ahmedabad, New Delhi, Lucknow and Kolkata are developing aggregator policies.
- Ride sourcing services are frequently used for emergency trips when P.T. services are rarely available or is unavailable.
- The peak demand time for hiring the shared services is around 7 o'clock when about 36% users book the service.

Speaker making presentation

- Majority of shared mobility users are having an average monthly income of Rs. 50,000 – 1,00,000.
- The study concludes that majority of the Indian users still prefer public transport over shared services.

Outcome

- Shared mobility should be linked with police for safety. White number plate vehicle should not be used commercially in OLA and UBER.
- Motor Vehicle Act should be amended to include shared mobility policies. Capping of number of vehicle city wise is required.
- Shared mobility has an impact on both public transport as well as private transport.
- Shift attributed towards shared mobility system is primarily from personal vehicles, whereas public transport systems have had lesser impact.
- In medium size cities where 2 wheeled shared mobility system exists, major shift is attributed from public transport.

- Most of the shared users preferred it over P.T. because of door to door connectivity and convenience of booking.
- Users are ready to shift to public transport, if it provides better connectivity and service.
- Bike sharing i.e. 2 wheelers is emerging as the most affordable and convenient mode of transport.
- Among the 2W App based mobility users, about 35% user's prior mode was Public Transport.
- As per the pre-feasibility rider survey conducted by UBER in Delhi, 52% people may prefer Uber Moto for their daily work trips. 24% would prefer Uber Moto for first and last mile connectivity from metro stations.
- Key elements of India's mobility transformation would be inclusive policy paradigm, shared infrastructure development, including mobility-oriented development and vehicle grid integration and system integration encompassing shared and connected key attributes of India's mobility future.

Round Table 2:- Metro, Metro Lite and Metro Neo

In accordance with the objectives of the National Urban Transport Policy, 2006, among other solutions, Mass Rapid Transit Systems have been implemented across the country. Today, 667 km of metro rail is operational in 18 cities across the country and more than 850 km is under construction, which when completed, would expand the metro network to 27 cities. It is expected that by 2024 about 1500 km of metro services shall be operational across the country. The Ministry of Housing and Urban Affairs (MoHUA) has envisaged an investment of more than Rs. 3 lakh crore in Metro Projects across the country. In view of the huge investment expected in this sector, MoHUA has initiated steps for reducing cost of investment. In this direction, standard specifications have been issued by MoHUA for Rolling Stock, Signalling System, Electrical & Electromechanical Systems and Civil Engineering Structures, including underground and elevated sections.

The Ministry has also formulated specifications for Light Urban Rail Transit System named "Metro Lite" with lesser capacity at much lesser cost. 'Metro Lite' would also act as a feeder system to the high capacity Metro. In addition to less capital cost, the operation and maintenance costs of Metro Lite would also be less making the system more viable.

Further, the Ministry has also undertaken the formulation of standards for articulated vehicles named Metro Neo with rubber tyres, electrically powered with overhead catenary and with exclusive right of way as an option for mass rapid transit in smaller cities. The session focused on specifications for Metro, Metro Lite and Metro Neo and highlighted the issues being faced by states / cities in adopting the same.

Panelist sharing his views

Chairperson: Shri Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs

Moderator: Shri K.R. Jyothilal, Principal Secretary, Transport Department, Government of Kerala

Shri Alkesh Kumar Sharma, Managing Director, Kochi Metro Rail Ltd.

Presenter: – Metro Neo Nashik by Shri Brijesh Dixit, Managing Director, Maha Metro Rail

Corporation Ltd.

Panelist : - Principal Secretaries (Urban Development/ Transport)
- Managing Directors, Metro Rail Companies
- Shri Jaideep, OSD (UT) & Ex. Officio Joint Secretary, MoHUA
- Directors, Ministry of Housing and Urban Affairs
- Representatives of Rolling Stock Manufacturers

Rapporteur: Shri Chetan Tyagi

Highlights of Discussion

- Cost of metro rail needs to be reduced by new innovations with the help of vendors by developing cheaper and efficient products.
- Metro Neo is one of the latest innovations, which is elevated or at grade with shared right of way. It is rubber tyred, bi-articulated electric coaches – quality at par with metro.
- Coaches are capable of running on battery in non-OHE zones. Guided coaches for passenger safety and also upgradable to LRT.
- It will have small stations with entry from footpath to platform through lift / link bridge. It has higher acceleration and deceleration. Coaches can run very close to each other, thus attaining lesser headway.
- Telecom network to connect coaches, provide ticketing and smart passenger information system. Superior in terms of vibration, noise, acceleration and cost.
- At grade, if dedicated RoW is to be provided, then continuous fencing / plinth is provided. It will have a maximum operating speed of 65 kmph and average speed of 30 kmph.
- Metro Neo will be combining the best features of all other systems like rail-based LRT, Tram, BRT, rubber tyred metro system and address traffic requirement between 5,000 – 15,000 PHPDT. The proposed Metro New has many advantages due to its availability of the sub system worldwide, adaptability of Metro Neo to the city,

Delegates in the Round Table discussion

workability of the solution due to its faster execution at lesser cost and willingness of reputed manufacturers worldwide to supply the equipment to Metro Neo.

- It is a cost-effective transport solution to fill the gap between BRT and Metro Rail systems. It caters to the needs of tier II – III cities and is the most ideal solution for such traffic conditions.
- Cost per km for Metro Neo is Rs. 62 crore, excluding land cost.
- Need for light rail could be seen in the context of high growth of population and vehicles, improving inter-connectivity, an icon for city, commercial and private investment.

COMPARISON OF DIFFERENT PUBLIC TRANSPORT SYSTEMS

BRT system	Metro system (MRT)	Light Rail Transit	Electric coaches (Metro-Neo)
Higher acceleration, lesser headway	Dedicated RoW, lesser acceleration	dedicated RoW, lesser acceleration	higher acceleration, less headway
PHPDT upto 5000	PHPDT upto 20000	PHPDT upto 13000	PHPDT upto 10000
Passenger capacity of 12m bus = 80-90	Capacity of each car = 400	Capacity of one train = 310	Capacity of each 25m coach = 250
Average speed = 28kmph	Average speed = 35kmph	Average speed = 35kmph	Average speed = 30kmph
Length = 12m typical	Length of car = 21m	Length of one LRT train 43m	Length per coach = 18 – 25m
Cost of construction for dedicated BRT = 20Cr/KM	Dedicated elevated Metro = 250Cr/KM	Dedicated elevated LRT = 120Cr/KM	Dedicated elevated Metro –neo = 70Cr/KM
Completion time = 2-2.5 yrs	Completion time = 4 yrs	Completion time = 3 yrs	Completion time = 1.5-2 yrs

Metro neo is ideally suited for tier 2/3 cities

Outcome

- Based on current and future needs of public transport, Metro Lite is the best mobility solution for Indian Tier II cities:
- Best value for money with flexibility, simplicity and safety features.
- 25 – 30 years life cycle with manufacturers being able to provide long term maintenance, spare parts and local support.
- Ecofriendly mode, customized to blend with heritage & culture of city.
- Most efficient and cost effective for PPP (procurement & maintenance on lease).

Round Table 3:- Road Map for Electric Mobility (sponsored by WRI)

The motorized transport sector is currently dependent on fossil fuels. The transport sector contributes approximately one-quarter of all energy-related carbon dioxide emissions into the atmosphere. The emissions are set to increase by one-third, thereby growing faster than any other industry. Electrification of transport presents an opportunity to arrest this growth. Electrification of transport, coupled with renewable energy growth, will have a more significant impact on clean mobility options. Many states in India have come up with Electric Vehicle (EV) policy, which is a good start. However, the cities now need to develop a roadmap for transitioning from the Internal Combustion Engine (ICE) regime to EV. The session focused on how cities and states could develop this roadmap and address the impact of such a roadmap.

Panelist interacting with audience

Moderator -	- Dr. O.P. Agarwal, CEO, WRI India
Panelists -	- Mr. Gerald Ollivier, Lead Transport Specialist, the World Bank - Shri Vivek Chandran, Shakti Sustainable Energy Foundation - Dr. Indradip Mitra, Senior Technical Advisor, GIZ - Shri Rahul Bagadia, Managing Director, PManifold - Shri G. P. Hari, Additional General Manager, Kochi Metro Rail Ltd,
Rapporteur	- Shri Vishal Chaudhary

Highlights of Discussion

- A comprehensive long-term e-mobility policy at city / state level should be framed in consultation with all stakeholders for promotion of e-vehicle in a phased manner. It should also take into consideration the environmental concerns.
- E-portal needs to be developed for creating awareness.

- Charging stations should be provided with renewable source of energy like solar energy, etc.
- Charging points should be provided at parking areas, markets, commercial streets, etc.
- Government taxation should be reduced for encouraging the purchase of e-vehicles.
- Need is to integrate transport policy including e-vehicle strategy with town planning provisions.
- E.V. connects – a monthly Newsletter published by WRI gives update of the recent advances in e-vehicle technology and policies.

Glimpse of the Round Table

- Campaign is on to accelerate E.V. A platform designed by WRI India and supported by Shakti Foundation Electric Mobility Forum bring together diverse stakeholders to scale up key projects on the ground in multiple states.
- Kerala electric mobility road map stipulates turning policy ideas into actions on the ground. It is a three phased road map for transition comprising of pilot project, scale up and self-propelled initiatives.
- A guidance document on accelerating electric mobility in India prepared by IIT, Madras identifies India's uniqueness, assesses key segments and technology, demystifies technicalities for state and city governments and suggests a road map for implementation.

Outcome

- A cell is required at the city level to coordinate with different entities to solve the problems of e-vehicles. It may have a single window clearance for e-vehicle registration and, if possible, to provide necessary relaxation in the procedure.
- Old petrol / diesel vehicles may be replaced with electric vehicles. If required, registration of petrol / diesel vehicle may be banned in a phased manner.

Round Table 4:- Functional Specifications for ITS & MIS for Urban Bus Systems and Design of Bus Depots for City Bus Operations in India

The objective of this study, under the Efficient & Sustainable City Bus Services (ESCBS) Project of the Ministry of Housing and Urban Development, is to develop a Manual that can be used by Public Transport agencies that are involved in the planning, design and deployment of ITS / MIS projects, either as completely new implementations or as extensions / upgrades to existing ITS or MIS systems. It is aimed to address the entire process of stakeholder's engagement, needs assessment, user requirements, concept of operations and functional specifications. As of now, the draft manual has been prepared and shared with an Expert Panel for their inputs and suggestions.

The other objective of this assignment, under the ESCBS Project is to develop a bus depot planning, design and implementation manual that can be used by PT agencies that are involved in the planning, design, construction, commissioning and operation of bus depots. The manual is aimed to address (a) identification of system bus maintenance and storage needs; (b) preparation of a system bus depot plan; (c) functional space requirements; (d) concept of operations and (e) construction and implementation schedule.

Panelist sharing his views

The draft manual has now been prepared and being modified based on the comments received from various experts.

Chairperson Shri Abhijit Sarkar, Training Expert, PMC ESCBS, Mott MacDonald

Moderator Shri Sudesh Kumar, Team Leader, PMC- ESCBS, Mott MacDonald

Presenter -
- Shri Ajay Gupta, DIMTS
- Shri Neeraj Aggarwal, DIMTS

Rapporteur - Ms. Aditi Singh

Highlights of Discussion

- Manual is a guide for planning and implementation of ITS in public transport for the agencies on how to plan and implement a holistic system.

- After finalization of the manual, training sessions for those concerned are to be organized on how to make best use of the manual.
- Target audience of the manual would be public transport agencies, operators, consultants and suppliers. It is also targeting chief executives / top management, ITS / ICT / IT heads, Heads of other departments, middle management officers and other ITS / ICT personnel as user officers.
- Application areas of ITS are operation, management, passenger information, fare collection and security.
- Financial performance indicators of MIS will be operational cost, revenue and performance ratio, while operational performance indicators will be capacity, service reliability and safety.
- Key lessons learnt in various stages of the project, i.e. conceptualizing and design, procurement, implementation, operation and maintenance are as under:

Delegates in the Round Table

	PROJECT PHASE	KEY LEARNINGS
	Project Conceptualization and Design	• Lack of in-house capacity to understand and conceptualize ITS/ MIS Project
	Project Procurement	• Long drawn out bidding process with multiple iterations
	Project Implementation	• Resistance to change at various levels of the organization • Long duration to achieve stabilization of the ITS initiatives
	Operation and Maintenance	• Vendor lock-in and inability to scale up beyond the terms agreed in the RFP

Outcome

- Manual once finalized would be a useful guide for project conceptualization, procurements, implementation and operation of ITS and MIS projects by authorities.

Round Table 5:- Bus Karo: National Public Transport Investment Program (Sponsored by WRI)

India has approximately 16 lakh registered buses of which public agencies operate around 160,000 buses (10 percent of the total) carrying 70 million people per day. Currently, there are approximately 11 buses per lakh population as against the required standard of 60 buses per lakh population, prescribed by the Ministry of Housing and Urban Affairs (MoHUA). The situation in cities is even more concerning where only 30,000 public buses are available, resulting in the availability of only 7.96 buses per lakh population. The country also faces a shortage of support infrastructure for public bus transport, such as bus depots, terminals, workshops, resources for operation and maintenance, workforce, etc. The session looked at the need and framework for a National Public Transport Investment Program drawing lessons from India and aboard.

Panelists interacting with participants

Moderator - Dr. O.P. Agarwal, CEO, WRI India

Panelists -

- Prof. Shivanand Swamy, Executive Director, CEPT, University
- Shri H. K. Gupta, Chief General Manager, HRTC
- Shri Vivek Chandran, Shakti Foundation
- Shri Amit Bhatt, Director (Integrated Urban Transport), WRI India
- Shri K. R. Jyothilal, Principal Secretary, Transport Dept., Govt. of Kerala

Presenter - Shri Ankit Kant

Highlights of Discussion

- Currently 10.4 buses per lakh population in the country are available as against the requirement of 40 – 60 buses per lakh population.

- It varies greatly with 54 buses per lakh population in Chandigarh and less than 1 bus per lakh population in Bihar.
- State Transport undertakings are recovering just 74% of the operation cost and need support from the state / central governments.
- Bus system monitoring and data are fragmented and need to be integrated.
- City authorities control city buses and metros. The need is to have good road infrastructure for buses. It is observed that the buses are generally created with a focus on affordability and not quality.
- Share of transport sectors in the total passenger kilometers performed in 2012-13 covered 85% by roads, 13% by rail and 2% by air. Within the roads it is 75% by private buses, 10% by public buses and 15% by other modes. It clearly indicates that buses are the predominant mode of public transport in India.
- Even though the passenger kilometer travelled has increased exponentially, the number of buses has remained almost stagnant. 0.74% of the total vehicle fleet are buses, while 0.06% of the total vehicle fleet are public buses.
- About 127 class I towns and 52 million plus cities have organized bus services. In the remaining towns, public transport is unorganized and often provided by private bus operators or intermediate public transporters. Key questions for augmenting the city bus service need to be addressed by the state / central governments and other agencies.

Participants in the session

Outcome

- Conference felt that MoHUA should also look at supporting bus program apart from metro rail projects to promote the city bus services.
- Bus depots could be commercialized for better returns.
- Role of various stakeholders, central government, state / city governments and the private sector need to be identified to run the city bus model.

Round Table 6:- City Bus Service

Report on the Review of Regulatory Institutional and Fiscal Policies (India) and the Efficient and Sustainable City Bus Service (ESCBS) Project (2019) undertaken by the MoHUA and the World Bank reveal an estimated shortfall of about 42,000 city buses in million plus cities. Shortfall for all urban areas has been assessed at 122,500 buses. It affects the city bus service reliability, coverage and overall public transport share. States and cities lack financial and technical capability to augment city bus service. There is, therefore, a need to provide central support for augmentation of city bus service and increase uptake of buses from the manufacturers to meet this shortfall. The session discussed the nature of MoHUA support required, outline of the scheme in this regard and the expected benefits.

Discussion in progress

Chairperson - Shri Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs

Moderator - Dr. O.P. Agarwal, CEO, WRI

Presenter - Shri K. Sanjay Murthy, Additional Secretary, Ministry of Housing and Urban Affairs, Government of India

Panelists -

- Shri Jaideep, OSD (UT) &Ex. Officio Joint Secretary, MoHUA
- Dr. Surendra Kumar Bagde, General Manager, BEST Undertaking
- Shri R.S. Bal, GM (Projects and Finance), PIDB Amritsar
- Shri Anand Prakash Tiwari, Managing Director, Assam State Transport Corporation
- Shri Rakesh Jain, Vice President – Business

Development & Transportation Technology Solutions, DIMTS

- Shri M. Ramsekhar, MD, DIMTS
- Shri Ajai Mathur, Managing Director, UMTC
- Dr. Rajesh Pandya, Deputy Municipal Commissioner, Surat Municipal Corporation
- Ms. Rolley Mahendra Varma, Director (Transport), Niti Aayog
- Dr. Shriniwas Arkatkar, Assistant Professor, SVNIT, Surat
- Prof. Shivanand Swamy, Executive Director, CEPT University, Ahmedabad

Rapporteur - Shri Ankit Kant

Highlights of Discussion

- Background of the scheme identified the problem of city bus service, which is required to be addressed quickly.
- Model request for proposal (RFP) and agreement for operation and selection of scheme / project have already been published by the MoHUA.
- Approximate number of buses required is huge, but at this stage tier III cities are to be considered under the scheme.
- Only intra city and not intercity bus would be considered with flexibility in terms of funding pattern between center and state.

Chairman sharing his views

- Mechanism for monitoring the overall progress shall be in place to check the progress.
- The scheme entails reforms at city, state and transport department levels.
- The benefits of the proposed scheme will be in the form of sustainable travel with environmental benefits and it will give a boost to the automobile sector.
- There are different revenue models prevailing in various cities for operating bus service. For instance, Delhi is having percentage revenue share with operator, but it is

not comprehensive. Gurgaon has different revenue model. Nagpur has essential space / infrastructure in place to have better participation by private player.

- Cities Covered
    - Cities with population of over 500,000 as per 2011 Census.
    - Capitals of States / UTs not covered above.

- Eligible components
    - Scheme is exclusively for urban transport, i.e. city bus service and / or bus rapid transit system for the city.,
    - City bus operations with buses of all types of fuel (excluding hybrid / battery electric buses covered under DHI schemes) would be eligible for seeking support under the scheme.
    - Deployment of only new buses would be supported.
    - The buses procured must have been manufactured at production facilities located in India.
    - The benefits of the scheme cannot be combined with any other scheme of the central or the state government.
- Methodology for procurement.
- Procurement through Government E-Marketplace (GeM) portal.
- State nodal agency to place a consolidated order for supply of buses for all the cities in the state.

Glimpse of the Round Table

- Model Bus Operators RFP and Agreements prepared by the MoHUA to be adopted

(with suitable changes) by the selected city for selection of the bus operators.

- Issue order for supply of buses within a period of 2 months from the sanction order and select operator for O&M of buses within a period of 4 months from the sanction order.
- Release of Funds
    - The Centre's capex support shall be released to the city upon delivery of the buses.
    - The Centre's opex support shall be payable over a period of 5 years such that the city gets the corresponding amount on present value terms @ 10.5 p.a. discount rate
    - The opex support amount shall be released by MoHUA on a half yearly basis in arrears based on the number of buses operated by the city during the period.
- Scheme Administration
    - Brief project report & its appraisal
    - State nodal agency
    - State funding of the remaining capex and opex
    - Central Sanctioning and Monitoring Committee
    - Urban Transport Reforms
    - Progress monitoring

Participant posing a question

- Expected Benefits from the Scheme.
    - Cities will have an augmented bus service preventing modal shift towards personal vehicles and lead to sustainable travel with environmental benefits.
    - Immediate business opportunity for the automotive sector.
    - Immediate business opportunity for the private bus operators.
    - Supports faster procurement of buses by using GeM portal, existing bus specifications (UBS-II) and model RFP / agreements.
    - Over 1 lakh jobs are likely to be created on account of the deployment and operation of the buses.

- Over 1 crore passenger trips per day are projected to be supported by the proposed 20,500 buses requiring central outlay of Rs. 5,812 crore.

Outcome

- Funding pattern needs to be considered carefully, including Capex or Opex or combination of both before zeroing on bus specifications, i.e. type / model / propulsion.
- Focus should be on reforms for development of city bus network and that too in a time bound manner.
- India has to deploy the plan in quick manner to address the pollution problems.
- Multilevel depots could be one option to address the land issue.

Round Table 7:- Guidelines on Parking Management for Small and Medium Towns (Research study of MoHUA)

Inadequate parking facilities in cities encroaches upon the limited urban road space. This hinders the smooth flow of traffic and obstructs pedestrian movement. Thus, there is a need to manage parking on street and also to reduce the need for creating parking spaces in the city. The conventional parking policies in India mainly focused on supplementing the ever increasing parking demand generated by the swelling vehicular traffic in urban centers. Under the current scenario, a need arises for parking management and development of parking norms that emphasize on initiatives that could control the increasing parking demand and encourage people to shift from private mode to public transport so as to make the urban areas more livable.

To address the issue, the session recognized measures for reducing parking demand and identified enforcement measures & institutional mechanism for the implementation of parking policy.

Speaker interacting with participants

Chairperson - Dr. Pawan Kumar, Associate Town & Country Planner, Town & Country Planning Organisation (TCPO)

Presenter - Ms. Vijaya Rohini, Urban Transport Planner, Institute of Urban Transport, India

Panelists -

- Dr. P.K. Sarkar, Director, Asian Institute of Transport
- Ms. Aswathy Dilip, Senior Programme Manager, Institute for Transportation and Development (ITDP)

Rapporteur -

- Shri Vishal Chaudhary

Highlights of Discussion

- Parking policies need to focus on parking demand management and also to encourage people to shift from private mode to public mode of transport.
- International experience shows the trends of elimination of curb side parking by high parking fees comparative to offsite parking. Residents are being incentivized for leasing their private parking space for others.
- CO_2 emission based parking fee is based on vehicle's engine standard. Location and parking fee are fixed according to road and transit capacities.
- Indian example of parking management focus on increasing public transport share, reduction in vehicle Km. travelled, avoiding utilization of public spaces for parking, proper utilization of land and incentivizing use of green mobility measures.
- Study undertaken by IUT covered 12 cities across India having small cities below 10 lakh and medium cities between 10-30 lakh population.
- Survey locations identified in the selected cities included city center with or without public transport and city periphery areas with or without public transport. It was further classified into commercial, institutional, residential and transport zones within the selected cities.
- Accordingly, data was analyzed encompassing parking accumulation, parking index and parking turnover. It revealed that the demand and supply gap is about 60% or more across all types of commercial land uses and 50-55% across all types of institutional land uses in different tier of cities.
- Parking regulations are generally not enforced or poorly enforced and enforcement and management is sometimes informal.
- The strategic intent of the policy is to effectively manage and cater to the parking demand, reduction of congestion due to parking and regulating the growth of vehicle numbers by framing appropriate rules.
- A typical parking policy in small and medium towns is developed in various stages.
    - Initially, no problem parking space is gradually used up.
    - Demand exceeds the supply regulations are introduced.
    - As demand further increases, time limit is introduced in city center and other busy areas. Parking spaces created to supplement and replace on-street parking.
    - Commuters are pushed into surrounding areas.
    - More and more differentiation of parking tariff is introduced.
    - Development of park and ride facilities.

- Inclusion of parking in transport demand management like introduction of congestion parking, strengthening public transport, etc.

- The state of Jharkhand has adopted a progressive policy in Ranchi. In orange zone having high demand and occupancy and in commercial areas, the parking charges are Rs. 40 / hour, in yellow zone with medium demand and occupancy in passive commercial zone, it is Rs.30 / hour, while in green zone with low demand and occupancy and Ranchi Municipal Corporation owned areas, it is Rs. 20 / 3 hours. It has resulted in increase in revenue from Rs. 1 million to Rs 12 million.
- Ranchi did it by managing on-street parking, price parking effectively and made the city vibrant with people.

Outcome

- There is high parking accumulation, irrespective of availability of public transport.
- Lack of public transport in small cities and higher egress distance in case of medium cities lead to usage of private modes.
- Medium term parking is more in most of the cities.
- Public should be taken into confidence for wider acceptability of any sort of restriction of vehicles through promotion of public transport system.
- Legalize the enforcement of parking in parking areas to make enforcement more effective.
- Off street parking may be priced lower than on street parking and people made aware of that so that they are encouraged to use the former.
- Private organizations under the control of public agencies seem to be the best form of organizations for parking management.

Delegate posing a question

- Legislation is needed to set a framework for parking charges and fines on cars and other vehicles.
- Park and ride facilities have an important role to play in maintaining the accessibility of congested areas of the towns.

Round Table 8:- Training Needs Assessment for E-Buses (supported by GIZ)

In March, 2019, India was reported to have more than 160 e-buses plying on the roads, which was a meagre contribution of 0.01% to the STUs fleet of 1,70,000 buses. In order to support the growth of E-buses, the Government proposes 41% share of demand incentive component for e-bus vehicle segment and intends to deploy more than 7,000 e-buses through operational cost model.

Despite the strong subsidy support by Government, there are still several barriers, both on the supply and STU sides that have delayed aggressive adoption. On STU side, one significant deterrent is the lack of new skills for effective life cycle management of e-uses, phasing across – planning, procurement, charging infra setup and operations, bus operations & maintenance, integration with legacy fleet, safety, disposal and others. To address this systemic barrier and improved adoption of e-buses with STUs, there is a strong need for systematic diagnostics and training needs identification for STUs.

This roundtable identified and focused on the gaps in deployment of e-buses and to strengthen overall capacity, which would promote growth of e-buses mix in the legacy fleet. The session was structured with a brief introduction of the objectives of the training needs assessment, followed by brief point - of - view presentations from cities, industry experts, institutions and OEMs on their training needs, and then open house discussion across invited stakeholders to facilitate growth and adoption of e-buses in India.

Speakers on the dias

Chairperson - Mr. Ronald Haas, Senior Technical Advisor, GIZ

Moderator - Shri Laghu Parasher, Senior Technical Advisor, GIZ

Shri Rahul Bagdia, Managing Director'

pManifold Business Solution Pvt. Ltd.

Speakers -

- Shri Krishna Sharma, Vice President and Business Head - Electric Vehicle Supply

Equipment (EVSE), Exicom Tele Systems Limited

- Shri Naga Satyam, Executive Director, Olectra-BYD
- Shri Arindam Lahiri, CEO, Automotive Skills Development Council (ASDC)
- Shri H. K. Gupta, Chief General Manager, Himachal Road Transport Corporation (HRTC)
- Dr. Prabhjot Kaur, CEO - Centre of Battery Engineering and Electric Vehicles (C-BEEV), IIT Madras

Rapporteur - Shri Ankit Kant

Highlights of Discussion

- In Kulu – Mandi area of Himachal Pradesh, 25 –e-Buses are operating. Tender finalization for procurement of e-busses, infrastructure development, scheduling, etc. are some of the challenges being faced on acquisition and operation of e-buses. There is a need for conducting regular courses on electric mobility.
- For a 9 meter e-bus, 1 single charge is adequate for travel up to 200 kms with AC and full load. In this regard, BYD Auto as one of the largest BV makers in the world have performed bus trial all over India.
- For operation of e-buses, power generation sub-station charging infrastructure, better energy, selection of routes are important.
- Automotive Skill Development Council (ASDC) takes up training programs for value addition, assessment of certification process and skill requirement in electric vehicle sector.

Speaker making presentation

- Esmito dealing with technology for e-bus fleet for STU have expertise in e-bus fleet, battery and charging infrastructure. They take care of requirement of e-fleet management, route optimization, driver management, inventory management apps for customer, charging infrastructure management, battery swapping stations, dashboard and analysis, etc.

- In order to upgrade skills in the field of electro mobility, there is a need to add new streams in engineering on electro mobility.
- Short training courses of 6 months to one-year duration for technicians on various streams at micro level are required in the following areas:-
    - Types of battery and battery management system.
    - Battery charging system.
    - Power Motor working and logics.
    - Electronic information system in electrical vehicle logics.
    - Electrical vehicle air-conditioning and logics.
    - Logical fault diagnosis and servicing of electric equipment.
- Electric buses for public transport in Himachal Pradesh face the following challenges:-
    - In the absence of standard deliverable performance parameter, it is difficult to finalize technical specifications.
    - Lack of in- house technical knowledge and exposure for using the pure electric vehicle.
    - Cost and time consumed for creating charging infrastructure is very high.
    - Availability of discrete spare parts is difficult.
- Olectra Greentech Ltd. are the leaders in next generation transportation technology and brought electric buses to India in 2016. It has presence in 30 + countries and 150 + cities.
- A total of 200+ electric buses have been deployed in India by Olectra and additional 150 e-buses of 12 meter length will be deployed in Nasik.
- Presently, Olectra BYD e-bus trials is available in Manali – Rohtang, Dehradun – Mussoorie, Nanital, Agra – Lucknow, Hyderabad, Vijaywada, Tirupati and Puducherry.
- Operational constraints faced for e-buses are as follows:-
    - Bus route allocation due to bunching in depot during out shedding.
    - Traffic jams are an everyday problem, which delay the trips.
    - The power supply varies, which affects the charging time.
    - There is a gap in demand and supply of drivers for this generation of vehicles.
    - For maintenance, there is a constraint of depot capacity. As for every 20 buses, 1 acre area of land is required. For every 15 buses, one inspection kit and for every 2 kits one bay are required. The required demand is not being met.
    - Fixed cost of electric bus is significantly higher than the comparable diesel bus, while variable cost is significantly lower than diesel buses. It will, however, be comparable when buses are utilized for more number of years. To achieve

higher daily run, battery should be capable of running higher range in a single charge.

- Experience shows that depot charging is the most suitable option as it eliminates most of the unwarranted risks, which is like a famous advertisement line “fill it, shut it, forget it”.
- Availability of proper land, timely permissions, best technology and proper implementation and selection of effective business model are the success drivers for e-bus infrastructure.
- Automotive Skills Development Council (ASDC) is continually developing and upgrading automotive skills. It has identified training needs in EV diagnostics, safety precautions, work methodologies, battery handling, vehicle integration, batter swapping service and maintenance.

Audience in the session

Outcome

- Training and short-term courses / programs for imparting the latest skills in various components of electric vehicle technology and logistics are essential to promote the electric vehicle system.
- There is a need to incentivize OEMs to go for long range buses with a single charge (say minimum 200 kms /single charge).
- Bidding parameters should be devised to have a sustainable; business model for both STUs and as well as OEMS.
- There is a strong need for a comprehensive program to upskill STU’s / operators for improved e-buses adoption and integration.
- Training should have 3 important components starting with training needs assessment, training material development, training delivery and upscale.

Round Table 9:- Moving ahead on National Common Mobility Card (NCMC)

MoHUA has indigenously developed and launched the 'One Nation One Card' based on National Common Mobility Card (NCMC) specifications in March, 2019. This would enable people to pay multiple kinds of transport charges, including metro services and toll tax, across the country. This inter-operable transport runs on RuPay card and would allow the holders to pay for their bus travel, toll taxes, parking charges, retail shopping and even withdraw money.

The interface specifications of the NCMC Eco-system were drawn up by C-DAC and National Payments Corporation of India (NPCI). NPCI had defined the card specifications (qSparc), including card Validation Terminal Interface. C-DAC had defined the interface specifications of Automated Fare Collection (AFC) Systems, which comprise various parts as Validation Terminal –Mechanical Gate Interface, Validation Terminal – AFC Interface, AFC-Bank (acquirer) Interface. This is the first Indian specifications of its kind. Bharat Electronics Limited (BEL) designed and manufactured the metro gate indigenously. This breakthrough is expected to not only bring down the cost of the AFC systems and enable interoperability on account of open-loop standards, but also boost India's self-reliance on technology and export.

The pilot project using the NCMC specifications has already been initiated in metro rail by Noida Metro Rail Corporation Ltd. and in buses by BEST undertaking and many other cities are expected to follow suit. The session showcased these examples and focused on the problems being faced by various cities / states in adopting the NCMC and how to address them.

Panelists interacting with participants

Chairperson - Dr. Surendra Kumar Bagde, General Manager, BEST, Undertaking, Mumbai.

Speaker

- Presentation on Pilot Project of Noida Metro by Shri S.S. Joshi, Director (Rolling Stock), Delhi Metro Rail Corporation Ltd..
- Presentation on Pilot Project of BEST by Dr.

Surendra Kumar Bagde, General Manager, BEST Undertaking.

- Presentation on National Common Mobility Card Ecosystem by Shri Rajesh Kushwaha, C-DAC.

Panelist -

- Managing Directors, Metro Rail Companies
- Directors, Ministry of Housing and Urban Affairs
- Representatives of Bus Operating Companies
- Representatives from Cities
- Managing Directors of BRTS Companies
- Representatives of Leading Banks

Rapporteur - - Shri Shivam Shukla

Highlights of Discussion

- In the era of digital economy, need for cashless fare collection, a common card for usage across various modes of transport has assumed greater importance.
- In this context, NCMC eco-system with specifications and standardization has been developed by MoHUA through BEL, C-DAC and NPCI.
- Interface and communication between different levels of the eco-system, coordination, validator, AFC system, banking, etc. were defined and developed.
- DMRC and SBI have been brought in as partners. 21 banks have tested NCMC at stations of DMRC. NAMMA metro is the next in line for testing this. QR code will serve as an alternative for physical token.
- Centralized AFC system at BEST based on NCMC integrated ticketing system for Mumbai will introduce mobility as a service across all modes of transport.
- A pilot project implemented at Shastri Park, Dwarka and Barakhamba Road metro stations in Delhi, faced the following challenges:-
    - Slow pace of project due to limitations in availability of trained resources and current vision of NCMC more inclined towards 'One city one card' philosophy.

Glimpse of the Round Table

- Major hardware changes need to be implemented based on feedback to meet throughout requirement.
- Software issues regarding ease of operability and transition from present system to new system with consistent output
- Volume of cards and not commuters are very high, which is another challenge.
- Airport line is a good field for NCMC testing. Sale and issue of cards by multiple agencies need to be addressed.
- NCMC may be less attractive for consumers to shift from present card due to service charges of banks. Card loss and misuse need to be addressed with minimum inconvenience to commuters.
- Centralized AFC at BEST will drastically bring down the nearly 80% fare collection through cash. This scheme will be started on a pilot basis in 2 depots shortly.
- Namma metro while endorsing the concerns raised by DMRC agreed that economic scalability of the pilot projects is still a debatable issue due to financial liabilities on the part of operators and banks.
- Distribution of cards and the economics and logistics related to it need to be addressed between operator and banks through committed discussions.
- Interests of passengers, operators and acquirers should be addressed by MoHUA for the pilot project to be truly implemented in commercial scale.
- It makes sense to make it account based existing debit and credit eco-system. Open loop system is already functional in Nagpur metro with complete responsibility of banks for O&M of fare collection based on the lines of Kochi Model. New possibilities will be explored for Pune Metro.
- RFID system for Fast tag can also be studied by C-DAC. Kochi's one card model is already successful and is still being expanded. The major challenge is expensive POS and negotiation with SBI.
- In a scenario where multiple acquirers are brought on board, the already existing arrangement and economics need to be reworked out with the operators.

Outcome

- Make in India concept for NCMC and general idea of NCMC being the main concerns of Metro Corporations need to be resolved, which is much easier in buses.

- AFC system is a real requirement with a basic acceptance that everything / everyone cannot have full satisfaction with certain compromises to be accepted by both operators and banks.
- Augmentation of C-DAC team with competent professionals will help in speeding up and implementation of the best possible system.

Glimpse of the Round Table

Round Table 10:- Innovations for STUs to Increase Ridership on Buses (supported by Chalo)

Discussion in progress

Moderator - - Shri Mohit Dubey, CEO and Co-founder, Chalo

Panelists -

- Shri K.R. Jyotilal, Principal Secretary, Transport Department, Government of Kerala.
- Shri Rajendra Cholan, Managing Director, NWKRTC.
- Shri Sreekumar Kumaraswamy, Head, Urban Transport, WRI India.
- Ms. Swati Khanna, Senior Sector Specialist Urban Development and Mobility, KFW.
- Shri Rajinder Verma, Indian Program Lead, Urban Works Institute (ITDP)

Highlights of Discussion

- The discussion started by establishing that the government's main role is to ensure a reliable, safe and comfortable public transport system and that India needed more buses to be able to attract more people to start using public transport.
- The expectations of passengers and shortcomings were highlighted with one specific aspect, which could be solved by implementing a robust ITMS project.
- The reasons for the failure of well-intentioned ITMS projects across the country were discussed, which highlighted that the model of engagement with the service provider was flawed as the goals of the service provider were not aligned with the goals of the STU.

Outcome

- The discussion concluded by noting that in-keeping with the changing requirements and rapid advancement of technology, the traditional GCC and NCC model would need to be re-looked. The disruptive model, like the PPP model innovated by the Assam State Transport Corporation (ASTC), Assam could be considered.
- ASTC has adopted a pay-for-performance model where the service provider is paid only if the ridership / revenue of the buses increases.

Participants in the Round Table

- The panelists agreed that the service provider should be paid for performance, i.e. increasing ridership, rather than merely for the deployment of hardware and software.

Round Table 11:- Options and Recommendations for Resolving Regulatory, Institutional and Fiscal Constraints in Providing Efficient and Sustainable City Bus Service.)

The ESCBS Project of the Ministry of Housing and Urban Affairs aims at identifying the gaps and constraints in the existing regulatory, institutional and fiscal set up for operation of city bus services in the country and formulate policy guidelines to resolve the same. The broad scope of work of this study involves (a) a critical examination of the regulatory, institutional and fiscal provisions for operation of city bus services at the national, state and city level through a representative sample of states and cities; (b) identification of deficiencies therein and recommendations for improvements in the existing legal, regulatory, institutional and fiscal frameworks, as applicable to the urban bus sector to improve its overall effectiveness, efficiency and viability, including improved service delivery; and (c) development of options and recommendations in consultation with stakeholders on the possible solutions.

The initial hypothesis was formulated and presented in a Focus Group Discussion. The inputs received were incorporated and the validity of the revised initial hypothesis is presently being determined in 15 identified cities.

This round table session was organized to discuss the international best practices, practices in the domestic sector, constraints and draft hypothesis.

Panelists on the dias

Chairperson - Shri Jaideep, OSD (UT) and Ex-officio Joint Secretary, MoHUA

Presenter - Shri Rakesh Jain, Vice-President Business Development and Transportation Technology Solutions, DIMTS.

Moderator - Shri Sudesh Kumar, Team Leader, PMC, ESCBS. Mott MacDonald

Highlights of Discussion

- Traditionally, the states are responsible for urban development, whereas the subject "Mechanically Propelled Vehicles" being an item in the concurrent list can be legislated both by the Centre as well as the States. As such, at national, state and city levels, roles are identified in planning, operation, legislation and development of urban transport and city bus operation.
- Types of Public Transport Agencies

Central Government	▪ Union Territory Administration (e.g. CTU) ▪ Special Purpose Companies (SPCs) formed jointly with the State Governments (e.g. DMRC and NMRCL)
State Governments	▪ State Transport Department (e.g. Haryana Roadways) ▪ State Road Transport Corporations (SRTCs) (e.g. BMTC, APSRTC, DTC)
ULBs/Municipal Corporations	▪ ULB Transport Cell (e.g. Gandhinagar, Mira Bhayandar) ▪ Municipal Transport Undertakings (MTUs) (e.g. BEST, AMTS, NMMT) ▪ SPCs (e.g. PMPML, AJL, AICTSL, JCTSL) ▪ Societies established with State Governments and Municipal Corporation (e.g. Raipur and Bilaspur Urban Public Transport Society)

SN	**Types of Public Transport Agencies**	**No. Of Entities**	**% to Total**
1	Central Government		
	a) UT Administration	1	1%
	b) Through SPVs/SPCs	2	2%
2	State Governments (SGs)		
	a) Directly- by Transport Department	8	9%
	b) State Road Transport Corporations (SRTCs)	15	16%
	c) Through SPVs/SPCs)	22	24%

3	ULBs/Municipal Corporations a) Directly b) Municipal Transport Undertakings (MTUs) c) Through SPVs/SPCs d) Societies	 5 9 19 11	 5% 10% 21% 12%
	Total	92	100%

- Out of 7,935 urban settlements, organized bus service is provided in 198 cities, i.e. 2.5% of total towns / cities.
- In Class I towns above one lakh population numbering 468 cities, organized bus service is available in 127 cities, accounting for 27.1%.
- In cities with more than 5 lakh population numbering 90 cities, organized bus service is available in 69 cities, i.e. 76.7%.
- In million plus cities numbering 53, as many as 52 cities, i.e. 98.1% have organized bus service
- Gap in supply of buses is more than 3 times the present supply in urban areas. Among the million bus cities, about 39% of total gap is in 1-2 million cities.
- Learnings for India from international case studies are as under :
    - Essential public service of local interest is entrusted with Municipalities (Sao Paulo, Brazil)
    - Single authority constituted with clear mandate, (Tfl, London), LTA, Singapore, Lagos (AMATA).
    - Mobility Plan is mandatory as per law (Sao Paulo, Sydney, London).
    - Jointly local governments could form authority to organize mobility (Transport Code of France.)
    - State Transport service offer centralized hiring of personnel to support various public transport agencies (TfnSW, Sydney)
    - A system of benchmarking at national level is evolved for measuring performance of the operators (Sydney)
    - Benchmarking of costs to avoid any over compensation and under compensation (EU regulations on Passenger Transport)
    - Associations (i) American Public Transport Association (APTA), (ii) Cooperation for Urban Mobility in the developing world (CODATU), an

association established by French law & (iii) UITP also facilitates transport services

- Independent body by law established with required powers and responsibilities (IPART, PTC, Singapore)
- Periodic and formula-based revision (Sydney, Singapore)
- Organizing authority responsible for fare revision / fixation (Tfl London, SYTRAL, Lyon, SPTrans, Sao Paulo, Translink, Vancouver).
- Transport plan / strategy is mandatory by law (London, Lyon, Sydney, Vancouver, Lagos, Accra)

- Issues faced by Indian Bus Sector :
  - Insufficient Service Delivery
  - More than 80% of buses are under in-house operations
  - Wide divergence of physical and financial performance of PTAs
  - In-house operations typically costing more than the outsourced operation
  - Absence of Service Level Agreements for PTAs
  - Inadequate support infrastructure for city operations
  - Inadequate use of advanced IT tools in managing city bus operations (passenger centric and user feedback mechanism)
- Lack of skill to prepare Network, Route and Service Planning
- Dearth of skilled resources to manage city bus operations.
- Nature of urban bus operation is financially unviable owing to revenue and cost structure of the industry imposed by socio-political objective.
- Multiple incidents of taxes lead to additional financial burden on the PTAs who are already incurring losses in undertaking urban bus operation.

Glimpse of the Round Table

- There are more than 20,000 buses under unorganized / fragmented operations in India. Enforcement of compliance with permit related regulations are not effective.
- Intermediate public transport modes are usually provided by last mile connectivity. Mode share of IPT is significantly higher in many cities.

Outcome

- Powers and functions of the state transport authority (STA) or regional transport authority (RTA) need to be clearly demarcated in terms of operation of service, fare fixation, bus routes, common bus infrastructure and collaboration with other agencies.

- For efficient and sustainable city bus service, following interventions need to be considered in institution, fiscal - financial and regulation aspects:
- **Institution**
    - Designated Agency
    - Clear mandate
    - Required capacity:-
        a. Trained personnel
        b. Operational practices
        c. Technology
        d. Industry Body
        e. Benchmarking
        f. Data Standardization
- **Fiscal and Financial**
    - Financial sustainability
    - Adequate funds for capital and operational activities
    - Standardization of accounts
- **Regulation**
    - Enabling Provisions
    - City Bus Services
    - Institution
    - Clear Mandate
    - Fiscal and Financial
    - Operator procurement
    - Interface with other authorities

G. Awards for Excellence / Best Practice projects in Urban Transport

Each year the Ministry of Housing and Urban Affairs, Government of India, constitutes an Awards Selection Committee to consider and recommend projects for which awards are given for excellence in urban transport / best practice projects during the Urban Mobility India (UMI) Conference-cum-Exhibition.

Accordingly, the Ministry constituted the Awards Selection Committee under the Chairmanship of Dr. M. Ramachandran, former Secretary to Government of India to consider and recommend awards for excellence in urban transport in the following 6 categories:-

i. Best NMT (Non-Motorized Transport) project
ii. Best City Bus Service Project
iii. Best Urban Mass Transit Project
iv. Best Intelligent Transport System Project
v. Best Initiative for Improved Road Safety
vi. Best City in Urban Transport Initiatives

2. The Ministry had invited entries for awards in a prescribed format from the Chief Secretaries of all State Governments and Union Territories, including Principal Secretaries of Urban Development, Transport, Municipal Commissioners, Development Authorities, Director Generals of Police, CEOs of Smart Cities, etc.

3 A total of 61 entries were received by the closing date, which were duly considered by the Committee. The Committee shortlisted 29 entries for the next round of selection. The Committee, after going through the documents provided and detailed presentation by the short listed organizations, recommended two award winners for excellence in urban transport and fourteen commendable initiatives in the above six categories and a new category on "Best Green Initiative in Urban Transport," which were accepted by the Ministry of Housing and Urban Affairs.

Awarded Projects:-

S. No.	Category	Award Winner as the Best	Commendable Initiative
1	Best NMT Project	None	(i) Reclaiming Space for Pedestrian & Decongesting Karol Bagh, North Delhi Municipal Corporation (NDMC)

S. No.	Category	Award Winner as the Best	Commendable Initiative
			(ii) Last Mile Connectivity, Delhi Metro Rail Corporation Ltd. (DMRC)
2	Best City Bus Service	None	(i) City Bus Services in Gurugram Area (ii) Bhubaneswar City Bus Modernisation Project (iii) Surat City Bus Service (iv) Seamless Mobility for Kochi
3	Best Urban Mass Transit Projects	(i) Bus Rapid Transit System in Amritsar (ii) Hubballi Dharwad BRTS Project, Karnataka	(i) Lucknow Metro Rail Corporation Limited (ii) Bangalore Metro Rail Corporation Limited (iii) Chennai Metro Rail Limited
4	Best Intelligent Transport System	None	(i) Launch of Common Mobility Card in Delhi across Buses & Metro, Delhi Integrated Multimodal Transit Systems Ltd. (DIMTS)
5	Best Initiative for Improved Road Safety	None	(i) 3D Radar based Gantry mounted over speed violation detection system (OSVD) with ANPR and Red Light Violation Detection System (RLVD) – Delhi Police
6	City with Best Urban Transport Initiative	None	(i) Best City in Urban Transport Initiatives, Navi Mumbai
7	Best Green Initiative in Urban Transport	None	(i) Green Metro – An initiative for sustainable and viable Urban Transport, DMRC (ii) Green Mobility, Andaman

The State / city authorities were officially invited by the Ministry for the award ceremony during the valedictory session of UMI 2019 Conference held on 17.11.2019. The awards, i.e. trophy and citation were handed over to the winners by Dr. Dinesh Sharma, Hon'ble Deputy Chief Minister of Uttar Pradesh and by Shri Ashutosh Tandon, Hon'ble Minister for Urban Development of Uttar Pradesh in the presence of Shri Durga Shanker Mishra, Secretary, MoHUA, Shri Deepak Kumar, Principal Secretary Housing and Urban Planning, Govt. of Uttar Pradesh, other dignitaries on the dais and delegates.

Dignitaries on the dias

Glimpse of the Awards of Excellence








Glimpse of the Awards of Excellence

H. Leaders Forum

The Ministry of Housing and Urban Affairs, Government of India and The World Bank, in association with the Centre of Excellence in Urban Transport, CRDF, CEPT University, Ahmedabad organized the final review of mentoring of projects undertaken by the selected participants of the Seventh "Leaders in Urban Transport Planning and Management Program" during the 12th Urban Mobility India Conference on 16th November, 2019. The program was designed to equip senior and mid-level urban transport professionals with integrated strategic planning and management processes by developing skills for undertaking urban transport planning and management tasks in a holistic and comprehensive manner.

As a part of the program, the participants were required to work on a specific transport project of relevance to their city and / or their current sphere of work under the guidance of specific mentors. 37 participants worked on 23 projects, and presented their project work at the conference. The projects were related to EV adoption, first and last mile connectivity, public transport, traffic management and parking. The participants were expected to make a brief presentation of 15-20 minutes on their projects.

The review panel comprised of Mr. K Sanjay Murthy, Additional Secretary, Ministry of Housing and Urban Affairs, Dr. M. Ramachandran, Former Secretary, Ministry of Urban Development, Mr. I.C. Sharma, National Project Manager, ESCBS Project, Dr. O P Agarwal and Mr. Amit Bhatt from WRI, Mr. Sudesh Kumar, Team Leader, Mott Macdonald, Prof. H.M. Shivanand Swamy, Dr. Shalini Sinha and Dr. Nitika Bhakuni from CEPT University, Mr. Laghu Parashar from GIZ , Prof. Sanjay Gupta and Prof. Seva Ram from SPA, Delhi, Mr. A.S. Lakra, Mr. P.C. Sehgal, Dr. Abhijit Lokre, Mr. Gautam Patel, Mr. Hiren Joshi, Mr. Jayant Deshmukh, Transport Experts.

The Forum was organized in 6 sessions with 4-5 presentations each.

1. **Combined Sessions 1 and 2 –** Organized in Media Centre from 9:30 am – 11:30 am. Presentations were made on Strategies for Electric Mobility for Gurugram with focus on Micro Markets (IPT), Efficient Traffic and Demand Management of Manali, Transition from CEV to EV by Enabling E-Infra & Electric vehicles for Promoting E-Mobility in Bhopal ; Route and Facility Planning for Deployment of Electric Buses in Bengaluru; Use of Shared E-rickshaws in Jabalpur; ; Parking Policy Implementation in Pimpri Chinchwad Municipal Corporation ; Parking Management plan for heavy vehicles in Panvel Municipal Corporation and Aizawl Urban Street Management.

2. **Sessions 3 and 4 -** Organized as parallel sessions from 11:30 to 13:30 hours. Presentations were made on Strategies for Ridership Enhancement - A case of Kochi Metro; Integrated Land Use- Transport Planning framework at Local area level: case study- Delhi; NMT case studies; Congestion Charging for Bangalore; Need for Expansion of City Bus Services at Dimapur, Nagaland; Last Mile Connectivity for Rajkot BRTS; Roadmap for rolling out city bus services in the State of Jammu and Kashmir and Strengthening Institutional arrangements towards Integrated Public Transport case of Chennai.

3. **Sessions 5 and 6-** Organized as parallel sessions from 14:30 to 16:00 hours. Presentations were made on Last Mile Connectivity to / from the Meenambakkam Airport; Development of Self-Sustainable Bus Port at Salem, Tamil Nadu; Study of Nashik Phata Junction in Pimpri Chinchwad Municipal Corporation; Road Safety Analysis of Raipur Airport Road; Route Rationalization for BRT; Modernization of Urban Transport Agra-Mathura City Bus Transport Service; Minimizing the Pilferage and Maximizing the revenue in Bus Operations

Glimpse of the LUTP final review at 12th Urban Mobility India Conference

I. Research Symposium

INTRODUCTION

The Research Symposium in Urban Transport was held on 16th and 17th November, 2019 during the 12th Urban Mobility India Conference and Exhibition 2019 at Lucknow. This provided a platform to highlight the current research carried out by academia and research institutes in urban transport, especially by young researchers pursuing post graduate or Ph.D. programs or those who had completed their Ph. D. in the last two years (not earlier than May, 2018). These researchers working in the area of urban transport were initially invited to submit abstracts based on the work carried out by them as part of their academic / research work.

The objectives of the Research Symposium are as under: -

- Encourage young researchers working in various facets of urban transport to present their research work and provide them an opportunity for networking with fellow researchers and professionals.
- Enhance capacity building of young researchers in the field of urban transport.
- Contribute towards building up of research data base, dissemination and identification of thrust areas for research in the country.

Call for Papers and Selection Criteria

Extended abstracts of about 500 words for the research symposium were invited on line. After receiving the abstracts, the same were sent for peer review to the members of Peer Review Committee of the Research Symposium. The symposium was coordinated by IUT. The following themes were selected:-

(i) Improving Public Transport.
(ii) Inclusive Urban Transport
(iii) Compact Development for Improved Accessibility
(iv) Artificial Intelligent in Urban Transport.
(v) Use of Big Data in Planning for Urban Transport
(vi) Impact of Urban Transport on Climate Change.

Each abstract was submitted for peer review to three reviewers / members of the Committee not affiliated to the author's institution and were requested to evaluate on a scale of 1 to 10. The scores so assigned were based on weighted average method and a final score was arrived at for selection.

In all 64 abstracts were received till due date from various institutions across the country, out of which 50 abstracts were short listed for submission of full paper. In response thereto, 36 full papers were received which were sent to the reviewers / members of the Committee for selecting the final papers that would be presented at the conference. On the basis of evaluation of full papers by the Review Committee, 24 authors were selected and asked to make presentation at the Research Symposium of UMI Conference. In addition, 7 full papers were selected for poster presentation. Papers presented at the conference were judged by an independent jury and scores were given on a scale of 1 to 10. The weighted average of the score was considered for grading the papers. The papers were than ranked in order of merit and the top three were considered for awards. Similarly, posters were also adjudged by an independent jury and based on average grading, one poster was selected for award. Keeping in view the number of papers received on various themes, the presentations were re-arranged and clubbed under six themes based on the topic of the papers. Accordingly, the Research Symposium was conducted in six sessions, which were moderated by a chair / co-chair as detailed out below.

Research Symposium

Chairperson: Shri Sudesh Kumar, Team Leader, PMC, ECBS, Mott MacDonald

Theme of Session of Research Symposium	Author / Presenter	Paper Title
1.Improved Public Transport and Inclusive Mobility	1. Shri Tushar Sangal, CEPT University, Ahmedabad	Integration of Metro with other Modes of Transport: Customer Satisfaction – A Case of Delhi
	2. Ms. Yaksha Chakrawarti, CEPT University, Ahmedabad	Continuity and change in Urban Development Arena – A case study of Indore
	3. Ms. Shinjini Acharya, School of Planning and Architecture, New Delhi	Planning for Gender Equality in Urban Mobility: Case study of Delhi.
	4. Shri Ninad Gore, SVNIT, Surat	Is habit of travel resistive to use Public Transport An Assessment of Acquaintance Behaviour of Travellers in

		Transit Deficient Metropolitan city

Chairperson: Dr Sewa Ram, Professor, School of Planning and Architecture, New Delhi.

2. Technology and Climate Change in Urban Transport	Shri Bala Eswari Macha, School of Planning and Architecture, New Delhi	Sustainable Strategies to Minimise Vehicular Pollutant Concentrations – A Case of Vijayawada City
	Shri Chintaman Bari, SVNIT, Surat	Vehicular Emission Modelling at Toll Plaza Under Mixed Traffic Conditions
	Shri Mohd Anas, School of Planning and Architecture, New Delhi	Operational Economics of Electric Buses in the context of Mega city of Delhi.
	Ms. Shravani Sharma, WRI, India	The Role of Taxies in Urban Mobility of Metropolitan Environment – A Case of Ahmedabad

Chairperson: Dr. Pawan Kumar, Associate TCP, TCPO

3. Public Transport and Compact Development	Ms. Shravani Tummalapalli, CEPT University, Ahmedabad	Contextualising Node in Transit Oriented Development (TOD) using 3v Approach – A Case of Hyderabad.
	Ms. Aditi Mewada, CEPT University, Ahmedabad	User's Perception on Integrated Public Transport System
	Shri Ganana Kiruka, CEPT University, Ahmedabad	Understanding the Factors Influencing Multimodal Choice – A Case of Chennai

Chairperson: Shri A.K. Gupta, Director, RCUES, Lucknow

4.Improving Public Transport	Ms. Suranjana Choudhuri, IIESTs	Reasons and Circumstances for Choosing Toto operation as on occupation. A Case of Two Adjacent Municipalities of Kolkata Metropolitan Area
	Ms. Divyanka Dhok, CEPT University, Ahmedabad	Assessing the Impact of Shift of AMTS Buses – on the BRTS Corridor
	Ms. Ishita Gautam, CEPT University, Ahmedabad	Funding Public Transport in Urban Areas – Case of Bangalore, Mumbai, Ahmedabad.
	Shri Dawda Nandan, SVNIT, Surat	Modelling Dwell Time Variation for the City Bus Transport System of Surat City

Chairperson: Dr. Syed Aqeel Ahmed, HOD, Integral University, Lucknow

5.Innovations and Technology	Shri Soumyajit Dutta, School of Planning and Architecture, New Delhi	Impact of Transport Technologies in Shaping Future Cities Towards Sustainability
	Shri Samir Patel Dr. Chetan R. Patel Mr. Bhaskar V. Bhatt, SVNIT, Surat	An approach towards Sustainable Transportation: A Case Study of Public Bike
	Shri Ede Somya, School of Planning and Architecture, New Delhi.	Impact of Navigation Apps on Travel Behaviour in Delhi

Chairperson: Dr. Shriniwas Arkatkar, Assistant Professor, SVNIT, Surat

6.Big Data and Artificial Intelligence	Ms. Suchismita Nayak, IIT Kharagpur	Appraisal of Different Artificial Intelligence Techniques for Travel

		Demand Analysis
	Shri Sheikh Muzamil Hussain, CEPT University, Ahmedabad	Artificial Intelligence and the Urban Transport. The Arguments for Precision Sustainability and Environment
	Shri Ninad Gore, SVNIT, Surat	Analysing Travel Time Viability Using Wi-Fi Detection
	Ms. Anshula Gumber, School of Planning and Architecture, New Delhi	Impact of Common Mobility Card on Travel Pattern – A Case Study of Delhi

All the sessions of Research Symposium were well received and interactive. The presentations were judged by an independent jury and following papers were adjudged in order of merit. The awards were given by Dr. Dinesh Sharma, Hon'ble Deputy Chief Minister of Uttar Pradesh in the Valedictory Session of the conference held on 17.11.2019:-

Sl. No.	**Position**	**Name**	**Title of Research paper**
1	**First**	Shri Ede Sowmya, School of Planning and Architecture, New Delhi	Impact of Navigation on Travel Behaviour in Delhi.
2	**Second**	Shri Ninad Gore, SVNIT, Surat	Analysing Travel Time Variability Using Wi-Fi Detection
3	**Third**	Shri Samir Patel, SVNIT, Surat	An approach towards Sustainable Transportation – A Case Study of Public Bike
4		Ms. Shravani Thummalapalli, CEPT University, Ahmedabad.	Contextualising Node in Transit Oriented Development (TOD) Using 3 V approach – A Case Study of Hyderabad

In addition, six poster presentations were made, which were also judged by the Jury. The following poster was adjudged first by the Jury:-

First	Shri Lakshit B. Mundel, SVNIT, Surat	Public Bicycle Sharing System Issues and Challenges for Liveable and Accessible Cities: An Indian Experience

Glimpse of the Research Symposium

J. Poster Making Session

In UMI 2019 Conference – cum – Expo, a Poster Making Session with school children was organized on 16th November, 2019. In this session, children from 5 schools, namely Mount Litera Zee School, Lucknow, Kendriya Vidyalaya, Aliganj 1st Shift, Lucknow, Kendriya Vidyalaya, Gomtinagar, Ambika School of Education, Rani Bazar, Barabanki and Red Rose Public School, Lucknow. In all, about 40 students participated in the session. These students were from 6th to 11th class. They were given a topic on "Problems They Face in Mobility". Students showed keen interest in making the free hand posters. Delegates appreciated their efforts in conveying the day to day problems and issues faced by the common man and children, particularly while walking and crossing the roads during the peak hours. All the children were given participation certificates and the best entries, adjudged by an independent jury, were displayed for viewing by the delegates.

K. Workshop: Takeaways from Energy Sector Management Assistance Program (ESMAP) Implementation

A key indicator of the GEF-World Bank aided Efficient and Sustainable City Bus Services (ESCBS) project is the fuel efficiency of city buses. Fuel constitutes the single largest controllable element in the urban transport sector and is also the chief contributor to the G.H.G. emissions and pollution. In the ESCBS project, under component 1 (capacity building), a specific program namely, Energy Sector Management Assistance Program (ESMAP) is being conducted in 34 bus depots in 21 cities across 12 States / UTs.

The program, which is an initiative of the Ministry of Housing and Urban Affairs (M0HUA), focuses on improving the driving skills of bus drivers through training and comprehensive maintenance of buses in 4 rounds of training. One of the tasks under the program involves presenting the results and key takeaways from the first two rounds of implementation at a national workshop in bus fuel efficiency.

After round 1, there has been noticeable overall depot level improvement in fuel efficiency by 3 to 5% and improvement in performance of identified individual drivers / buses by about 25 to 30%. In fiscal terms, the monthly savings on the overall fuel amount is estimated at Rs.100 lakhs, covering 34 bus depots in 21 cities of 12 states / UTs having bus fleet of 3,470 and operated by 7,525 drivers. Two sessions of workshop were held to discuss the takeaways from the implementation of the above project.

Speaker making presentation

Session 1:

Chairperson - Shri Sudesh Kumar, Team Leader, PMC, ESCBS, Mott MacDonald

Presenter - Ms. Shivani Rai

Session 2:

Chairperson - Shri Abhijit Sarkar, Training Expert, PMC, ESCBS, Mott MacDonald

Presenter -

- Shri Gyan Prakash, Joint Director (Transport) Petroleum Conservation Research Associates (PCRA)
- Shri Rakesh Kumar Agarwal, Deputy Director (Transport) PCRA
- Shri N. Srinivas
- Shri I.C. Sharma, Project Manager, SUTP
- Shri K. Sanjay Murthy, Addl Secretary, MoHUA, Government of India

Highlights of Discussion

- Energy Sector Management Assistance Program (ESMAP) is a technical assistance trust fund administered by the World Bank.
- The mission of the program is to increase knowhow and technical capacity to achieve environmentally sustainable energy solutions for poverty reduction and economic growth.
- Fuel typically costs 35-45% of the operation and maintenance costs of bus operations.
- ESMAP first pilot project was taken up in Bhopal, Mira Bhayander, Chandigarh and Jaipur in 2013-14 focusing on improvements in depots in different operating and environmental conditions. The second pilot project undertaken in Chennai and Jaipur in 2016 emerged as a good approach, which could be applied by other bus companies.

Participant posing a question

- Accordingly, pilot expansion was undertaken under the ESCBS project in Karnataka, Tamil Naidu, Andhra Pradesh and Puducherry in 16 depots.
- In round 1, basic data base on bus inventory, route inventory, route grouping and fuel consumption was created.
- Operated FEAT software was used for operation of vehicles and drivers.

- Analysis revealed that the average monthly saving across the sixteen depots was more than 1,400 litres per month.
- In round 2 implementation, generated the ranking improvement of round 1 attended buses and drivers and round 2 ranking through FEAT software.
- 5% drivers and 10% buses of round 2 were different from round 1 drivers and buses.
- Average monthly saving across the sixteen depots was more than 1,600 litres per month. Average Co2 emission saved was 2.94 kg. per litre of diesel. Average cost saved was Rs.70/- per litre of diesel.
- Petroleum Conservation Research Association (PCRA) has undertaken a project for improving fuel efficiency of city bus service through ESMAP approach in select National Urban Renewal Mission (NURM) cities numbering 32 cities and 34 depots.
- Typical cost of fuel for a depot with 100 buses works out to 37% of the total operating cost. Therefore, fuel efficiency is a very important factor in city bus service.
- Major benefits of fuel saving in city bus service are long term sustainability in terms of reduced fuel consumption and reduced operating cost, improved air quality by reduced level of air pollution and reduced greenhouse gas emissions and the cost saving.
- Factors affecting fuel consumption include route characteristics, bus characteristic, bus maintenance and driving skill.
- Identical bus running on the same route give a different KMPL. Similarly, identical bus running on different routes also give different KMPL. Same route, but different bus results vary in KMPL. So, it clearly shows that different factors in different situations affect the fuel consumption.
- In this type of situation, ESMAP approach for fuel saving is of two folds, i.e. management actions and technical actions.
- In this approach, the workflow includes 4 rounds of activities in 6-8 weeks per round. It is stretched from pre-engagement task to train the trainer followed by data collection, data validation and data analysis using FEAT software, which leads to results / outcome.
- With all this approach the impact analysis show a saving of 80.5 Kl in two months in terms of Rs.52.3 lakh saved and 215.7 T Co2 emissions reduced.

Outcome

- Depots are very much occupied with their day to day operations and they don't consider this project as part of the job. Hence, more commitment is required from the depot management.

- Modified preventive maintenance schedules, specific to the depots, could bring significant savings.
- Depots need to be very particular in having proper real time record of bus operating data for analysis and carrying out recommended checks for improved KMPL / KMPKG.
- Need for sharper focus on monitoring by depot management.
- Bus operating company should consider towards computerized recoding of fuel data.
- There is a need for modification in preventive bus maintenance schedules.
- Corrective actions for faults identified in buses and skill deficiency in driver should be replicated in all buses / drivers.
- Drivers should be trained to use eco-driving techniques namely bus starting, accelerator use, gear shifting, proper breaking, concentration and anticipation.

Memento being presented

- Depots should continue training and follow up monitoring to reinforce eco-driving techniques amongst drivers.
- Depots should strengthen data recording and analysis

L. Exhibition

An expo is a special feature of the UMI conference to disseminate and showcase the latest development in urban transport technologies and systems, implementation of best transport projects, propagation of innovative ideas, presentation of research in the topical areas of urban transport and exchange of good urban transport initiatives and practices in the field. In all 18 sponsors and 19 exhibitors (Annexure III & IV) participated in the exhibition and exhibited their products, technology, projects and the transport systems for wider dissemination. The exhibition was jointly inaugurated by Shri Yogi Adityanath, Hon'ble Chief Minister of Uttar Pradesh and Shri Hardeep Singh Puri, Hon'ble Minister of State (I/C) for Housing and Urban Affairs, Government of India. Four foreign companies participated in the expo and showcased their products and technologies. The latest technologies, particularly the modern transport system, NMT, computer system helping in traffic management were of special interest to the delegates and visitors. Exhibitors received a lot of specific queries about their products from the delegates to solve urban transport problems in their respective cities.

On the whole, the expo was received well by both the participants and visitors. A glimpse of the expo area clearly shows the keen interest taken by the delegates in various provisions of the exhibition.

Awards for best exhibitors were given to the following companies:

PRIZE	COMPANY
First Prize	Yulu Bikes
Second Prize	National Capital Region Transport Corporation
Third Prize	GIZ and Mumbai Metro Rail Corporation Ltd.

Glimpses of the Exhibition

M. Valedictory and Closing Session

The valedictory session of the 12th UMI Conference was held on 17th November, 2019 from 16:30 hrs onwards. The session was chaired by the Hon'ble Deputy Chief Minister of Uttar Pradesh in the presence of Hon'ble Minister for Urban Development of Uttar Pradesh, Hon'ble Minister for Transport of Kerala, large number of dignitaries, delegates and award winners. Brief outcome of the session is as under:-

Welcome Address:	Shri Deepak Kumar, Principal Secretary (Housing and Urban Planning), Government of Uttar Pradesh.
Address by:	Shri Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs, Govt. of India
Address by:	Shri Ashutosh Tandon, Hon'ble Minister for Urban Development of Uttar Pradesh
Valedictory Address by:	Dr. Dinesh Sharma, Hon'ble Deputy Chief Minister of Uttar Pradesh
Presentation of Awards for Excellence in Urban Transport	Dr. Dinesh Sharma, Hon'ble Deputy Chief Minister of Uttar Pradesh
Vote of Thanks:	Shri K. Sanjay Murthy, Additional Secretary, Ministry of Housing and Urban Affairs, Government of India

Welcome Address by Principal Secretary, GoUP

Shri Deepak Kumar, Principal Secretary (Housing and Urban Planning), Government of Uttar Pradesh in his welcome address, highlighted the large-scale participation of more than 1,000 delegates from India and abroad. He praised the extensive deliberations and interactive sessions during the 3-day conference. All the sessions were very apt and interesting. The Conclave and Plenary Sessions on Public Transport for All, Accessible Mobility, Metro Lite and Metro Neo were of special attraction. There were excellent presentations by the experts and useful feedback from the participants in all the sessions. The 12th UMI conference was a grand success with new path breaking events and outreach. He expressed his gratitude to the Ministry of Housing and Urban Affairs, Government of India for having organized the conference in Lucknow. The outcome of all the sessions would go a long way in achieving the goals of Urban Mobility and Accessible and Liveable Cities, as well as to follow the right policies and practices.

In his address, Shri Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs, Government of India presented the outcome of the conference. The UMI conference was started in 2008, of which the first eight editions were held in Delhi. It prompted the Hon'ble Prime Minister to point out why the UMI conferences were being held in Delhi all the time and not in other state capitals also. A beginning was, therefore, made by holding the 9th UMI 2016 conference in Gandhinagar, Gujarat, followed by the 10th UMI 2017 conference in Hyderabad, Telangana, and the11th UMI 2018 conference in Nagpur, Maharashtra. It was decided to hold this year's conference in this historic city of Lucknow in collaboration with the Government of Uttar Pradesh. In all, this conference had 1,026 registered delegates from 30 States and Union Territories, Central Government, transport undertakings, metro rail companies, foreign nationals, etc. It also included 109 students. A total of 10 foreign countries and international organisations participated in the conference. The conference was structured into one Conclave, 2 Plenary Sessions, 8 Technical Sessions, 11 Round Table Discussions and 6 Research Symposium Sessions. The Conference Expo had 19 exhibits from reputed companies and agencies engaged in urban transport. It was really a participatory conference. The Secretary (HUA) emphasized the role of urban transport as a wheel in the economic development process. Similarly, urbanization has become an important factor in the development growth across the world. When people migrate to the cities, they need everything, like housing, water supply, sanitation, social amenities and mobility through a planned public transport network. As per 2011 Census report, the urbanization level was at 31%. It is envisaged that the country would become more urban than rural by 2051. In this context, it has to be seen whether business as usual should continue or whether we should have more planned and organized urban development throughout the country. Increasing urbanization needs to be seen as an opportunity for development. With this objective in focus, the Ministry of Housing and Urban Affairs has initiated and launched a number of programs, such as Smart City Mission, AMRUT, HRIDAY, Housing for All, Swachhata Abhiyan and development of Metro Rail in major cities. During the last 5 years, a network of 500 km of metro rail was made operational and about 700 km is in the pipeline. The country is being redeveloped. About one billion Euros would be spent in improving the urban mobility.

Address by Secretary, MoHUA

He expressed hope that the participants would have appreciated and welcomed the latest developments of Metro Lite and Metro Neo at much lesser cost for urban mass transit in

smaller cities and also the Water Metro being developed in Kerala. He mentioned that extensive discussions have been held by the Ministry with all stakeholders on the National Common Mobility Card, i.e. one card to serve all the purpose of citizens by ensuring security and privacy, as well as on the Transit Oriented Development policy and Regional Rail Transit System (RRTS). The Ministry is currently focusing on promoting city bus service in smaller cities and exploring the possibilities of bus funding on the lines of the erstwhile JnNURM scheme. At the same time, innovative financing has to be tapped optimally, as is being practiced in Maharashtra where development charges are good examples of new and innovative financing. A State like Himachal Pradesh is contemplating to promote public transport on the pattern of urbanization with digital technology and electronic platform. Simultaneously, we need to relook at land use to manage the demand for mobility with the help of town planning expertise available in the country. It has, therefore, become necessary to undertake a detailed study of 100 cities to capture the latest information and development aspects of urban transport.

Development of non-motorized transport in the form of pedestrian and cycle tracks needs to be given priority in city transport planning. A single window system needs to be developed for all clearances required for promoting electric vehicle mobility. Child friendly mobility should be supported by laws and regulations. The 3-day conference had very useful discussions on these subjects and the outcomes were very encouraging for improving urban mobility.

Participants in the session

As regards best practice awards for excellence in urban transport, these have been given for implemented and planned urban transport projects in the last 6 to 7 areas. These awards were instituted many years ago when little had happened in the urban transport sector. Therefore, these awards recognized good initiatives only, irrespective of actual delivery on the ground. Now a lot has already happened and we need to move forward to an award system that recognizes the Aspirational New India. Accordingly, after detailed discussions with the experts, the awards for future UMI events have been revised and would be as under:-

1) City with the Most Sustainable Transport System;
2) City with the Best Public Transport System;
3) City with the Best Non-Motorized Transport System;

4) City with the Best Safety and Security System & Record;

5) City with the Best Intelligent Transport System (ITS);

6) City with the Most Innovative Financing Mechanism;

7) City with Best Record of Public Involvement in its Transport Planning;

8) City with the Best Freight Transport System;

9) City with the Best Green Transport Initiative;

10) Metro Rail with the Best Multimodal Integration;

11) Metro Rail with the Best Passenger Services and Satisfaction; and

12) Running trophy for the State / UT, which has Implemented Best Urban Transport Projects during the previous year.

Criteria for each award category would be properly indexed and communicated to the participating States and UTs. These new awards shall be applicable from UMI 2020 Conference onwards. There is a lot to look forward to the information sharing and learning in the UMI conferences. Concluding his address, Shri Mishra announced that the 13th UMI 2020 Conference cum Expo would be held in Delhi from the 30th October to 1st November, 2020 on the theme of "Emerging Trends in Urban Mobility". He congratulated the organizers, speakers and experts who had helped to shape the ideas and thanked all the delegates for their active participation.

Address by Hon'ble Minister for Urban Development of Uttar Pradesh

In his address, Shri Ashutosh Tandon, Hon'ble Minister for Urban Development of Uttar Pradesh said that Uttar Pradesh, the largest state in India, has implemented all the central schemes in urban development, namely Smart City Mission, AMRUT, Swachhta Abhiyan, etc. There are 10 smart cities under the central scheme, while the state has also taken up 7 additional smart cities out of its own budget. Uttar Pradesh has 17 Municipal Corporations, which are implementing these schemes. The main challenge is the increasing population. The need is to provide safe transport, improved road network and reduce pollution. Under FAME 1 and FAME II, 2,600 E.V. buses are being procured. 40 charging stations are being made operational. He lauded the useful discussions on women safety, child friendly transport and public transport for all.

Valedictory Address by Hon'ble Deputy Chief Minister of Uttar Pradesh

In his valedictory address, Dr. Dinesh Sharma, Hon'ble Deputy Chief Minister of Uttar Pradesh appreciated the thread bare discussions held during the last 3 days. The conclusions of the conference would be useful for the cities to have pollution free good transport system. He said that Lucknow is of special importance in Uttar Pradesh. State has 16.5% of India's population with urbanization level of 22% as against the all India average of 31%. After 2014, a series of schemes have been implemented in the state, such as AMRUT, Smart Cities, Housing for All, HRIDAY, Swachh Bharat, etc. In Uttar Pradesh, 75 Districts have been declared as open defecation free (ODF) and 3.5 lakh houses constructed. He narrated that earlier while working as Mayor, he had seen all the difficulties in urban areas while implementing these schemes. Now the system was working very well; roads are being widened; slums are being improved; 6 to 7 cities will have metro system with the first having been made operational in Lucknow. The State is fast moving towards urbanization and new techniques are being used to tackle the urban problems. He concluded by saying that the deliberations of the 3-day conference would be very useful in improving urban mobility. The increasing level and scale of the UMI, which would be held in Delhi next year, augurs well for the future.

Immediately after the address of Hon'ble Deputy Chief Minister, the awards ceremony was held in which 2 awards were given for excellence in urban transport and fourteen commendable initiatives in the six categories of awards and a new category on "Best Green Initiative in Urban Transport." Awards were also given to the best exhibitors in the expo, as well as for the best research papers presented by the students.

Vote of Thanks by Additional Secretary, MoHUA

Shri K. Sanjay Murthy, Additional Secretary, Ministry of Housing and Urban Affairs, Government of India proposed the vote of thanks. He thanked the Hon'ble Deputy Chief Minister of Uttar Pradesh, Hon'ble Urban Development Minister of Uttar Pradesh, Hon'ble State Transport Minister of Kerala, Secretary, Ministry of Housing and Urban Affairs for gracing the occasion and addressing the gathering. He also thanked GIZ, Sponsors, Researchers, Practitioners, Government of Uttar Pradesh, Principal Secretary, Housing and Urban Planning, Lucknow Metro (UPMRCL) and all the delegates and participants. He invited all the participants to the UMI 2020 Conference to be held in Delhi next year.

Annexure-I

Detailed Conference Program

Day 0 – 14.11.19 (Thursday)	
1500 - 1800	Registration
Day 1 – 15.11.19 (Friday)	
09:00 – 11:00 *(Hall – Mars)*	Registration
11:00 – 11:15 *(Hall – Strome/ Saturn)*	**Inauguration of the Exhibition**
11:15 – 12:30 *(Hall – Mars)*	**Inaugural Session** • Lighting of the Lamp • Welcome Address by Shri Rajendra Kumar Tiwari, Chief Secretary, Government of Uttar Pradesh • Film on "Journey of urban Transport in India" • Release of "Standard Specifications of Light Urban Rail Transit System- METROLITE" • Opening Address by Shri Hardeep Singh Puri, Hon'ble Minister of State (I/C) for Housing and Urban Affairs, Government of India • Key Note Address by Jose Luis Irigoyen, Former Senior Director, Transport and ICT (Global Practices), World Bank • Inaugural Address by Shri Yogi Adityanath, Hon'ble Chief Minister of Uttar Pradesh • Vote of Thanks by Shri K. Sanjay Murthy, Additional Secretary, Ministry of Housing and Urban Affairs, Government of India ***MoHUA**–Shri Janardan Prasad, Director (MRTS-I) &Shri Jasbir Singh, Under Secretary (UT-V) and Shri Lalit Kumar, Under Secretary (UT-I)* ***IUT** – Ms Vijaya Rohini Kodati , Ms Anindita Ghosh & Mr Ankit Pachauri* ***Rapporteurs*** - Mr. Nirdosh Kumar Gupta, Mr. Surendra Kumar Gupta and Hemant Yadav & Ankit Kant
12:30 – 13:00	Visit to the Exhibition
13:00 -14:45 *(Hall – Pavilion)*	Inaugural Lunch
14:45 – 16:45 *(Hall – Mercury)*	**Conclave on "Public Transport for All"** ***Moderator and Presenter***- Dr OP Agarwal, Chief Executive Officer (CEO), World Resources Institute (WRI) ***Panelist*** • Mr Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs, Government of India • Mr Keshav Varma, Advisor, Government of Uttar Pradesh • Mr Prasanna Patwardhan, Managing Director, Prasanna Purple • Dr. Axel Friedrich, Former Head of Transport and Noise Division,

	German Environmental Agency • Mr Brijesh Dixit, Managing Director, Maha Metro Rail Corporation • Mr R.K. Misra, Cofounder and President, Yulu Bikes **Concluding Remarks by** Dr OP Agarwal, CEO, WRI ***MoHUA****–Shri C. Uppili, Director (MRTS-II), Mr J. Sankar, Under Secretary (MRTS-IV)* ***IUT*** *– Mr Sandeep Prusty & Ms Minoti Rawat* ***Rapporteurs*** - Mr. Vivek Varma & Mr. Pradeep Kumar Verma and Chetan Tyagi & Vishal Chaudhary
16:45 – 17:00 (Earth - 1st Floor)	Tea Break
17:00 – 18:30 *(Hall – Moon III)*	**Session 1 – Walk the Talk on Walkability Policy** (panel discussion) ***Chairperson –*** Mr Tarun Kapoor, Vice Chairman, Delhi Development Authority ***Co-Chair & Moderator*** – Mr Keshav Varma, Advisor, Government of Uttar Pradesh ***Panelist*** • Ms Mariana Alegre, General Coordinator, Lima Cómo Vamos Citizen Observatory, Perú • Dr Geetam Tiwari, Professor, IIT Delhi • Ms Varsha Joshi, Commissioner North Delhi Municipal Corporation • Mr Mukesh Meshram, Divisional Commissioner, Lucknow ***MoHUA*** *- Shri Kumar Manoj Kashyap, Under Secretary (MRTS-I)* ***IUT*** *– Ms Minoti Rawat* ***Rapporteurs*** - Mr. Hemant Kumar
17:00 – 18:30 *(Hall – Moon IV)*	**Session 2 – Problems for Small and Medium Towns &Introduction of Public Transport Systems** ***Chairperson*** – Dr M. Ramachandran, Former Secretary, Ministry of Housing and Urban Affairs • Ms Janna Piorr, Director of Strategy and Portfolio, Deutsche Bahn International Operations GmbH (Sponsored) • Ms Paola Tapia, Former Minister of Transport and Telecommunications, Chile • Mr Prasanna Patwardhan, Managing Director, Prasanna, Purple • Mr Sanjay Dubey, Principal Secretary, Urban Development and Housing Department (UDHD) and Managing Director, Madhya Pradesh Metro Rail Company ***MoHUA*** *- Ms Rachna Kumar, Under Secretary (MRTS-Coord)* ***IUT*** *– Ms Anindita Ghosh* ***Rapporteurs*** - Mr. Pradeep Verma
17:00 – 18:30 *(Hall – Moon II)*	**Round Table 1: Impact Of Shared Mobility On Public Transport (research Study of MoHUA)**

	Chairperson – Mr. B.I. Singal, Ex-DG, IUT ***Moderator*** - Ms Sonia Arora, Urban Transport Expert, IUT **Presenter**- Mr Ankit Pachauri, Transport Planner, IUT ***Panellist*** – • Mr. Vinay Maitri, Professor, School of Planning and Architecture, New Delhi • Dr. G.J. Joshi, Associate Professor, SVNIT Surat ***MoHUA*** - *Shri BiswanathSahoo, Under Secretary (UT-II)* ***IUT*** – *Mr Ankit Pachauri & Ms Devika* **Rapporteurs**- Ankit Kant
17:00 – 18:30 *(Hall – Moon I)*	**Round Table 2: Metro, MetroLite and Metro Neo** ***Chairperson*** **–** Mr Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs ***Moderator*** - Mr K.R. Jyothilal, Principal Secretary, Transport Department, Government of Kerala/ Mr Alkesh Kumar Sharma, Managing Director, Kochi Metro **Presente**r – Metro Neo Nashik by Mr Brijesh Dixit, Managing Director, Maha Metro Rail Corporation - Proposed Standard Specifications for Metro Neo ***Panellist*** • Principal Secretaries (Urban Development/ Transport) • Managing Directors, Metro Rail Company • Directors, Ministry of Housing and Urban Affairs • Mr Jaideep, OSD (UT) & Ex. Officio Joint Secretary, MoHUA • Representatives of Rolling Stock Manufacturers ***MoHUA*** - *Ms. Priya Mahadevan, Under Secretary (MRTS-III)* ***IUT*** – *Ms Vijaya Rohini Kodati & Mr Rahul Kapoor* ***Rapporteurs*** - Mr. Chetan Tyagi
17:00 – 18:30 *(Hall – Moon V)*	**Round Table 3: Road Map for Electric Mobility** (sponsored by WRI) ***Moderator – Dr O.P. Agarwal, CEO, WRI India*** ***Panellist:*** • Dr O.P. Agarwal, CEO, WRI India • Mr. Gerald Ollivier, Lead Transport Specialist, World Bank • Mr. Vivek Chandran, Shakti Sustainable Energy Fiundation • Dr. Indradip Mitra, Senior Technical Advisor, GIZ • Mr. Rahul Bagadia, Managing Director, PManifold • Mr. G. P. Hari, Additional General Manager, KMRL

	***IUT** – Mr Sandeep Prusty* **Rapp**. Vishal Chaudhary
17:00 – 18:30 (Media Centre)	**Round Table 4: Functional Specifications for ITS & MIS for Urban Bus Systems and Design of Bus Depots for City Bus Operations in India** **Chairperson –** Mr. Abhijit Sarkar, Training Expert, PMC ESCBS, Mott MacDonald **Moderator –** Mr. Sudesh Kumar, Team Leader, PMC- ESCBS, Mott MacDonald **Presenter –** Mr. Ajay Gupta, DIMTS **Presenter –** Mr. Neeraj Aggarwal, DIMTS ***IUT** – Mr Soumya Ranjan Nayak*
Day 2 – 16.11.19 (Saturday)	
09:30 – 11:00 *(Hall – Moon III)*	**Research Symposium 1 - Improved Public Transport & Inclusive Mobility** ***Chairperson –*** Mr Sudesh Kumar, Team Leader, PMC, ECBS, Mott MacDonald • Integration of Metro with Other Modes of Transport – Customer Satisfaction: A Case of Delhi by Mr TusharSangal, CEPT University Ahmedabad • Continuity and Change in Urban Transport Development Arena- A Case of Indore by Ms Yaksha Chakrawarti, CEPT University • Planning for Gender Equality in Urban Mobility: Case Study of Delhi by Shinjini Acharya, School of Planning and Architecture, New Delhi • Is Habit of Travel Resistive to Use Public Transport? An Assessment of Acquaintance Behavior of Travelers in a Transit Deficient Metropolitan City by Mr Ninad Gore, SVNIT Surat ***MoHUA**–Ms Rachna Kumar, Under Secretary (MRTS-Coord)* ***IUT** – Mr Rahul Kapoor* ***Rapporteurs*** - Mr. Hemant Kumar
09:30 – 11:00 *(Hall – Moon IV)*	**Research Symposium 2 – Technology & Climate Change in Urban Transport** ***Chairperson*** - Dr Sewa Ram, Professor, School of Planning and Architecture, Delhi • Sustainable Strategies to Minimize Vehicular Pollutant Concentrations – A case of Vijayawada City by Mr BalaEswari Macha, School of Planning and Architecture, New Delhi • Vehicular Emission Modelling at Toll Plazas Under Mixed Traffic Conditions by Mr Chintaman Bari, SVNIT Surat • Operational Economics of Electric Buses in Context of Mega City of Delhi by MohdAnas, School of Planning and Architecture, New Delhi

	• The Role of Taxis in Urban Mobility of Metropolitan Environment A Case of Ahmedabad, India by Ms Shravani Sharma, WRI India ***MoHUA*** *- Mr J. Sankar, Under Secretary (MRTS-IV)* ***IUT*** *– Mr Soumya Ranjan Nayak* ***Rapporteurs*** - Mr. Pradeep Verma
09:30 – 11:00 *(Hall – Moon II)*	**Research Symposium 3 – Public Transport and Compact Development** ***Chairperson*** **-** Dr.Pawan Kumar, Associate TCP, TCPO • Contextualising Node in Transit-Oriented Development (TOD) Using 3V Approach –A Case of Hyderabad by Ms Shravani Tummalapalli, CEPT University, Ahmedabad • Users' Perception on Integrated Public Transport Systems by Ms Aditi Mewada, CEPT University, Ahmedabad • Understanding the Factors Influencing Multimodal Choice – The Case of Chennai by Mr Gnana Kiruba, CEPT University, Ahmedabad ***MoHUA*** *- Shri Kumar Manoj Kashyap, Under Secretary (MRTS-I)* ***IUT*** *– Ms Devika S* **Rappaorteurs** Ankit Kant
09:30 – 11:00 *(Hall – Moon I)*	**Poster making Session with School Children - Problems they Face in Mobility** ***MoHUA*** *- Shri Biswanath Sahoo, Under Secretary (UT-II)* ***IUT*** *– Ms Minoti Rawat* ***Rapporteurs*** - Mr. Chetan Tyagi
09:30 – 11:00 (Hall V & Media Centre)	**LUTP Review by CEPT** ***MoHUA*** *- Shri Lalit Kumar, Under Secretary (UT-I)&Ms. PriyaMahadevan, Under Secretary (MRTS-III)* ***IUT*** *– Mr Sandeep Prusty* **Rapp.** Vishal Chaudhary
11:00 – 11:30*(Earth - 1st Floor)*	Tea Break
11:30 – 13:00 *(Hall – Moon III)*	**Session 3 – Role of State Government in Improving City Bus Service** ***Chairperson*** **–** Dr. Surendra Kumar Bagde, General Manager, BEST Undertaking • Mr Robin Kaenzig, Transport Economist, UK • Mr Gerald Ollivier, Lead Transport Specialist, World Bank • Mr. Rakesh Jain, Vice President – Business Development & Transportation Technology Solutions, DIMTS • Dr. Madan Regmi, United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) • Mr. Arun Bothra, Managing Director, Capital Urban Region Transport (CRUT), Bhubaneswar • Mr R.S. Bal, GM (Projects and Finance), PIDB Amritsar ***MoHUA*** *- Shri Jasbir Singh, Under Secretary (UT-V)*

	IUT** – Ms Anindita Ghosh & Mr Rahul Kapoor* ***Rapporteurs - Mr. Hemant Kumar
11:30 – 13:00 *(Hall – Moon IV)*	**Session 4 – How Women can be Empowered through Public Transport?** ***Chairperson –*** Mr M L Chotani, Consultant – IUT & Former Director AMDA • Dr. Axel Friedrich, Former Head of Transport and Noise Division, German Environmental Agency • Ms. Daniela Coimbra Swiatek, Expert Consultant for Mobility Innovation, Sao Paolo, Brazil • Mr Christian Vosseler, Senior Project Manager, KFW • Dr Nitika Bhakuni, Associate Professor, CEPT University ***IUT** – Mr Ankit Pachauri* ***Rapporteurs*** - Mr. Pradeep Verma
11:30 – 13:00 *(Hall – Moon II)*	**Round Table 5: Bus Karo: National Public Transport Investment Program** (Sponsored by WRI) ***Moderator*** - Dr OP Agarwal, CEO, WRI India ***Panellist*** • Prof. Shivanand Swamy, Executive Director, CEPT University • Mr. H. K. Gupta, Chief General Manager, HRTC • Mr. Vivek Chandran, Shakti Foundation • Amit Bhatt, Director (Integrated Urban Transport), WRI India • Mr. K. R. Jyothilal, Principal Secretary, Transport Dept., Govt. of Kerala ***IUT** – Mr Sandeep Prusty* **Rapporteurs** Ankit Kant
11:30 – 13:00 *(Hall – Moon I)*	**Poster making Session with School Children - Problems they Face in Mobility** ***MoHUA**–Shri Biswanath Sahoo, Under Secretary* ***IUT** – Ms Minoti Rawat* ***Rapporteurs*** - Mr. Chetan Tyagi
11:30 – 13:00 (Hall V & Media Centre)	**LUTP Review by CEPT** ***MoHUA** - Ms. Priya Mahadevan (UT-II) & Shri Lalit Kumar, Under Secretary (UT-I)* ***IUT** – Mr Soumya Ranjan & Ms Devika* **Rapp.** Vishal Chaudhary
13:00 – 14:30 *(Hall – Strome/ Saturn)*	Lunch
14:30 – 16:00 *(Hall – Moon III)*	**Session 5 –Child Friendly Mobility** ***Chairperson*** - Mr Mukesh Meshram, Divisional Commissioner, Lucknow • Mr B.I. SIngal, Former Director General, Institute of Urban Transport (India) • Mr Amit Bhatt, Director (Integrated Urban Transport), World Resources Institute

	• Mr Kasinath Anbu, Technical Advisor, GIZ ***MoHUA*** *- Mr J. Sankar, Under Secretary (MRTS-IV)* ***IUT*** *– Mr Sandeep Prusty & Mr Rahul Kapoor* ***Rapporteurs*** - Mr. Hemant Kumar
14:30 – 16:00 *(Hall – Moon IV)*	**Session 6 – Introduction of Electric Mobility: Challenges in Implementation** • ***Chairperson*** **-** Mr. Ajay R. Charthankar, Joint Managing Director, Pune Mahanagar Parivahan Mahamandal Ltd. (PMPML) • Mr. Shirish Mahendru, GIZ • Mr Weimin Zhou Sr. Transport Specialist, World Bank, China • Mr Stefan Bakker, Team Leader, GFA Consortium Group, Netherlands • Mr. Mohit Dubey, CEO, Chalo ***MoHUA*** *- Ms. Priya Mahadevan, Under Secretary (MRTS-III)* ***IUT*** *– Ms Devika S* ***Rapporteurs*** - Mr. Pradeep Verma
14:30 – 16:00 *(Hall – Moon II)*	**Round Table 6 – City Bus Service** ***Chairperson*** – Mr Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs ***Moderator*** - Dr O.P. Agarwal, CEO, WRI **Presenter** – Shri K. Sanjay Murthy, Additional Secretary, Ministry of Housing and Urban Affairs, Government of India ***Panellist*** – • Mr. Jaideep, OSD (UT) &Ex. Officio Joint Secretary, MoHUA • Dr.Surendra Kumar Bagde, General Manager, BEST Undertaking • Mr R.S. Bal, GM (Projects and Finance), PIDB Amritsar • Mr. Anand Prakash Tiwari, Managing Director, Assam State Transport Corporation • Mr. Rakesh Jain, Vice President – Business Development & Transportation Technology Solutions, DIMTS • Mr M. Ramsekhar, MD, DIMTS • Mr AjaiMathur, Managing Director, UMTC • Dr Rajesh Pandya, Deputy Municipal Commissioner, Surat Municipal Corporation • Ms. Rolley Mahendra Varma, Director (Transport), NitiAayog • Dr. Shriniwas Arkatkar, Assistant Professor, SVNIT, Surat • Prof. Shivanand Swamy, Executive Director, CEPT University, Ahmedabad ***MoHUA*** *- Ms Rachna Kumar, Under Secretary (MRTS-Coord)* ***IUT*** *– Ms Anindita Ghosh & Mr Ankit Pachouri*

	Rapporteurs Ankit Kant
14:30 – 16:00 (Hall V & Media Centre)	**LUTP Review by CEPT** ***MoHUA*** *- Shri Lalit Kumar, Under Secretary (UT-I)&Shri Kumar Manoj Kashyap, Under Secretary (MRTS-I)* ***IUT*** *–Mr Rahul Kapoor & Ms Minoti Rawat* **Rapp**. Vishal Chaudhary
16:00 – 16:30 *(Earth - 1st Floor)*	Tea Break
16:30 – 18:00 *(Hall – Mercury)*	**Plenary Session 1 – Panel Discussion on Accessible Mobility** ***Chairperson –*** Dr O.P. Agarwal, CEO, WRI ***Moderator –*** Mr Jaideep, OSD (UT) & Ex. Officio Joint Secretary, MoHUA • Prof. Shivanand Swamy, Executive Director, CEPT, Ahmedabad • Mr. Janardan Prasad, Director, MRTS-II, MoHUA • Mr. Pankaj Kumar Bansal, Managing Director, Chennai Metro • Mr MATSUMURA Shigehisa, NIKKEN SEKKEI Research Institute, Tokyo ***MoHUA*** *- Shri Biswanath Sahoo, Under Secretary (UT-II)* ***IUT*** *– Ms Vijaya Rohini Kodati & Mr Sandeep Prusty* ***Rapporteurs*** - Mr. Ankit Kant and Mr. Vishal Chaudhary
Day 3 – 17.11.19 (Sunday)	
09:30 – 11:00 *(Hall – Moon III)*	**Research Symposium 4 –Improving Public Transport** ***Chairperson –*** Mr A. K. Gupta, Director, RCUES, Lucknow • Reasons and Circumstances for Choosing Toto Operation as an Occupation: A Case of Two Adjacent Municipalities of Kolkata Metropolitan Area by Ms Suranjana Chaudhuri, IIESTS • Assessing the Impact of Shift of AMTS buses on the BRTS Corridor by Ms Divyanka Dhok, CEPT University, Ahmedabad • Funding Public Transport in Urban areas Case of Bangalore, Mumbai, Ahmedabad by Ms Ishita Gautam, CEPT University, Ahmedabad • Modelling dwell time variation for the city bus transport system of Surat city by Mr Dawda Nandan , SVNIT Surat ***MoHUA*** *- Shri Kumar Manoj Kashyap, Under Secretary (MRTS-I)* ***IUT*** *– Mr Rahul Kapoor* ***Rapporteurs*** - Mr. Hemant Kumar
09:30 – 11:00 *(Hall – Moon IV)*	**Research Symposium 5 – Innovations & Technology** ***Chairperson*** **-** Dr Syed Aqeel Ahmad, HOD, Integral University, Lucknow • Impact of Transport Technologies in Shaping Future Cities Towards Sustainability by Mr Soumyajit Dutta, School of Planning and Architecture, New Delhi • An Approach Towards Sustainable Transportation: A Case Study of Public Bike by Mr Samir Patel, Dr. Chetan R. Patel, Mr Bhasker V. Bhatt, Dr Gaurang J. Joshi, SVNIT Surat and Dr Rajesh J.

	Pandya, Deputy Commissioner, Surat Municipal corporation • Impact of Navigation Apps on Travel Behaviour in Delhi by Mr Ede Sowmya, School of Planning and Architecture, New Delhi ***MoHUA*** *- Ms. Priya Mahadevan, Under Secretary (MRTS-III)* ***IUT*** *– Mr Soumya Ranjan* ***Rapporteurs*** - Mr. Pradeep Verma
09:30 – 11:00 *(Hall – Moon II)*	**Research Symposium 6 – Big Data & Artificial Intelligence** ***Chairperson*** **–** Dr. Shriniwas Arkatkar, Assistant Professor, SVNIT, Surat • Appraisal of Different Artificial Intelligence Techniques for Travel Demand Analysis by Ms Suchismita Nayak, IIT Karagpur • Artificial Intelligence and the Urban Transport- The Arguments for Precision, Sustainability, and Environment by Sheikh Muzamil Hussain, CEPT University, Ahmedabad • Analyzing travel time variability using Wi-Fi detections by Mr. Ninad Gore, SVNIT Surat • Impact of Common Mobility Card on Travel Pattern: A Case Study of Delhi, Ms Anshula Gumber, School of Planning and Architecture, New Delhi ***MoHUA*** *- Shri J.Sankar, Under Secretary (MRTS-IV)* ***IUT*** *– Ms Devika S* ***Rapporteurs*** - Mr. Chetan Tyagi
09:30 – 11:00 (Media Centre)	**Takeaways from Energy Sector Maintenance Assistance Programme (ESMAP) Implementation** **Chairperson –** Mr. Sudesh Kumar, TL, PMC ESCBS, Mott MacDonald **Presenter –** Ms. Shivani Rai, ***IUT-*** *Mr Sandeep Prusty*
09:30 – 11:00 *(Hall – Moon V)*	**Round Table 7 – Guidelines on Parking Management for Small and Medium Towns** (research Study of MoHUA) ***Chairperson-*** Dr. Pawan Kumar, Assistant TCP, Town & Country Planning Organisation (TCPO) ***Presenter*** – Ms Vijaya Rohini, Urban Transport Planner, Institute of Urban Transport, India ***Panellist*** • Dr. P.K. Sarkar, Director, Asian Institute of Transport • Ms Aswathy Dilip, Senior Programme Manager, Institute for Transportation and Development (ITDP) ***MoHUA*** *- Ms. Rachna Kumar, Under Secretary (MRTS-Coord)* ***IUT*** *– Ms Vijaya Rohini Kodati, Ms Anindita Ghosh* **Rapp.** Vishal Chaudhary
09:30 – 11:00 (Media Centre)	**Takeaways from Energy Sector Maintenance Assistance Programme (ESMAP) Implementation**

	Chairperson – Mr. Abhijit Sarkar, Training Expert, PMC ESCBS, Mott MacDonald **Presenters** • Mr. Gyan Prakash, Joint Dir. (Transport), Petroleum Conservation Research Association (PCRA) • Mr. Rakesh Kumar Agrawal, Deputy Director (Transport), PCRA • Mr. N. Srinivas • Mr. I. C. Sharma, Project Manager, SUTP • Shri K. Sanjay Murthy, Additional Secretary, MoHUA, Govt. of India ***IUT-*** *Mr Sandeep Prusty*
11:00 – 11:30 *(Earth - 1st Floor)*	Tea Break
11:30 – 13:00 *(Hall – Moon III)*	**Session7 – Clean Air Action Plan: Mitigations in Urban Transport Sector in Reducing Pollution** ***Chairperson*** – Mr. Stefan Bakker • Ms Anumita Roy Chowdhury, Executive Director, CSE • Dr. Axel Friedrich, Former Head of Transport and Noise Division of German Environmental Agency • Mr. Harish Chandra Nayak, Additional Commissioner - Enforcement, Bhubaneswar Development Authority ***MoHUA*** *- Shri Lalit Kumar, Under Secretary (UT-I)* ***IUT*** *– Mr Sandeep Prusty, Mr Rahul Kapoor* ***Rapporteurs*** - Mr. Hemant Kumar
11:30 – 13:00 *(Hall – Moon IV)*	**Session 8 –Technology to Leverage Services for Improved Mobility** ***Chairperson*** **–** Dr. Sanjay Gupta, Head of Department (Transport Planning), SPA Delhi • Dr Rajesh Pandya, Deputy Municipal Commissioner, Surat Municipal Corporation • Ms. Daniela Coimbra Swiatek, Expert Consultant for Mobility Innovation, Sao Paolo, Brazil • Light Rail Solutions at Grade – Mr Ankur Mohan Agarwal, General Manager, Technical, CAF India Pvt. Ltd. • Mr. T V Shrinivas, Senior General Manager, Tata Motors, Pune ***MoHUA*** *- Shri Biswanath Sahoo, Under Secretary (UT-II)* ***IUT*** *– Ms Minoti Rawat, Mr Soumya Ranjan Nayak* ***Rapporteurs*** - Mr. Pradeep Verma
11:30 – 13:00 *(Hall – Moon II)*	**Round Table 8 - Training Need Assessment for E-buses** (supported by GIZ) ***Chairperson*** **–** Mr. Roland Haas, Senior Technical Advisor, GIZ ***Moderators*** **–** • Mr. Laghu Parashar, Senior Technical Advisor, GIZ • Mr. Rahul Bagdia, Managing Director, pManifold Business Solutions Pvt. Ltd. Speakers – • Mr. Krishna Sharma, Vice President and Business Head -

	Electric Vehicle Supply Equipment (EVSE), Exicom Tele Systems Limited • Mr. Naga Satyam, Executive Director, Olectra-BYD • Mr. Arindam Lahiri, CEO, Automotive Skills Development Council (ASDC) • Mr. H. K. Gupta, Chief General Manager, Himachal Road Transport Corporation (HRTC) • Dr. Prabhjot Kaur, CEO - Centre of Battery Engineering and Electric Vehicles (C-BEEV), IIT Madras ***IUT*** *– Ms Devika S* ***Rapporteurs*** Ankit Kant
11:30 – 13:00 (Hall – Moon I)	**Round Table 9: Moving Ahead on NCMC** ***Chairperson –*** Dr.Surendra Kumar Bagde, General Manager, BEST Undertaking • Presentation on Pilot Project of Noida Metro by Shri. S.S. Joshi, Director (Rolling Stock), Delhi Metro Rail Corporation (DMRC) • Presentation on Pilot Project of BEST by Dr.Surendra Kumar Bagde, General Manager, BEST Undertaking • Presentation on National Common Mobility Card Ecosystem by Mr Rajesh Kushwaha, CDAC ***Panellist –*** • Managing Directors, Metro Rail Company • Directors, Ministry of Housing and Urban Affairs • Representatives of Bus Operating Companies • Representatives from Cities • Managing Directors of BRTS Companies • Representatives of Leading Banks ***MoHUA*** *- Shri Jasbir Singh, Under Secretary (UT-V)* ***IUT*** *– Mr Ankit Pachouri* ***Rapporteurs*** - Mr. Shivam Shukla ***Rapporteurs*** - Mr. Chetan Tyagi
11:30 – 13:00 *(Hall – Moon V)*	**Round Table 10 – Innovative PPP Engagements to Increase Revenue for STUs and SPVs (supported by CHALO)** ***Moderator –*** Mr. Mohit Dubey – CEO and Co-founder, Chalo ***Panellists –*** • Mr K. R. Jyothilal, Principal Secretary, Transport Department, Government of Kerala • Mr. Amarendra Prasad Singh, Administrator, Bihar Road Transport Corporation • Mr. Anand Prakash Tiwari, Managing Director, Assam State Transport Corporation • Mr. Y. Srinivasa Rao, Senior Manager – IT, Andhra Pradesh State Transport Corporation • Ms Swati Khanna, KfW

	• Mr. Rajendra Varma, India Program Lead, Urban Works Institute (ITDP)
11:30 – 13:00 (Media Centre)	**Round Table 11 - Options and Recommendations for Resolving Regulatory, Institutional & Fiscal Constraints in providing Efficient & Sustainable City Bus Services** **Chairperson:** Mr Jaideep, OSD (UT) &Ex. Officio Joint Secretary, MoHUA **Moderator –** Mr. Sudesh Kumar, TL, PMC ESCBS, Mott MacDonald **Presenter –** Mr. Rakesh Jain, Vice President – Business Development & Transportation Technology Solutions, DIMTS
13:00 – 14:30	Lunch *(Hall – Strome/ Saturn)*
14:30 – 16:00 *(Hall – Mercury)*	**Plenary Session 2 – Avenues for Increased Revenue and cost cutting Methods in Metro Rail Systems** ***Chairperson*** **–** Mr Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs ***Moderator*** - Mr Kumar Keshav, Managing Director, UP Metro Rail Corporation • Mr Mangu Singh, Managing Director, Delhi Metro Rail Corporation • Mr Brijesh Dixit, Managing Director, Maha Metro Rail Corporation • Mr. Alkesh Kumar Sharma, Managing Director, Kochi Metro Rail Ltd. • Mr P.K. Bansal, Managing Director, Chennai Metro Rail Ltd. • Mr Ajay Seth, Managing Director, Bangalore Metro Rail Corporation Limited • MATSUMURA Shigehisa, NIKKEN SEKKEI Research Institute, Tokyo ***MoHUA*** *- Shri Janardan Prasad, Director (MRTS-I), Shri Kumar Manoj Kashyap, Under Secretary (MRTS-I) &Shri Jasbir Singh, Under Secretary* ***IUT*** *– Ms Anindita Ghosh &Mr Ankit Pachauri* ***Rapporteurs*** – Mr. Hemant Kumar & Pradeep Verma
16:00 – 16:30 *(Hall – Mercury)*	Tea Break
16:30 – 18:00 *(Hall – Mercury)*	**Valedictory Session** • Welcome Address by Shri Manoj Kumar, Principal Secretary (Urban Development), Government of Uttar Pradesh • Opening Remarks by Shri Deepak Kumar, Principal Secretary (Housing & Urban Planning), Government of Uttar Pradesh • Address by Shri Rajendra Kumar Tiwari, Chief Secretary, Government of Uttar Pradesh • Address by Shri Ashutosh Tandon, Hon'ble Minister for Urban Development of Uttar Pradesh • Address by Dr. Dinesh Sharma, Hon'ble Deputy Chief Minister of Uttar Pradesh • Valedictory Address & Launch of UMI 2020 by Shri Durga

	Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs, Government of India • Presentation of Awards for Excellence in Urban Transport & Urban Mobility Awards by Dr. Dinesh Sharma, Hon'ble Deputy Chief Minister of Uttar Pradesh • Vote of Thanks by Shri K. Sanjay Murthy, Additional Secretary, Ministry of Housing and Urban Affairs, Government of India ***MoHUA*** *- Shri C.Uppili , Director (MRTS-II),&Shri J.Sankar, Under Secretary (MRTS-IV)&Shri Lalit Kumar, Under Secretary (UT-I)* ***IUT*** *– Ms Vijaya Rohini Kodati, Ms Anindita Ghosh* ***Rapporteurs*** - Mr. Chetan Tyagi & Vishal Chaudhary
18:00 onwards *(Hall – Mercury)*	High Tea

Annexure-II

List of Sponsors

Sl. No.	Name of Organization	Category
1	Bangalore Metro Rail Corporation Ltd.	Lead Sponsor
2	Uttar Pradesh Metro Rail Corporation Ltd.	Diamond Sponsor
3	Delhi Metro Rail Corporation Ltd.	Diamond Sponsor
4	Mumbai Metro Rail Corporation Ltd.	Diamond Sponsor
5	National Capital Region Transport Corporation	Diamond Sponsor
6	Maharashtra Metro Rail Corporation Limited	Platinum Sponsor
7	Gujarat Metro Rail Corporation Limited	Platinum Sponsor
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10	Madhya Pradesh Metro Rail Corporation Limited	Gold Sponsor
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13	World Resources Institute (WRI)	Silver Sponsor
14	National Payments Corporation of India	Silver Sponsor
15	Titagarh	Silver Sponsor
16	Efficient and Sustainable City Bus Services Project	Silver Sponsor
17	CAF	Other Sponsor
18	Deutsche Bahn	Other Sponsor

Annexure-III

List of Exhibitors

Sl. No.	Name of Organization
1	GIZ
2	Datamatics
3	Assam State Transport Corporation
4	Mumbai Metropolitan Region Development Authority
5	Madhya Pradesh Metro Rail Corporation Limited
6	Delhi Metro Rail Corporation Ltd.
7	Gujarat Metro Rail Corporation Limited
8	Yulu
9	Eventure
10	National Payments Corporation of India
11	Titagarh
12	Maharashtra Metro Rail Corporation Ltd.
13	Mumbai Metro Rail Corporation Ltd.
14	Lucknow Metro Rail Corporation Ltd.
15	National Capital Region Transport Corporation
16	Chalo
17	Bharat Electronics Ltd.
18	Alstom
19	Olectra

Annexure-IV

List of Knowledge and Media Partners

Sl. No.	Name of Organization	Category
1	GIZ	Knowledge Partner
2	Rail Analysis	Media Partner
3	Metro Rail News	Media Partner
4	Geospatial Media and Communications	Media Partner
5	Urban Transport News	Media Partner
6	TrafficInfra Tech	Media Partner

Annexure-V

Abbreviations and Acronyms

AFCA	-	Automated Fare Collection System
AFD	-	AAGENCE FRANÇAISE DE DÉVELOPPEMENT - FRENCH DEVELOPMENT AGENCY
AICTSL	-	Atal Indore City Transport Services Ltd.
AMRUT	-	Atal Mission for Rejuvenation and Urban Transformation
ATM	-	Automated Teller Machine
BEV	-	Battery Electric Vehicle
BHLS	-	Buses with High Level of Service
BIM	-	Building Information Modelling
BMRCL	-	Bangalore Metro Rail Corporation Ltd.
BRT	-	Bus Rapid Transit
BTE	-	Brake Thermal Efficiency
CAPEX	-	Capital Expenditure
C-BEEVs	-	Centre for Battery Engineering and Electric Vehicles
CDAC	-	Centre for Development of Advanced Computing
CEO	-	Chief Executive Officer
CEPT	-	Centre for Environment Planning and Technology (Ahmedabad)
CMP	-	Comprehensive Mobility Plan
CNG	-	Compressed Natural Gas
CO_2	-	Carbon Dioxide
COE	-	Certificate of Entitlement (Singapore) / Centre of Excellence
COO	-	Chief Operating Officer
COP-21	-	Conference of Parties
CPCB	-	Central Pollution Control Board
CSE	-	Centre for Science &Environment
CTU	-	City Transport Undertaking
DFC	-	Dedicated Freight Corridor
DIMTS	-	Delhi Integrated Multi Modal Transit System Ltd.
DMRC	-	Delhi Metro Rail Corporation
DMU	-	Diesel Multiple Unit
DPR	-	Detailed Project Report
DTC	-	Delhi Transport Corporation
E-Bus	-	Electric Bus
EBL	-	Exclusive Bus Lanes
E-Cars	-	Electric Cars
EEA	-	European Environment Agency
E-Rickshaw	-	Electric Rickshaw
ERP	-	Electronic Road Pricing
ESCAP	-	Economic and Social Commission for Asia and the Pacific
EV	-	Electric Vehicle

FAME India	-	Faster Adoption and Manufacturing of Hybrid and Electric Vehicle India
FAR	-	Floor Area Ratio
FIR	-	First Information Report
FIRR	-	Financial Internal Rate of Return
FSI	-	Floor Space Index
GDP	-	Gross Domestic Product
GHG	-	Green House Gases
GIZ	-	Gesellschaft Zusammenarbiet (German Institute)
GOI	-	Government of India
GPS	-	Global Positioning Systems
HDV	-	High Density Vehicle
HOVs	-	High Occupancy Vehicles
HVAC	-	Heating, Ventilation and Air Conditioning
IC Engine	-	Internal Combustion Engine
ICCE	-	International Centre for Culture and Eduction
ICLEI	-	International Centre for Local Environmental Initiatives
ICT	-	Information communication and Technology
IDC	-	Internet Database Connection
IIT	-	Indian Institute of Technology
INDC	-	Intended Nationally Determined Contribution
IPCC	-	Inter-governmental Panel on Climate Change
IPT	-	Intermediate Public Transport
IT	-	Information Technology
ITDP	-	Institute for Transport and Development Policy (USA)
ITMS	-	Integrated Transport Management System
ITS	-	Intelligent Transport System
IUT	-	Institute of Urban Transport (India)
IWT	-	Inland Water Transport
JTPA	-	Japan Transport Planning Association
KfW	-	Kreditanstalt für Wiederaufbau (German government-owned development bank)
KMC	-	Knowledge Management Centre
KMRL	-	Kochi Metro Rail Ltd.
KSRTC	-	Karnataka State Road Transport Corporation
LCC	-	Life Cycle Cost
LDV	-	Light Duty Vehicle
LMATA	-	Lagos Metropolitan Area Transport Authority (Lagos)
LRT	-	Light Rail Transit
LRV	-	Light Rail Vehicle
LTA	-	Land Transport Authority (Singapore)
LVC	-	Land Value Capture
MAHA Metro	-	Maharashtra Metro Rail Corp. Ltd.
MD	-	Managing Director
MEGA	-	Metro-Link Express for Gandhinagar and Ahmedabad
MMRCL	-	Mumbai Metro Rail Corporation Limited

MMT	-	Million Metric Tons
MoF	-	Ministry of Finance (India)
MoHUA	-	Ministry of Housing and Urban Affairs
MoRTH	-	Ministry of Road Transport and Highway (India)
MoUD	-	Ministry of Urban Development
MRT	-	Mass Rapid Transit
MRTP Act	-	Maharashtra Regional and Town Planning Act.
MTSU	-	Mumbai Transport Support Unit
NAPCC	-	National Action Plan on Climate Change
NBT	-	Navbharat Times (Delhi)
NCAP	-	National Clean Air Programme
NCMC	-	National Common Mobility Card
NCRPB	-	National Capital Region Planning Board
NCRTC	-	National Capital Region Transport Corporation
NDC	-	National Development Council
NEERI	-	National Environmental Engineering Research Institute (Nagpur)
NEKRTC	-	North Eastern Karnataka Road Transport Corporation
NEMMP	-	National Electric Mobility Mission Plan
NGO	-	Non-Governmental Organisation
NMEM	-	National Mission for Electric Mobility
NMT	-	Non-Motorized Transport
NMV	-	Non Motorised Vehicle
NPCI	-	National Payment Corporation of India
NTDPC	-	National Transport Development Policy Committee
NUTH	-	National Urban Transport Helpline
NUTP	-	National Urban Transport Policy
O&M	-	Operation and Maintenance
OECD	-	Organisation for Economic Corporation and Development
OEM	-	Original Equipment Manufacturer
OFCS	-	Optical Fiber Communication System
OPEX	-	Operating Expenditure
OSD & E.O.J.S	-	Officer on Special Duty & Ex-Officio Joint Secretary
PBMS	-	Punjab Bus Metro Society
PBS	-	Public Bicycle Sharing
PCMC	-	Pimpri Chinchwad Municipal Corporation
PHEVs	-	Plug-in Hybrid Electric Vehicles
PHPDT	-	Peak Hour Peak Direction Traffic
PMU	-	Project Management Unit
PMV	-	Personal Motorized Vehicles
POS	-	Point of Sale
PPA	-	Power Purchase Agreement
PPH	-	Persons per Hectare
PPHPD	-	Passengers per Hour per Direction
PPP	-	Public – Private – Partnership
PRT	-	Personal Rapid Transit

PSD	-	Platform Screen Doors
PT	-	Public Transport
RESCO	-	Renewable Energy Service Company
RFP	-	Request for Proposals
RITES	-	Rail India Technical and Economic Services Ltd.
ROW	-	Right of Way
RRTS	-	Regional Rapid Transit System
RTCs	-	Roadway Toll Collection System
RTE	-	Right to Education Act
SARAL	-	Safe, Accessible, Reliable, Advance and Low Carbon
SME's	-	Small & Medium Enterprise
SPA	-	School of Planning and Architecture
SPVs	-	Special Purpose Vehicle
STUs	-	State Transport Undertaking
SUTP	-	Sustainable Urban Transport Project
SUV	-	Support Utility Vehicle
TCPO	-	Town and Country Planning Organisation
TDM	-	Travel Demand Management
TDR	-	Transferable Development Rights
TERI	-	The Energy and Resources Institute
TfL	-	Transport for London
TOD	-	Transit Oriented Development
TRTC	-	Telangana Road Transport Corporation
UEMI	-	Urban Electric Mobility Vehicles Initiative
UITP	-	Union International des Transports Publics (International Association of Public Transport)
UK	-	United Kingdom
UMI	-	Urban Mobility India
UMTA	-	Unified Metropolitan Transport Authority
UMTC	-	Urban Mass Transit Company Ltd.
UN	-	United Nation
UNDP	-	United National Development Programme
UNEP-DTU	-	United Nations Environment Programme - Division of Technology
VGF	-	Viability Gap Funding
VKT	-	Vehicle Kilometers of Travel
VMT	-	Vehicle Miles Traveled
V2X	-	Vehicle to Everything
WRI	-	World Resources Institute

Proceedings prepared by Shri M. L. Chotani, Consultant / RDO, assisted by Ms. Shabnam Rana, Assistant (UMI) and edited by Shri Sumit Chatterjee, Officiating Executive Secretary.

Institute of Urban Transport (India)
1st Floor, Anand Vihar Metro Station Building, Delhi – 110092
www.urbanmobilityindia.in