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NATIONAL TRANSPORT DEVELOPMENT POLICY COMMITTEE (NTDPC)

Working Group on Urban Transport



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Final Report

डॉ॰ सुधीर कृष्ण
Dr. Sudhir Krishna

सचिव भारत सरकार
Secretary to the Government of India

शहरी विकास मंत्रालय
निर्माण भवन, नई दिल्ली–110108
MINISTRY OF URBAN DEVELOPMENT
NIRMAN BHAVAN, NEW DELHI-110108
Tel. : 23062377, Fax : 23061459
E-mail : secyurban@nic.in
URL : http://urbanindia.nic.in

D.O. No.K-14011/3/2010-UT
Dated : 21st December, 2011.

Dear Dr. Rakesh Mohan

Working Group on Urban Transport for National Transport Development Policy Committee (NTDPC) was constituted by Planning Commission vide their OM No.3/1/2010-Tpt. dated 19th July, 2010 under the chairmanship of undersigned with Shri S.K. Lohia, OSD(UT) & Ex-officio Joint Secretary, Ministry of Urban Development as the Member Secretary, besides several eminent Members.

2. The Terms of the reference of the committee inter-alia, includes assessment of transport requirements of the economy for the next two decades and to recommend a comprehensive and sustainable policy, to assess the investment requirement of the transport sector, to examine the laws, rules and regulation pertaining to regulations various modes of transport and to suggest measures to improve the capacity and evolve implementing projects etc.

3. The Working Group discussed the issues in its various meetings. National consultations were also held by the Working Group to elicit the views of the different stake holders. After, detailed deliberations as well as taking into account the views of NTDPC members, a final Report has been prepared which is attached (alongwith executive summary) for further necessary action. A soft copy of the report is available with the Member Secretary for further use. It is also placed on the website of MoUD

4. I would like to take this opportunity to thank all the members of the Working Group for their unstinted cooperation in going through voluminous data and enabling the group to produce the Report in time. I must express my gratitude specially to the Member Secretary who put in great efforts burning mid-night oil in collating the data and giving shape to the Report in the required form. My thanks are also due to the Institute of Urban Transport and specially to its Director General Shri B.I. Singhal who spared no efforts in compiling the

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voluminous data, giving the professional touch and producing the Report in its present form. I would also like to thank Miss Anvita Arora, Senior Urban Transport Specialist with JnNURM Technical Cell, MoUD and Ms. Sonia Arora, Manager (Transport), UMTC for doing proof reading, providing professional inputs and formatting the report its present form.

With regards,

Yours sincerely,

(Sudhir Krishna)

Dr. Rakesh Mohan,
Chairman,
National Transport Development Policy Committee (NTDPC)
6th Floor, The Capital Court,
Olof Palme Marg, Munirka,
New Delhi-110067.

National Transport Policy Development Committee (NTDPC)
Working group on Urban Transport

List of Members

1. **Dr. Sudhir Krishna, Chairman**
   Secretary, Ministry of Urban Development,
   Government of India, Nirman Bhawan, New Delhi

2. **Shri S.K. Lohia, Member Secretary**
   OSD (UT) and EO JS, Ministry of Urban Development,
   Government of India, Nirman Bhawan, New Delhi

3. **Shri B.N. Puri,**
   Member, Coordinator- NTDPC,
   Planning Commission, Yojana Bhawan, New Delhi

4. **Shri R. Gopalan,**
   Secretary,
   Deptt. of Financial Services, North Block, New Delhi

5. **Shri Manu Kumar Srivastava,**
   Principal Secretary, Urban Development,
   Govt. of Maharastra, Mantralaya, Mumbai.

6. **Shri Rajiv Chaudhry,**
   Executive Director (WP)
   Ministry of Railway, Rail Bhawan, New Delhi

7. **Shri P.S. Kharola,**
   Commissioner, Department of Commercial Taxes,
   Vaniya Therige Karyalaya, Gandhi Nagar, Bengaluru

8. **Shri S. Sunder,**
   Distinguished Fellow,
   The Energy and Resource Institute(TERI)
   Darbari Seth Block, India Habitat Centre Complex, New Delhi

9. **Shri B.I. Singal,**
   Director General, IUT,
   Nirman Bhawan, NBO Building, New Delhi.

10. **Prof. Dinesh Mohan,**
    Transportation Research & injury Prevention Programme (TRIPP),
    Indian Institute of Technology, New Delhi

11. **Prof. Sudhir Chella Rajan,**
    Department of Civil Engineering,
    Indian Institute of Technology Madras, Chennai

12. **Prof. CSRK Prasad,**
    Head Transport Division, NIT, Warangal (AP)

13. **Prof. Geetam Tiwari,**
    Associate Professor-TRIPP
    Indian Institute of Technology, New Delhi

14. **Prof. H.M. Shivanand Swamy,**
    Professor and Associate Director,
    Centre for Environmental Planning & Technology (CEPT) University, Ahmedabad

15. **Dr. Ashwin Mahesh,**
    Indian Institute of Management,
    Bennerghatta Road, Bengaluru

16. **Shri S.N. Sahai,**
    MD & Chief Executive Officer,
    DIMMTS Ltd., Maharana Pratap ISBT, Kashmere Gate, Delhi-6

17. **Shri K. Ramchand,**
    Director, M/s ILFS,
    2-A Bhikaji Cama Place, New Delhi

18. **Shri Vinayak Chattarjee,**
    MD & CEO,
    M/s Feedback Ventures, DLF, Cyber City, Phase, III, Gurgaon.

19. **Shri Ajai Mathur,**
    MD, UMTC, 5th Floor, A-Wing,
    IFCI Tower, 61, Nehru Place, New Delhi

20. **Shri C.N. Raghupathi,**
    Vice President, M/s Infosys,
    K-30 Green Park Main,New Delhi-110016

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1 EXECUTIVE SUMMARY

Cities are important as they contribute most to the 'gross domestic product' of a country. This figure today is about 60%. By 2030 this figure is estimated to grow to about 70%. Urban transport is a key urban service that imparts efficiency to the city by providing mobility to the workforce and hence best productivity.

Urban transport policy can contribute to poverty reduction both through its impact on the city economy and hence on economy growth and through its direct impact on the daily needs of the very poor. Urban transport impacts the development of the city economy. The economic performance of cities can be improved by better integrating transport with other aspects of city development strategy.

At present there is a huge deficit in urban transport services and infrastructure both in quality and quantity. The use of desirable modes; walk, bicycle and public transport is declining and the use of undesirable modes i.e. car and 2-wheeler is growing. As a result congestion is increasing, mobility is reducing and pollution, use of fossil fuel and accidents are rising.

The ongoing urbanization will make the situation worse in the 'business as usual' scenario. The Energy and Resources Institute (TERI), a Delhi-based non-governmental organization (NGO), has forecast that India's commercial energy demand and emissions will increase by more than seven times under business as usual scenario (if nothing is done to curb the emissions) from the existing levels by 2031/32. An MORTH committee on road safety and traffic management (February, 2007) estimated about 50% increase in road accidents over a 10 year period (2005-15). There is thus an urgent need to reverse the present trend.

Two recent study reports, one each by Mckinsey Global Institute and the 'High powered expert

Urban transport should grow along a sustainable path to support the desired economic growth, protect the environment and to improve the quality of life

committee' commissioned by Ministry of Urban Development Government of India have projected that Mass rapid transit services and roads (The main infrastructure for urban transport) together require nearly 50% of the total projected investment for various urban services (including housing) in cities. This amounts to nearly Rs one lakh crore per year for the next 20 years. The estimate of the working group on urban transport shows that this investment can be reduced by nearly 30 % by pro-actively promoting sustainable practices.

1.1 POLICY INTERVENTIONS NEEDED TO ACHIEVE THE SUSTAINABLE SCENARIO

A paradigm shift is needed in approach to urban transport with three key strategies, namely, **Avoid, Shift and Improve**. The most important aspect for the sustainable path is to 'avoid' increased demands for mobility by reducing the number of trips as well as also reducing the length of trips. The comprehensive mobility plan and the master plan of the city need to duly integrate the land use and transport thereby prevent the urban sprawl, promote mixed land use pattern and transit oriented development so that these contribute to short trip length and less dependence on motorized travel. As such, it is essential that law mandate integration of land use with transport, at the stage of planning itself. Using IT to reduce demand for Physical Transportation is one step. Government authorities responsible for traffic management may engage with businesses to encourage a tele/e-work culture and flexi-work hours and also encourage them to develop sustainable mobility plans for their staff.

A shift from personal vehicles to other mass transit and non-motorized modes is necessary to reduce energy demand from cities. Share of public transport on the average should be aimed at 60% of motorized trips and 35% of total trips including walk.

Measures such as Road congestion, fuel and parking pricing, restrictions on Vehicles use, Road space reallocation, Priority for bus and non-motorized modes and Flexible work hours will help. World experience has shown that an effective shift to public transport can occur only if transport demand management measures are adopted in tandem with increased provision of public transport.

Public transport network should include, the road network with all associated infrastructure such as parking, Road and rail based modes of transport, Intermediate Public Transport, and suburban rail and road based transport. **Improved accessibility of stations/stops** for the last mile connectivity should be a vital feature of public transport planning. Planning should be flexible and permit entry of new technology at a later date. **Buses** are the main component of public transport even when rail transit is provided. It is, therefore, essential that the financing of modern intelligent transport system enabled buses, both capital and revenue is placed on a firm footing because the very large number of small and medium size cities will not need rail transit. Planning should be flexible to permit the introduction of new technology options of the future.

Citywide footpaths for **walk** and dedicated lanes for **bicycles** should be provided to promote these green modes of transport. Funds allocation for major transport infrastructure should be linked to achieving targets for creating facilities for NMT. Maintenance and upkeep of the road surface with improved drainage should receive priority.

Clean efficient vehicle technology needs to be used both for private and public modes in order to reduce their fuel consumption and emissions. Fuel efficiency standards should be introduced in India and implemented effectively. The foregoing would contribute to: Reduction in private vehicles on-road, increase in public transport and NMT ridership, and a cleaner vehicle fleet. Better urban planning and a modal shift to public transport along with long-term transport plans are necessary to facilitate the growth of cities in a manner that is not hostile to the environment.

Cycle rickshaw is a public mode of personalized transport and best suited to provide the last mile connectivity. An upgraded cycle rickshaw should be assigned a role in an integrated citywide multimodal public transport network.

Intermediate public transport is a major public transport mode in most small and medium size cities and supplements mass rapid transit in large cities. It will continue to play a significant role in the foreseeable future. It needs technological upgrade.

For congestion management administrative steps and economic instruments should be used to discourage motorized vehicle ownership, discourage motorized vehicle use and encourage use of low emission technology. **Movement of goods** needs to be studied to evolve planning norms that permit goods movement without affecting passenger movement.

Program to improve **safety** should include a review of all road design and traffic management standards. Cities should undertake **safety audit** for hazardous locations to reduce accidents, fatalities and injuries. An effective Strategy to improve **safety** will include; Design solutions Management solutions and Partnership initiatives.

By 2030, **technology** should find extensive use to manage urban transport in the cities. Various forms of road pricing such as electronic road pricing, road tolls and congestion pricing should be used particularly in large cities. **Intelligent transport systems** should be implemented in a phased manner taking into account capability and technology maturity of the transport organization and operational requirement. Fuel and vehicle technology improvements should be supported by tax concessions.

1.2 INSTITUTIONAL FRAMEWORK AND CAPACITY BUILDING FOR IMPLEMENTATION

To undertake the huge challenge and to manage the massive investments needed in urban transport, two vital steps are needed; creating a strong institutional framework in cities, states and the center and upgrade of skills.

Urban transport, which is presently a constitutional and institutional orphan, has to be properly recognized in the constitution as well as in the institutional mechanism. Urban transport professionals, as a rule are not employed by cities. For the huge investments needed, the

institutional framework for urban transport has to be extensive and more importantly effective. Accordingly, it would require important policy interventions to effectively drive the urban transport agenda for the next 20 years. The important policy interventions proposed are as follows:

- Urban transport to be provided in the concurrent list (List III of Schedule VII) of the Constitution of India;
- A new department of urban transport to be set up in the Ministry of Urban Development at Government of India level and in Municipal Administration and Urban Development Department in each state / union territory with full time Secretary in charge;
- Setting up of Commission for Urban Road Transport Safety to cover safety certification and audit of road vehicles and road infrastructure in urban areas;
- Setting up of a Commission for Metro Railway Safety;
- Setting up MPC/DPC as envisaged in the 74th constitutional amendment for inter-sectoral coordination and setting up Unified Metropolitan Transport Authority in all million plus cities under the MPC/DPC duly supported by Transport Cell manned by trained Urban Transport professionals;
- The funds flow for urban transport projects to various implementing agencies (as they exist today) to be routed through UMTA;
- Providing infrastructure status to bus transport;
- Setting up of a National Urban Rail Transit Authority;
- Corporatization of suburban rail services – both existing systems and new systems;
- Tax exemptions to be provided for public transport, both for Metro rail as well as for buses so as to make provision of quality public transport cost effective;
- Setting up of Dedicated Urban Transport Fund at National, State level and city level;
- Taking up maintenance of major urban roads (arterial and sub arterial roads) on BOT Annuity mode with the concept of final road level;
- To provide seamless connectivity across various modes of transport, National Common Mobility Card- “More” and National Public Helpline with Helpline Nos. 155220 and 155221 to be introduced across all cities in India, covering all modes including parking, toll, etc.;
- Central Road Fund, especially the component generated from sale of petrol, to be used primarily for urban transport;
- All cities with a population of one lakh plus to have organized public transport;
- Introduction of a system of annual validation/renewal of driving license as well as registration certificate and annual road tax instead of life time rod tax;

- Taking up of new Central Sector schemes for innovation, research and development in guided transit to promote indigenization and development of low cost technologies, pilot projects, public bicycle scheme, improvement of para-transit through Intelligent Transport Systems and setting up of a research, design, standardization and standard setting cell for Metro Railway;
- Continuing the existing schemes of Urban Transport Planning and capacity building in urban transport with additional allocation and scope;
- Cities to be empowered to take care of its needs including Urban Transport;
- Creation of separate NMT cell in each Municipal corporation/ Municipality;
- Tying of small cost projects with large size projects for improving the effectiveness of large size projects;
- Making separate budgetary allocation for different components in the budget especially pedestrianisation, cycle facilities, ITS etc as whatever get budgeted gets done.

By 2030, it is envisaged that cities would have taken full charge of their own urban transport needs. MPC/DPC, UMTA and existing city agencies will constitute a 3-tier set up in cities. The Central Government should take care of issues such as financing, PPP, capacity building, developing a data base and R&D. State Government should empower the city with an institutional framework, legislation, a resource generation policy and professional staff. A Safety Board should be set up in each State to deal with safety issues in a comprehensive, scientific and a systematic manner. Relevant R&D should support it. Rescue services should be organized for fast relief.

UMTA should be a full time professional body working under a city council with representation from all city agencies and stakeholders including the surrounding region. It should undertake; integration and approval of proposals by city agencies such as the Municipality, Development Authority, Regional development authority and Traffic police; Strategy and Policy Functions; Regulatory Functions; Transport Demand Management; Organizing urban transport services; Providing Common Services; Resolution of day to day matters and Monitor the work assigned to implementing agencies both for the city and the surrounding region.

UMTA should be effective. The best way of imparting the desired strength to institutional framework essentially UMTA is to give it the authority for allocation of funds to various agencies in the city to undertake various UT related activities.

Capacity building to upgrade skills in states/cities should be both institutional and individual. The Ministry of Urban Development, Government of India has already initiated comprehensive steps for capacity building, setting up a knowledge management cum data base center, and organized R&D. These are ongoing activities and should be institutionalized.

1.3 ROLLING PLAN AND FINANCING STRATEGY

The rolling program is based on the 'service level bench marks' issued by MOUD. The SLBMs provide for four levels of service. It is assumed that all cities are at the starting point and will move up one notch every five years up to 2030. Different size cities require different infrastructure. A strategy for action in cities of various size and type has been developed. Short and long term actions are required to encourage use of Public Transport and to retain the existing modal share of NMT and walk.

The strategy for funding of urban transport should be based on Consortium approach in which Central and State Govt. / City Development Authorities, Property Developers, Private Sector, Debt from Multilateral / Bilateral institutions and Debt from domestic financial institutions contribute. The funds should be channeled into Dedicated Urban Transport funds to be set up at National and State level. Operating and Maintenance losses in public transport services are inevitable. Mechanism for covering these expenses needs to be specified. Buses are the main component of public transport even when rail transport is provided. It is, therefore, essential that the financing of buses, both capital and revenue is placed on a firm footing because a very large number of small and medium size cities will not need rail transit.

Since the huge investment needs at Central Government level, cannot be met from traditional budgetary sources alone, innovative financing mechanisms will, therefore, require to be tapped

if we have to not only catch up with the backlog but also provide for the future. With the traditional methods we shall continue to move from one crisis to another rather than being in control of situation. Learning from the global examples, on the "polluter pays principle", and the Central Road Fund, a dedicated (non lapsable and non fungible) Urban Transport fund should be set up at National level as envisaged in NUTP-2006. Funds at National level should be generated as follows:

- A Green Surcharge of Rs. 2 on petrol sold across the country: Knowing the fact that petrol (or motor spirit) is exclusively consumed by the personalized vehicles and its other uses are limited, a Green Surcharge on Diesel (or high speed diesel) is not recommended. Diesel in India has its multiple uses and it is difficult to segregate diesels sold to personalized vehicles. Based on the estimates, this green surcharge on sale of petrol in the country will generate about Rs. 3,100 Crore in the base year and about Rs 14,000 Crore over the period of first four years.
- A Green Cess on existing personalized vehicles: All vehicles in India are required to be insured every year. There are several public and private sector enterprises in India which provides insurance to the vehicles at the rate of 3 percent of the annual insured value both for car and two wheelers. It is proposed that an additional 4 percent of the vehicle's insured value shall be collected as Green Cess. It is estimated that during first year the total collection from this source in urban areas would be of about Rs. 18,000 Crore and the amount over first four years will total to about Rs. 83, 200 Crore.
- Urban Transport Tax on Purchase of New Cars and Two Wheelers: As Urban Transport Tax on purchase of new personalized vehicle, a 7.5% additional tax on petrol vehicles and additional 20% in case personalized diesel vehicles is proposed. This will be help in collecting about Rs 18,800 Crore in the first year and about Rs 88,800 Crore over first four years. In case of diesel cars, the urban transport tax has been recommended at 20% in order take care of the fact that diesel is

Six key funding sources for generating funds used for UT development are

- *User charges*
- *Support from Government- tax concessions & dedicated levies,*
- *Land Monetization,*
- *Non-user beneficiaries*
- *Debt*
- *PPP*

available at substantially subsidized price and will continue to be so in near future. For arriving at the estimates, diesel cars have been assumed to be about 30% of the total cars as against 35% indicated by the present annual sales figures.

The above levies will serve twin purpose of generating dedicated and sustained stream of resources for the dedicated urban transport fund and also, on the other hand serving as a disincentive for use of personalized vehicles as a demand containment measures because merely adding to the supply side of the urban transport is not enough to bring commuters on board. A similar fund would also need to be set up at State & city level albeit with different sources of funding.

Since various taxes and duties at Central Govt. level, State Govt. level and ULB level form a major component of the cost of modern public transport, it would be desirable to give substantial tax concessions on public transport, both Railways as well as bus based. Presently only the rail based MRTS is covered in the definition of infrastructure. It would be important that the bus based transport system is also covered in the definition of infrastructure so that the same can qualify for priority lending, long tenure finances at cheaper rates.

2 INTRODUCTION

The working group on urban transport set up by NTDPC is required to determine the role of urban transport in meeting transport requirements of the economy over the next two decades and to develop a rolling program for 2030 in consonance with the National Urban Transport Policy. The plan should cover urban agglomerations as well as satellite towns, including integrated suburban rail based systems. The plan should be based on the following considerations:

- Promote access of all citizens to jobs, education and recreation at affordable costs and within reasonable time.
- Minimize overall production of green house gases and pollution (well to wheel) per passenger km.
- Minimize financial costs of transportation.
- Minimize overall demand for transportation.
- Achieve minimum service level benchmarks.
- Aim towards zero traffic fatalities.

The 'terms of reference' for the working group are placed at **annexure A.**

2.1 VISION FOR 2030

Cities today suffer from inadequate urban services and environmental degradation. Urban mobility and road safety are declining by the day. All categories of road users are facing problems in commuting. The pedestrians do not get a safe, conflict-free and obstruction free path to walk. The cyclists have to fight for the right of way with fast moving motorized modes of transport, many a times risking their lives. The user of public transport faces long waiting periods, uncertainty in travel time and difficult conditions of travel. Personal motorized modes of transport are slowed down by the slow moving traffic and face significant delays at traffic signals and road junctions. Road users get restless leading to road rage, rash driving and accidents.

By 2030 all this should change in cities, urban agglomerations as well as satellite towns. Traffic flow should be disciplined with better educated drivers and strict enforcement. All parking should be off-street. There should be no conflict between motorized vehicles and those who want to walk and bicycle. Walk and bicycle should become the favored and most common mode of urban transport. Public transport should be citywide, safe, seamless, user friendly, reliable and should provide good ambience with well behaved drivers and conductors. Citizens should get access to jobs, education, social services and recreation at affordable costs and within reasonable time. The consumption of fossil fuels, production of green house gases and pollution should reduce.

2.2 CITIES AND URBAN TRANSPORT SCENARIO

Cities are important being the engines of economic growth. Cities contribute most to the 'gross domestic product' of a country. This figure today is about 60%. By 2030 this figure is estimated to grow to about 70%. Successful urban transport systems not only increase commercial and labour market efficiency, but also increase access to amenities, improve general mobility and add to quality of life.

To attain the Vision 2030 for Urban Transport, policies, planning and investments need to be directed towards sustainable urban transport – with clear emphasis on public transport, walking and cycling. This needs to be supplemented with cleaner technologies, a stringent fiscal regime and use of intelligent transport systems

The National Urban transport policy 2006 (NUTP) **s**tates the importance of cities as follows;

Mckinsey Global Institute (2007) has estimated a capital outlay of USD 1,182 billion (About Rs 53 lakh crores) for the next 20 years to build up services in cities to enable them to play their role in the desired economic growth of the country. Mass rapid transit services and roads together require a major share of the projected investment; more than half of the estimated capital expenditure i.e. USD 392 and 199 billion (About Rs 26 lakh crores) each respectively.

> *'India is poised for rapid economic growth. Such future growth will largely come from the secondary and tertiary sectors of the economy, i.e., the industrial and service sectors. Since economic activities in these sectors primarily take place in urban areas, the state of our towns and cities is crucial to India's future growth'.*

The recent report (March 2011) of the 'High powered expert committee' commissioned by Ministry of Urban Development Government of India estimates a total expenditure of Rs 39,18,670 crores on 'Indian urban infrastructure and services' by 2031. This is of the same order as the Mckinsey estimate. As per this report, major expenditure is on urban roads; Rs 17,28,941 crores. Urban transport is estimated to require a fraction of this i.e. Rs 4,49,426 crores. In addition traffic support infrastructure is estimated to require Rs 97,985 crores and street lighting; Rs 18,580 crores.

Thus the total expenditure on roads and urban transport together out of the total expenditure is of the same order (as a %age) as the Mckinsey estimate. There is however a major difference in the estimate for roads vis-a-vis urban transport. Mckinsey estimates expenditure on urban transport twice that on urban roads while the HPEC estimates it as only about 30%.

Nevertheless the level of investment required in urban transport and roads (which is the main infrastructure for urban transport) as a %age of total investment for upgrading all urban services suggests the importance of urban transport in raising the economic potential of cities.

The biggest challenge of economic growth and development on our country is that of equity. The relationship between transport, urban economic growth and poverty is stated in the World Bank publication; 'City on the Move; A world bank Urban Transport Strategy Review'. It states that urban transport is the life blood of cities, and emerges as a subject of concern of all studies of the poor urban areas. The central problem for the big cities in the developing world is that with low incomes but very rapid growth, they are unable to devote enough land or invest enough in appropriate transport infrastructure, to keep transport problems manageable. This harms the poor in three ways:

- Growth of measured GDP is reduced by freight congestion, delays and unpredictability, difficulties of conducting business, and increasing signs of disarticulation of the labor market in some large cities such as Sao Paolo, Mexico and Manila.
- Also efficiency –reducing but not directly reflected in GDP statistics are most transport-originated air pollution, 'non-business' and time lost to congestion and traffic accidents.
- In the acute battles for space the poor suffer particularly, either from dwelling on pavements to be close to work or from only slightly less health-destroying accommodation in central slums, or from multi-hour journeys to work.

Urban transport policy can thus contribute to poverty reduction both through its impact on the city economy and hence on economy growth and through its direct impact on the daily needs of the very poor. Urban transport impacts the development of the city economy. The economic performance of cities can be improved by better integrating transport with other aspects of city development strategy.

2.2.1 THE PRESENT URBAN TRANSPORT SCENE

Urban transport scene in Indian cities, today, is headed in the wrong direction. The use of desirable modes i.e. mass rapid transit (MRT) and non-motorized transport i.e. walk, bicycle and cycle rickshaw is on a decline. Instead use of low capacity and undesirable modes i.e. personal car and 2-wheelers is rising. These modes are uneconomic and socially wasteful in the use of road space. The resulting imbalance in the use of road space is leading to increasing road congestion, falling journey speed, increasing air and noise pollution and reducing road safety. Fuel, of which a large part is imported, is wasted. GHG emissions are a global concern. There is a general degradation in the quality of life, city efficiency and its economic potential.

The report (May 2008) on 'Study on traffic and transportation policies and strategies in urban areas in India' commissioned by MOUD (Hereafter referred to as MOUD study) has reported that the share of personal modes especially of two wheelers has gone up at 12% per annum in the past two decades, while public transport has generally dwindled. The table below compares

the share of mass transport in cities of various sizes as observed in 1994 and 2007. A general decline in the public transport trips is noticeable in cities of all sizes.

Table 1: Public Transport share comparison 1994 to 2007

City Category	City Population (Range in lakhs)	WSA, 2007 (%)	RITES, 1994 (%)
1	< 5.0	0.0 – 15.6	– 22.7
2	5-10.0	0.0 – 22.5	22.7 – 29.1
3	10.9 – 20.0	– 50.8	28.1 – 5.6
4	20.0 – 40.0	– 22.2	35.6 – 45.8
5	40.0 – 80.0	32.1	45.8 – 59.7
6	Above 80.0	35.2 – 54.0	59.7 – 78.7

Source; MOUD study 2008

Use of non-motorized transport (NMT), especially cycling, has declined. Road congestion, increase in trip length due to urban sprawl, increase in purchase power of people and totally inadequate facilities for cycling have all contributed to reducing cycling to less than 11% of the mode share which is down from nearly 30% in 1994. Pedestrians continue to be neglected.

2.2.2 BUSINESS AS USUAL GROWTH SCENARIO

The MOUD study has projected a BAU growth scenario. A representative sample of 87 cities (all State capital cities and with population above 0.5 million) was selected. Out of this thirty representative cities were selected for detailed study. Data was collected through primary and secondary surveys for the 30 sample cities to understand the existing urban transport scene. Household interview survey, Cordon survey, Terminal Survey, Speed studies, Parking studies, etc, were undertaken to collect primary data. The BAU scene projected from 2007 to 2030 shows as follows:

- The per capita trip rate for all modes including NMT is estimated to increase from 0.8-1.5 to 1-2 for cities of various sizes

- The future public transport (PT) share will decrease from 5-46% to 2-26%
- Expected average journey speeds on major corridors in future for various city categories will fall from 26-17 kmph to 8-6 kmph
- The daily trips in the 87 urban centers are anticipated to double from 2,286 to 4,819 lakhs

"Business-as-usual" will significantly enlarge use of personal vehicles and their costs to society. The Energy and Resources Institute (TERI), a Delhi-based non-governmental organization (NGO), has forecast that India's commercial energy demand and emissions will increase by more than seven times under business as usual scenario (if nothing is done to curb the emissions) from the existing levels by 2031/32. An MORTH committee on road safety and traffic management (February, 2007) estimated about 50% increase in road accidents over a 10 year period (2005-15).

2.2.3 ALTERNATIVE GROWTH SCENARIOS

Different size cities have different intensity of travel demand and corresponding impact on environment owing to population size, spatial structure and travel behavior of people. Population density, however, is a key determinant of spatial spread of the city. For example Bangalore has 5889 persons/sq. km, Hyderabad has 6265 persons/sq. km and Ahmedabad has 15574 persons/sq. km. Three scenarios; business as usual, desirable and a third scenario in between BUA and Desirable have been considered. Specific parameters included to define the three scenarios are: Density, Trip Rate, Trip Length, Area under Roads, Transit share and rapid transit network. The scenarios are:

- **Business as Usual Scenario:** This is characterized by development which is low density, rigid zoning with transit supply focused on vehicles. Hence highways and railway infrastructure development gets priority.
- **Intermediary scenario:** In this scenario, the effort is still to steer development towards sustainable transport. Reversing trends would take time and not all that has happened can be reversed. Hence a scenario which has been developed as a moderate/intermediary scenario.
- **Desired Transport Scenario:** Focusing on accessibility, effort would be to build compact, poly centric cities with complete network, complete streets, affordable mass rapid transit, non-motorized vehicle and pedestrian facilities.

2.3 APPROACH FOR ACHIEVING SUSTAINABLE TRANSPORT IN 2030

The cities need to adopt the 'Avoid, Shift and Improve' approach in transport planning as advocated by the ADB in its draft 'Action Plan to Make Transport in Developing Countries More Climate-Friendly' and reiterated by the Bellagio Declaration 8 in May 2009. Cities need to tackle the problem at the root by trying to 'avoid' increased demands for mobility by reducing the number of trips and by reducing the length of trips.

2.3.1 AVOID: USING IT TO REDUCE DEMAND FOR MOBILITY

'Virtual Mobility refers to the use of the new Information and Communications Technologies (ICT) as an alternative to physical mobility. It is about using ICT as the means of "getting to" activities that would previously have required transport.' Government authorities responsible for traffic management may engage with businesses to encourage a tele/e-work culture and flexi-work hours and also encourage them to develop sustainable mobility plans for their staff.

Bangalore One is such a programme that was launched in Bangalore city; a TERI study in 2008 analysed the possible impacts of the initiative on travel demand in the city.

2.3.2 SHIFT: FROM PERSONAL VEHICLES TO PT AND NMT

Increasing use of personalized transport is one of the key reasons for the growing urban transport problems including that of increased energy consumption. A shift from personal vehicles to other mass transit and non-motorized modes is necessary to reduce energy demand from cities. Share of public transport on the average should be aimed at 60% of motorized trips and 35% of total trips including walk. Measures such as Road/congestion, fuel and parking pricing, restrictions on Vehicles use, Road space reallocation, Priority for bus and non-motorized modes and Flexible work hours will help.

While with increasing per capita incomes and growing aspirations the ownership of private vehicles cannot be easily discouraged, it is possible to discourage the routine use of personal vehicles through an intelligent combination of interventions listed above.

Global experience has shown that an effective shift to PT can occur only if transport demand management measures are adopted in tandem with increased provision of public transport.

2.3.3 IMPROVE: EFFICIENT, CLEAN VEHICLES AND IMPROVED TRAFFIC MOVEMENT

Clean efficient vehicle technology needs to be used both for private and public modes in order to reduce their fuel consumption and emissions. Fuel efficiency standards should be introduced in India and implemented effectively. In addition emission norms, and inspection and maintenance certification regimes should be tightened. Cities should encourage the use of alternate fuels and clean vehicle technology. Successfully implemented clean technologies include hybrid cars, electric cars and two-wheeler, and flexi-fuel cars, cars and three-wheelers using CNG and LPG.

2.3.4 IMPACTS ON ENERGY CONSUMPTION AND CO2 EMISSIONS

The Avoid, Shift and Improve approach recommended in the previous section would contribute to: Reduction in private vehicles on-road, increase in public transport and NMT ridership, and a cleaner vehicle fleet.

As per TERI, 2006, the number of vehicles in the country will increase to about 670 million by 2030 at a GDP growth rate of 8 per cent in a business as usual (BAU) scenario, which is about the number of cars now in the world. As per this study, if the share of buses is increased to 75 per cent by 2030 and private vehicles and IPT modes meet the remaining 25 per cent of the travel demand, the fuel demand would decrease by 21 per cent and CO2 emission by 20 per cent as compared to the BAU scenario.

Another TERI study, indicates 18 per cent reduction in motor fuel demand by 2030 as compared to the BAU if buses meet 70 per cent of the total passenger travel demand in 2030 (TERI 2007). According to this study, if fuel efficiency of vehicles can be improved by 5 per cent and 20 per cent in 2015 and 2030, respectively, for the vehicles registered after 2010, a reduction of about 17 per cent is achievable in motor fuel consumption by 2030 as against the BAU scenario, Integrated land-use and transport planning can also reduce transport energy demand by 20 per cent by 2030 (TERI 2007). These numbers indicates the impact of different interventions on energy and CO2 reduction. If these interventions are taken together, the reduction in energy use and CO2 emissions could be very significant.

2.3.5 WAY FORWARD FOR INDIAN CITIES

Better urban planning and a modal shift to public transport along with long-term transport plans are necessary to facilitate the growth of cities in a manner that is not hostile to the environment. Extensive facilities for public transport and non-motorized modes in urban areas in order to discourage the use of personal motorized vehicles are needed. There is also a need to initiating a switch to clean fuels, retiring old polluting vehicles, strengthening mass transportation, and promoting use of electric vehicles. Technical, fiscal and policy actions are needed to direct transport growth towards the path of sustainability. The National Urban Transport Policy (NUTP) also envisages integrated land-use transport planning, public transport and NMT cities.

Even 23 of the 35 million plus cities have a significant sharing energy consumption and CO2 emission by the transport sector and if they were to adopt the interventions suggested above, they could make and equally significant contribution towards reducing energy consumption and CO2 emission. They need to be encouraged and adequately funded to meet their growing transport demands on a low carbon path.

3 POLICY INTERVENTIONS

Achieving the desired scenario 2030 requires a fundamental shift in policies in favor of sustainable and low-carbon modes. Several policy measures and tools can be implemented especially with lessons learnt from the global examples of sustainable transport policies.

3.1 COMPREHENSIVE MOBILITY PLANNING

Mobility in the city depends on several factors that can be broadly grouped into three categories i.e.

- Services and modes of transport,
- Roads and linked infrastructure, and
- Other related matters such as planning, coordination and licensing.

Conventional transport planning approach aims at flow of motor vehicle traffic. A more comprehensive approach to transportation planning would mean personal mobility. The most comprehensive definition of transportation is 'Accessibility', the ability to reach desired goods, services and activities. It recognizes the value of more accessible land use patterns and mobility substitutes such as tele-commuting and delivery services as ways to improve transportation while reducing total physical travel. Thus planning should aim at improving accessibility, mobility and traffic flow in that order.

Comprehensive Mobility Planning is a vision statement of the direction in which urban transport in the city should grow. CMPs should cover all aspects that affect urban transport for integrated planning and integrated implementation. Intensive **consultation with public** on proposed policies and projects should become a norm because full cooperation of all city residents is essential for success. Intensive awareness campaigns should be launched to secure public support.

3.2 INTEGRATED LAND USE TRANSPORT PLANNING

Urban transport is a derived demand closely linked to urban growth policies. Therefore integrated land-use transport planning to minimize transport demand is essential. Some types of land use patterns increase the use of car, while others reduce the amount of vehicle travel needed to access goods, services and activities. Some transport policies such as increase in road capacity and speed, Generous parking supply, Low road user charges and fuel taxes, Poor walking and cycling conditions, Inferior public transit service, High public transit fares, tend to encourage city sprawl and hence travel demand, while others such as Transit service improvements, more affordable public transit fares, Pedestrian and cycling improvements, Reduced parking supply with parking management, Road and parking pricing, Traffic calming and traffic speed reductions tend to encourage Smart Growth and reduce travel demand. Thus rather than an urban sprawl, smart city growth should be the objective.

The present trend is unbridled expansion of the city as an urban sprawl. This increases trip length and discourages the use of the desirable green modes i.e. NMT and MRT. NMT being manually driven suits short distance trips. MRT does not get concentration of demand. As a result the financial viability of MRT further falls.

Most Indian cities have **mixed land-use** patterns, high residential densities and low income people living close to place of work by occupying public land. All three attributes contribute to short trip lengths and less dependence on motorized travel. Therefore, future land-use policies should legally encourage mixed land-use patterns.

NUTP 2006 highlights the intrinsic linkage of transport demand and land use planning and the need to develop an integrated master plan for each city. The service level benchmarks issued by MOUD specify parameters to measure the effectiveness of land use-transport planning. It should be mandatory for cities to restrict the expansion of the city area. If necessary, fiscal disincentives should be imposed on cities that do not grow as smart cities to restrict demand and hence pollution and green house gas emissions.

3.3 TRANSPORT DEMAND MANAGEMENT

It is not enough to improve traffic flow and augment urban transport facilities. There is a limit to augmentation of services and infrastructure in a city. There is thus, in addition, a need to control the growth in transport demand. Otherwise supply of urban transport may never be able to catch up with demand. Hence a 'Transport demand management' program should be an essential part of planning.

TDM is a wide range of policies, programs, services and products that influence why, when, where and how people travel to make travel behaviors more sustainable. There is a need to proactively shape travel demands so they can be served - efficiently, effectively, equitably and sustainably. TDM has four main components that provide an integrated approach to transport demand management.

- Education, promotion and outreach
- Travel incentives and disincentives
- Sustainable travel options
- Supportive land-use practices

3.3.1 EDUCATION, PROMOTION AND OUTREACH

Education, promotion and outreach create awareness that everybody can contribute to the cause in some way or the other. Everybody has to be made to realize that there are more sustainable ways of commuting. Such awareness programs should be formulated and implemented. It maximizes personal mobility choices by ensuring that individuals are aware of their travel options, understand how to use them, and are willing to do so. Some measures are listed below:

Table 2: Methods for Education, Promotion and Outreach

Mechanism	Description	Related TDM Strategy
Transportation choice	Whether alternatives to driving exist.	Transit, rideshare, shuttle services, walking, cycling, tele-work, car-sharing.
Information	Whether potential users can easily obtain accurate information about alternatives.	TDM programs and marketing. Transit improvements.
Travel time	Door-to-door travel time ratio between an alternative mode and driving.	Transit improvements. HOV Priority. Pedestrian and cycling improvements. Traffic calming.
Convenience and comfort	The relative level of convenience and comfort between an alternative mode and driving.	Transit improvements. Walking and cycling improvements.
Price	The relative financial costs between an alternative mode and driving.	Market reforms, road pricing, parking pricing, distance-based charges, transit improvements.
Prestige	Level of respect given by society to users of alternative modes.	TDM Marketing. Pedestrian and bicycle promotion. Transit improvements.

3.3.2 TRAVEL INCENTIVES AND DISINCENTIVES

These TDM measures offer individuals a tangible benefit or dis-benefit related to the use of one or more travel modes such as congestion pricing and other costs related to travel such as parking fee and transit tariff.

Dynamic, affordable, livable and attractive cities will never be free of congestion. Road transport polices, however, should seek to manage congestion. Steps to increase reliability and predictability of travel time, planning and coordination of road works, speedy response to

defective traffic signals and to disruptions caused by accidents and debris and creating one-way streets should be part of planning.

Typically, congestion cuts across jurisdictional boundaries and therefore the design and implementation of congestion management policies will require collaboration between different authorities. Policies should make coordination between regional transport and urban planning bodies legally possible.

Use of personal motorized vehicles and its adverse effects on air pollution, green house gas emissions, fossil fuel consumption and road rage are well accepted. Main reason for increasing use of personal vehicles is the gross deficiency in public transport facilities. Thus the most important long term means of controlling the use of personal transport is to augment public transport in quality and quantity so that the commuter has a choice. However, economic instruments should be used to control the use of personal vehicles. Pilot schemes to reduce the use of personal motorized vehicles should be taken up by MoUD.

Table 3: Travel Incentives and Disincentives

Type of Incentive or Disincentive	Possible Economic Instruments	Selected Economic Measures
Discourage motorized vehicle ownership	Tax/ charge on vehicle purchase/ ownership/ Scrappage	Annual vehicle tax Registration tax/ charge (re)sales tax/ charge Scrappage tax/ charge
	Restricting the number of vehicles and/or new registrations	Auction schemes/ competitive bidding for new licenses Licensing car ownership
Discourage motorize vehicle use and encourage switch to public or non-motorized transport	Tax/ charge on vehicle use	Fuel tax Pay-at-the-pump (sur)charges
	Tax/ charge on road and/or	Parking fees

Type of Incentive or Disincentive	Possible Economic Instruments	Selected Economic Measures
	infrastructure use; Restricting access to urban centers or special areas	City tolls Road pricing Bridge tolls Cordon/ area pricing Congestion pricing
	Subsidies for public transport and/or multi-modal transport (modal subsidies)	Subsidized public transport fees Subsidies for public transport networks and operation Tax-deductable public transport expenses P&R schemes
Encourage lower emission technology use and innovation	Taxes/ charges on vehicle purchase/ ownership/ scrappage; Taxes/ charges on vehicle use; Taxes/ charges on road and/or infrastructure use	Tax differentiations based on emissions Carbon/ energy taxes Emission fees Emission-based surcharges Subsidies, tax rebates for lower emission vehicles/ technologies

3.3.3 SUSTAINABLE TRAVEL OPTIONS

Sustainable travel options complement TDM by strengthening the supply of sustainable travel options (e.g. walking, cycling, transit). They can make travel by those modes faster and more comfortable, secure and enjoyable.

Managing the demand for transport is made up of a large number of small interventions that cumulatively can impact car use, but in particular improve the livability of cities. A sample of well-practiced and successful interventions includes:

- **Park and ride**. Parking spaces are provided, usually close to an expressway, where drivers can board buses that provide service to the city centre.
- **Traffic calming**. Measures that seek to reduce the speed of vehicles in urban areas, such as speed bumps and street narrowing. The measures indicate the need for much greater attention to street design and layout.
- **Priority lanes for buses, and high occupancy vehicles**. Lanes on major roads are reserved for buses, taxis and passenger vehicles with several occupants.
- **Alternate work schedules**. Encouraging work hours other than the dominant 9 to 5 schedule.
- **Promoting bicycle use**. Encouraging greater use of the bicycle through significant planning adjustments, such as the provision of bicycle lanes and bike stands.
- **Car sharing**. Encouraging drivers to share car use with neighbors or co-workers.
- **Enhancing pedestrian areas**. Visual attractiveness of roads can be enhanced by excluding vehicles altogether, or limiting access to public transport vehicles only.
- **Improving public transit**. by improving bus schedules and improving the appearance and comfort of transit vehicles and stations.
- **Parking management**. Restricting on-street parking and charging higher rates for parking.
- **Using technology i**.e. road and congestion pricing

3.3.4 SUPPORTIVE LAND-USE PRACTICES MINIMIZE NEED TO TRAVEL.

Supportive land-use practices refer to integrated land-use and transport and transit oriented development.

3.4 TRANSIT ORIENTED DEVELOPMENT

Transit Oriented Development (TOD) the major element of which is a congregation of housing, jobs, shops, and other activities around mass transit stations. The physical environment is often enhanced with wide sidewalks, an absence of surface parking lots and large building setbacks. It will help improve viability of public transportation. Thus TOD includes planning for:

- More people to live close to transit and to use it.
- A rich mix of uses within walking distance of a public transport station
- Pedestrian facilities and multi-modal connectivity with focus on moving people

- Making public transport station a gateway to the community.

Three pronged Strategy is proposed to achieve TOD in Indian cities

- Promote Spatial Planning: Mandatory Detailed Development Plans/Station Area Plans
- Revision of DCRs, policies, planning processes and enabling legislations
- Interdepartmental linkages to promote integrated planning: establish GIS based spatial database systems

3.4.1 COMBINING HIGH DENSITY AND DIVERSITY WITH TOD

"Higher the density, lower is the per capita infrastructure cost" – This is an important urban development mantra to remember for the lower income countries urbanizing at a fast rate. Low urban densities tend to go together with a high level of reliance on private cars and with low roles for public transport, walking and cycling.

High density offers the opportunity for average trip lengths to be short and to promote a high level of accessibility for non-motorized modes of transport, to foster successful, economically viable public transport, and to enable cities to have low levels of energy use per person in transport.

Generally, it is observed that the older areas of city have higher densities (gross) which range from 100 -125 persons per hectare (125-150 persons/hectare in case of metropolitan cities) compared to the newly urbanized areas which generally have a density of 50-75 persons/hectare. This low density urbanization is unsustainable for not only providing public transport facilities but also results in high energy consumption due to dependence on private modes therefore needs to be reversed. Accordingly it is proposed that the density in these areas may be increased upto 100-125 persons/hectare. All the new areas proposed to be urbanized to accommodate the increased urban population must also be planned with gross density of 100-125 persons per hectare.High density alone does however not guarantee the success of public transport. To realize the potential of public transport in dense and compact cities Transit Oriented Development needs to be consciously incorporated in city planning.

Transit-Oriented Development (TOD) is generally characterized by compact, mixed use development near new or existing public transportation infrastructure that provides housing, employment, entertainment and civic functions within walking distance of transit. Pedestrian-oriented design features of TODs are essential to encourage residents and workers to drive their cars less and ride public transit more. TOD can also be a significant source of non-farebox revenue for the participating transport agency. The goals of integrating TOD with high density are as follows:

- Provide easy, convenient and fast public transport access to the maximum number of people through densification and enhanced connectivity. To facilitate this, highest possible densities (as per context) and enhanced street connectivity networks should be planned around transit stations/ Stops.
- Maximize transit systems capacities, reliability and accessibility.
- Development density should be matched to the carrying capacity of the maximized transit + NMT System, car traffic capacity excluded from the calculation.
- Preservation, reuse and infill of existing areas balanced with dense areas of new growth should be used to create compact regions.
- An optimal mix of housing, commercial uses, incomes and services should be planned at the neighbourhood level
- A variety of parks and public spaces should be provided
- The hierarchy and intensity of mixed use should be planned based on Street Hierarchy and Level of Public Transport Service.
- New development should occur in areas adjacent to and within existing urbanized areas.
- Development patterns should be matched with sustainable transport options to minimize commuting times and distances.
- New FSI allowances above current caps can be taxed or otherwise monetized to fund infrastructure while increased future property taxes could fund operation and maintenance of the systems.

4 PLANNING INTERVENTIONS FOR SUSTAINABLE MODAL MIX

The transport modes to be used and the modal mix will depend on the city population, the city form and size, availability of road surface and the trip length. Share of public transport on the average should be aimed at 50% of motorized trips and 35% of total trips including walk. The objective should be to restore balance in the use of road space. Needs of all category of users should be catered to. Priority in planning for modes should be as follows in descending order:

- Walk and Non- motorised transport (NMT),
- Mass rapid transit; road, rail and waterways,
- Other motorized public transport,
- Personal vehicle transport.

Table below shows desirable modal shares for different city sizes based on trip length distributions in Indian cities.

Table 4: Desirable modal shares for different city sizes

City size in lakhs	5-1	1-5	5-10	10-20	20-50	>50
Walk	30	30	30	30	25	25
Cycle	25	20	15	12	10	10
Rickshaw	12	10	8	6	1	1
TSR	8	3	5	3	3	1
PT	12	15	15	20	33	38
Cars	1	1	2	4	8	10
MTW	12	21	25	25	20	15

Source: Tiwari, G. (2007), INRM Policy brief: Frame work for an optimal modal mix for urban passenger transport, Asian Development Bank

Safety of all road users and safe access to all road users is a pre-requisite for achieving optimal modal shares.

4.1 WALK AND NON-MOTORIZED TRANSPORT

NMT i.e. walk, bicycle and cycle rickshaw modes are green modes of transport that belong to the low carbon path, do not consume energy or cause pollution and in addition provide social equity besides employment. Presently these modes are neglected in the planning process. Facilities for NMT i.e. footpaths and dedicated cycle lanes should be developed on priority. These should be citywide to assure the commuter that he can complete his journey all the way by walk or bicycle if he so chooses. Funds allocation for major transport infrastructure should be linked to achieving targets for creating facilities for NMT.

NMT should get first priority in infrastructure development and funding

Walking is the most universal form of transport. All trips, especially public transport trips, begin and end with walk trips, however short or long they may me. Walking is a zero-emission mode of transport that needs to be the primary focus of a sustainable habitat.

Walking needs emphasis because:

- Walking is a critical for success of public transport: Each public transport trip requires two walk trips. If investments made in developing high quality public transport systems are to be efficiently utilized, pedestrian access to public transport has to be prioritized. Good walking environment encourages people to walk longer to reach public transport. This enhances the feasibility of mass rapid transit like BRT and Metro Rail. Pedestrian connections play a fundamental role of modal integration. Footpaths form important linkage needed for effective transfers between different modes of public transport.

- Walking will reduce vehicle use for short distance commuting: A significant number of trips are short distance trips that are under 3km. These include trips to access essential services like education, local shopping, leisure trips within neighbourhoods and job centres. Good pedestrian facilities with appropriate design based on weather conditions reduce dependence on motor-vehicles for such short trips.
- Walking and urban poor: India's urban poor are too poor to even afford a bus ride for daily commuting. Often the only option for them is to walk. Many others are captive public transport/para transit users who are dependent on walk to access public transport. This poses a serious equity challenge. Mobility of more than half of the people in all of our cities can be severely compromised if walkways lose viability.
- Walking enhances urbanity, lifestyle, and health: The World Health Organization (WHO) is now making an explicit link between walking and health status of the community. Walking for at least 30min each day reduces health risks associated with sedentary lifestyle. Streets bind people and communities. Walking is the best way of enjoying street level activity. This is why high streets across the world have great walking environment to encourage economic activity.
- Walking demands safe environment: Road injuries/fatalities are not accidents (unfortunate incident that happens unexpectedly and unintentionally) but the results of individual and institutional negligence and, primarily, of a system of neglect of vulnerable users. Mobility networks need to be built in a way that people are able to move around cities freely without the risks of being killed incidentally. It is a harrowing experience to walk in an Indian city. Road crashes in the country claim more than 118,000 lives every year, mostly pedestrians, cyclists or pavement dwellers. The pedestrian's right to safe and free passage has become a casualty.

Cycling has several benefits to the individual, to the environment, and to cities and can be a major contributor to making urbanization sustainable in our cities. After walk, cycle is the second most accessible mode of transport for urban poor. Urban middle class and rich are

discouraged from cycling because it is perceived as being uncomfortable, dangerous, and low in status.

Cycling should be encouraged because:

- Reach and effectiveness of Public Transport can be improved: Since cycling as a feeder mode can be 3 to 4 times faster than walking, the catchment area of public transport stops thus can become 9 to 16 times larger. By smart planning one can build an integrated cycling and public transport system.
- Cycling can counter congestion: In urban conditions, bicycles use between a third to fifth of the space occupied by a motor-car. Attractive cycling conditions will help to moderate people's aspirations to own and use a private car and current car owners may be tempted to substitute a part of their trips by bicycles.
- Cycling can improve road safety: Arguably, cyclists are vulnerable road users. But enhancing the cycling conditions, including taking measures to mitigate the number and speed of motor vehicles and to reduce risk at intersections, combined with a substantial increase of bicycle use will improve cyclists' road safety. 'Cycling promotion' and 'improving road safety' can result in a self-reinforcing interaction of these two policies; the so-called 'safety by numbers' effect.
- Cycling can make cities more attractive. Cycling is often a preferred mode to enjoy the city, especially by tourists. The slower pace than motor vehicles and ease with which one can stop and start allows people to enjoy various facets of the city. The promotion of cycling can help in a paradigm shift from motor-vehicle oriented to people oriented transport planning.
- Cycling contributes to improving air quality and mitigating climate change: Motorized trips contribute substantially to air quality problems (like SO2, NOx, PM) and the climate problem (CO2). Higher use of bicycles will result in reduced pollution and climate change, thereby providing better living environment for all.

- Noise reduction. Motorized transport is also the cause of the noisy environment in large parts of our cities and it remains worthwhile to try and prevent this problem by promoting the use of non motorized modes of transport like cycling, and measures to discourage and restrict car use in sensitive urban areas.
- Improved physical health. One of the (many) downsides of motorized transport is its enhancement of a sedentary lifestyle. Cycling commuters have (on average) a substantial better physical health than commuters using other modes[1].

4.1.1 PLANNING TO PROMOTE WALK AND BICYCLE

Walk facilities should be designed and managed to accommodate a wide range of uses. People walk alone and in groups, walk pets, push strollers and carts, run, skate, bicycle, stop to gaze and talk, play and eat on sidewalks and paths. Footpaths serve as both travel-ways and stopping areas.

Other steps to promote walk and bicycle include

- Improve sidewalks, crosswalks, paths and bike lanes.
- Correct specific roadway hazards to non-motorized transport (sometimes called “spot improvement” programs).
- Improve Non-motorized Facility Management and Maintenance, including reducing conflicts between users, and maintain cleanliness.
- Develop pedestrian oriented land use and building design (New Urbanism).
- Increase road and path Connectivity, with special non-motorized shortcuts, such as paths between cul-de-sac heads and mid-block pedestrian links.
- Street furniture (e.g., benches) and design features (e.g., human-scale street lights).
- Traffic Calming, Streetscape Improvements, Traffic Speed Reductions, Vehicle Restrictions and Road Space Reallocation.

[1] According to a Lancet study “Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport” by James Woodcock, Prof. Mohan and Dr. Tiwari, 2009, shifting to more active travel modes by 2030 would decrease the burden of heart diseases by 25%, diabetes by 17%, road fatalities by 69% and depression by 7% in the city of Delhi.

- Safety education, law enforcement and encouragement programs.
- Integrate with transit (Bike/Transit Integration and Transit Oriented Development).
- Provide Bicycle Parking.
- Address Security Concerns of pedestrians and cyclists.
- Public Bike Systems (PBS), which are automated bicycle rental systems designed to provide efficient mobility for short, utilitarian urban trips.
- Pedestrian ways, which are indoor urban walking networks that connect buildings and transportation terminals.
- Create a Multi-Modal Access Guide, which includes maps and other information on how to walk and cycle to a particular destination.
- Provision of multi-storey car parks for residents in order to gain public space on the road and gradually reducing parking space on the streets in order to promote cycle and walking;
- Monitoring of the public parking space with a special control task force;
- Additional park and ride facilities at the periphery of the city.

4.1.2 PLANNING NORMS FOR WALKING

For pedestrian safety, comfort and convenience on all streets:

- Street design must facilitate pedestrians to remain at ground level with comfortable and safe access and minimum detours from the most direct path;
- A continuous unobstructed footpath on each side of all streets with ROW wider than 12m. Minimum width of footpath shall be 2m in addition to space for trees/greenery/vending spaces and surface utilities. Width of footpath shall be determined based on pedestrian volume and have to be wider than 2m wherever required;
- Intermittent buffers, bollards and other physical elements should be used to protect footpaths from encroachment by motor vehicle parking. However, such elements should not form a barrier, such as continuous railings, that constrain access to pedestrians. Active enforcement is required to protect encroachment of footpaths;
- On streets with ROW of 18m or less, if pedestrian traffic is greater than 8000 per hour in both directions together, the entire ROW should be notified for pedestrianization. Streets may be considered for pedestrianization even if pedestrian traffic is lower than 8000 per hour depending on the potential to improve economic activity and/or safety and convenience;
- Elevation over the carriageway at all times should be <150 mm and adequate cross slope for storm water runoff. The elevation should be low enough for pedestrians to step onto and off of the footpath easily;

- All pedestrian facilities should be barrier free for universal access by all persons with reduced mobility including those with hearing and visual impairments;
- At least 5 safe street-level crossing opportunities per kilometer of street with 250m being maximum spacing between two crossings. Depending on context, these crossings may be signalized and/or traffic calmed (through raising crosswalk over street level by 150mm) to reduce vehicular speed;
- Pedestrian refuge with a minimum width of 1m at each street crossing location after crossing 7m of one way motor vehicle carriageway or 10m of two way motor vehicle carriageway at non signalized mid-block crossings. Pedestrian refuge width may be expanded to 1.75m where possible to accommodate a bicycle;
- If separated by heavy traffic roads appropriate and safe surface level crossings should be provided. Grade separated structures (foot-over-bridges and pedestrian-subways) should be avoided to prevent unnecessary detours to reach destinations;
- Limit speed on urban arterial roads and sub-arterial streets to 50kmph and on collector and local streets to 30kmph. Street design should be used as a means of limiting speed where possible aided by enforcement in the case of higher speed limit;
- Traffic calming of all streets with ROW of 12m or less through narrowing of driveway and meandering path with use of trees, islands and street furniture. Speed should be limited to 20km/hr by design;
- Highways within urban areas should be avoided since they disrupt pedestrian activity and disconnect neighbourhoods. Where present in core areas, they must be considered urban arterial streets and designed
- If grade-separated pedestrian crossings are unavoidable due to presence of highways in peripheral zones of urban areas, then such crossings structures should be frequent. There must be at least 4 crossing opportunities per kilometer in areas with development at edges. Every crossing should be universally accessible.
- Final road level should be fixed for all streets in the city. When repaving roads, previous layers must be scraped such that final road level remains the same. Footpath level should never be more than 150mm above adjoining carriageway level.

To create active streets for pedestrian security and enjoyment:

- Primary pedestrian access for buildings from the main street, with location as per shortest walking distance from nearest bus-stop. Vehicular / service access should be from secondary street wherever access to building is possible from multiple streets.

  The main building facade should face the street, located on the property line without setback or with active use within set back and transparent edge that contribute to street safety. Commercial frontages

should have facades with minimum 50% transparency (untainted) to facilitate visual surveillance of streets.

- Compound walls, if present, should be transparent above a height of 100cm. High security government buildings may apply for exemption.
- Vending spaces should be marked in addition and adjacent to the walking path, especially along high pedestrian volume areas to activate the street and make it safe. Space to be planned for utilities including drinking water kiosks and toilets so that the walking space is enhanced but not compromised.

4.1.3 PLANNING NORMS FOR CYCLING

Cities need to follow some basic design principles to make them comfortable, safe, convenient and attractive for cycling. These can be summarized as follows:

- Dedicated and physically segregated bicycle tracks with width of 2m or more, one in each direction, should be provided on all streets with total motor vehicle carriageway larger than 10m (not ROW) after providing adequately sized footpaths in each direction based on pedestrian traffic.
- Streets with motor vehicle carriageway smaller than 10m (not ROW) need not have cycle tracks but should be traffic calmed through design (maximum motor-vehicle speed under 30 km/h) for safe cycling.
- At least 5 safe street crossing per km for bicycles with spacing between two crossings not more than 250m.
- Citywide cycle network of segregated lanes or traffic calmed streets that provides access to at least 80% of built plots (should tend to 100%).
- At least one cycle sharing system with ≥ 5,000 cycles and automated payment in cities with a population of over 5 lakhs (benchmark census year 2011). Ridership of the system should be in excess of 1000 trips per bicycle per year.

4.1.4 PROMOTING USE OF THE CYCLE RICKSHAW

Cycle rickshaw is a public mode of personalized transport and best suited to provide the last mile connectivity in an integrated citywide multimodal public transport network. This mode has not received any attention from planners so far. The technology is outdated. Several American and European manufacturers of cycle rickshaws, often incorporate features not found in developing world vehicles, such as hydraulic disc, and lightweight fibre glass bodies, multispeed *gears* to lessen the effort for the rickshaw puller. Similar upgrade is needed in India.

Graduates Welfare Association, Fazilka

Ecocabs are traditional Indian rickshaw operation, added with facilities like dial-a-rickshaw through organized network. This is first time in the world at Fazilka, an Indian border town with population less than a lakh. With the order of honorable Punjab & Haryana High Court, the concept which originated at Fazilka two years back has been fully adopted by both Punjab and Haryana Government.

Per day 6 million people travel by rickshaw in Punjab alone which makes 2190 million passengers travel in total 1100 million rickshaws based trip generated. One ecocab saves about average 3 litres of fuel and 45.5 kg of fresh air required to burn the same fuel. It is zero-emission mode of transport. The project is supporting livelihood of 500 ecocab families in Fazilka and more than 6 lakhs families in Punjab, Haryana and Chandigarh is under process. It's already been implemented in more than 20 cities in Punjab. One ecocab costs about INR 9000 and finance is organized through nationalized bank under RBI's Differential Rate of Interest Scheme (DRI) at 4% annual rate of interest for new ecocabs. Overall organizational part, registration of ecocabs is taken care by State Local Body Departments in association with local NGOs/partners.

4.2 PUBLIC TRANSPORT (PT) MODES

Public transport consists of:

- Mass rapid transit;
- Intermediate public transport, and
- Personalized public transport.

Mass rapid transit is the backbone of city transport as it is the only mode that carries a very large number of commuters using minimum space. Intermediate public transport i.e. tempos and mini buses supplement mass rapid transit in large cities and are the main mode of public transport in nearly all medium and small size cities. Personalized public transport i.e. autos and taxis and cycle rickshaw cater to the demand of commuters seeking a substitute for personal transport.

4.2.1 MASS RAPID TRANSIT (MRT)

The main modes of mass rapid transit are:

- High capacity; Metro rail, Commuter rail
- Medium capacity; BRT, LRT, Monorail, HSST (Mag lev), Linear Metro, Automated guide-way transit (AGT), Automated people mover (APM) and several other modes
- Low capacity; buses of various sizes operating in mixed traffic

High capacity Metro rail and Commuter rail (Suburban Rail) are already in use in India; so are buses of various sizes. From amongst medium capacity modes, BRT has started operating in Ahmedabad, Delhi, Pune and Jaipur. An increasing number of cities in India are constructing/planning facilities to operate BRT. Use of Modern Tram (Also called Light Rail Transit) may be possible in many cities. Modern Tram being at grade is very convenient for commuters. It will not cause any local pollution when compared with BRT. It may be possible to operate both Trams and Buses on the same tracks.

Monorail, HSST (Mag lev), Linear Metro, Automated guide-way transit (AGT), Automated people mover (APM) and several other modes are currently in use in other countries. A monorail project is underway in Mumbai. Planning should be flexible so that these new resource-efficient technologies already available globally and those that have a high probability of being available in the future such as, hybrid buses among others can be accommodated.

4.2.1.1 CHOICE OF MRT MODE

Choice of Mode depends mainly on demand level on a corridor, available ROW and the capacity of the mode. Other considerations are land-use along the corridor, the location of building lines, and the potential for increasing the ROW. The chosen mode should be adequate for the future demand level on a corridor, both in quantity and quality of service such as journey time. Other features such as speed, cost, safety, eco-friendliness, energy and land conservation, aesthetics and local technology maturity from consideration of maintaining the system should be given due weight.

While ideally choice of technology is a multi- determinant variant, including population, per capita disposable income, densification in city, availability and opportunity cost of land, morphology of the city and importantly, aspiration of people revealed through political demand, a general guideline has been suggested by the working group constituted for inputs into the 12^{th} five year plan. These are reproduced in **annexure I.**

An important issue is at-grade or grade separated construction. At-grade MRTS is the most convenient facility for commuter. Grade-separated systems increase trip time by 10 to 15 minutes to account for the need to go up and down. At-grade construction should therefore be the default choice. A decision on this aspect would however depend on local conditions including availability of land.

In the metro rail projects undertaken so far concern to keep the cost within manageable limits has seemingly resulted in a preference towards elevated corridors. MRTS projects have a very long project life. Elevated structures are more land intensive. Hence, cost calculation as above,

may be specious, as they do not take into account the long term opportunity cost of the land. However, underground metro rail has the advantage in keeping the city landscape more aesthetic. Hence when at-grade or elevated construction is not feasible and when aesthetic considerations demand such as passing through heritage areas, underground construction would be necessary.

While Delhi metro continues to be the shining example of Rail based MRTS project at par with the best Metro systems in the world and worth emulating in project construction, operation and maintenance, Bangalore metro has also made a humble beginning with commissioning of 7 km of metro line in October' 2011. In addition, there are success stories of BRTS and City bus service on PPP in India which are worth emulating by others.

Ahmedabad Janmarg – A Sustainable Transit System Model

Ahmedabad, India has developed one of the most popular BRT systems comparable to global standards. The Janmarg, BRTS in Ahmedabad developed under JnNURM, is the first full BRTS in India that operates 102 buses over 45 kms of road network catering to 1.4 lakh passengers daily. During the next 2 years, the system is planned grow to cover 125 kms of network operating 400 buses catering to 5.5 lakh passengers.

The network was developed with assistance under JnNURM (Central Government-35%, State-15% and AMC – 50%).The operations are structured through a series contacts involving private sector, managed by Ahmedabad Janmarg Limited (AJL). The buses are procured from the private sector under a gross-cost contract. Fare collection is through a private contractor. The firm provides on-board and at bus station passenger information; fare collection through smart cards and tokens and manages bus schedules from the control centre. Level boarding is an unique feature which makes Janmarg services look like 'metro on road' services.

While the Janmarg offers high quality, reliable AC & non-AC services, the fare is kept low to make the services accessible to vast majority of urban poor. The lowest stage BRTS fare in Ahmedabad is kept at Rs. 3 and increases with distance. The minimum fares for ordinary services in Delhi, Mumbai and Nagpur are Rs. 5 and in Jaipur is Rs. 6. What is notable is that, within two period of operations, the Janmarg, despite keeping very low fares, manages to recover full operating costs as well as the cost of the buses.

In recognition of these achievements, during these two years, Janmarg has been awarded with the 2010 Sustainable Transport Award (TRB,CAI-Asia, UNEP, ITDP, EMBARQ), Outstanding Innovation Award (ITF & UITP), Best Mass Transit Award (MOUD,GOI), Best Information Technology Award (MOUD,GOI) and Innovative Technology Award (MOUD,GOI). Ahmedabad Municipal Corporation developed Janmarg with the technical partnership of CEPT University - The Centre of Excellence in Urban Transport of the MoUD, Government of India.

Bhopal Municipal Corporation

Bhopal Municipal Corporation (BMC) has successfully started with the city bus operations on Net-Cost Basis Contract through a private operator, M/s Purple, operating 105 buses (likely to be expanded to 225 buses) on 6 routes with required frequencies. The present operational bus services through a SPV - Bhopal City Link Limited (BCLL) headed by chairmanship of the Mayor of Bhopal & Commissioner BMC as Managing Director.

Under the Net-Cost Contract, operator would bear 30% bus cost and provide approximately 1.25 crore per year as premium to BMC. The operator will incur all expenses for operations & maintenance of the buses, including payment of all applicable taxes. In return, the operator collects and appropriate fares from passengers, notified by the competent authority. Revenue generated by smart card issued by BCLL is divided among BCLL and operator in 20:80 ratios. Advertisement revenue shared between BMC and operator on 50:50 bases. Operator pays route authorization fee (RAF), which is like premium to be paid on monthly basis and upfront fee for each of the cluster.

Operation of the bus system is through systematic & planned ITS based Monitoring Framework for 105 buses on BOOT basis. Focus is to automate BCLL's operations utilizing GPS based vehicle tracking & GIS based monitoring system, thereby improving the mass transport services. Average bus ridership got enhanced from 44,607 in Feb, 2011 to 68,376 in August 2011.

Delhi Integrated Multimodal Transit System Ltd. (DIMTS)

Bus services in Delhi were earlier provided by Delhi Transport Corporation (DTC) and Blueline Stage carriages, owned singly or by private individuals. Blueline system was fraught with number of systematic defects inherent to a business model which constrained bus owners to compete with each other for high revenue routes and time slots, on the road for passengers to mitigate revenue risks and maximize earnings. All these rendered enforcement of service parameters and on-road discipline impossible.

Delhi Government, as a solution, initiated the Scheme for Corporatization of Private Stage Carriage Service to substitute the existing private stage carriage system with a new business model presented by DIMTS. The 657 bus routes were bunched into 17 distinct clusters to be bid out to corporate fleet-owning entities while DTC would operate its buses in all the clusters. As fleet-owning entities, every concessionaire has the flexibility to deploy any of the routes in the cluster concessioned to it. This makes for optimal utilization and integration of capacity and assets. Fleet share of the private concessionaire and DTC in each cluster is to be in the ratio of 60:40.

Achievement of the project so far has been 100% fleet utilization, 99.68% Km efficiency (highest in the country), optimum load factor@987 passengers/day/bus, use of ETMs and reliability of service. The average earning per cluster bus is 20% higher than DTC buses on same routes. A total of 11,000 buses (both DTC and private) will be operated on these cluster routes in the coming years.

4.2.2 INTERMEDIATE PUBLIC TRANSPORT

Use of intermediate public transport in Indian cities is extensive as stated earlier. These are playing an important role in providing mobility to a large section of the population. They have a potential of providing clean mobility, low emissions and improved safety. Manufacturers should be encouraged to invest in improving the technology of these vehicles by:

It is equally important that public transport is made user-friendly so that the commuter uses public transport voluntarily.

- SIAM, MORTH, Ministry of Industry providing low interest loans for small scale industry producing these vehicles, and attractive replacement schemes for operators.
- Dedicating 10% of the cess money available with the Ministry of Industry from the transfer of technology for vehicle manufacturing for the improvement of intermediate public transport vehicles.
- Setting up emission and safety standards under the Motor vehicles act

In addition, scientific management of Auto rickshaws and taxies, with each auto and taxi fitted with GPS/ GPRS and subscribing to common control centre, can completely transform the usage as well as the image of these modes of IPT besides increasing the total revenue to each of these autos/taxies while reducing their empty running. A good beginning has been made through a PPP initiative (G-Auto) in Ahmedabad in this direction and needs to be not only emulated but also further improved.

G-AUTO: FOR SAFETY AND COMFORT OF PASSENGERS WHILE INSURING SOCIAL AND FINANCIAL SECIRITY FOR AUTO RICKSHAW DRIVERS

G-Auto which is short for Gujarat Auto is a programme of Nirmal Foundation in Gujarat. The Foundation organizes auto rickshaws drivers under a social umbrella brand called 'G Auto'. The programme was launched in February 2009. The foundation has a group of 10,000 auto rickshaws in Ahmedabad, Gandhinagar and Vadodara. The number is expected to grow to 50,000 in Gujarat by end of 2012. The programme provides rickshaw drivers known as G-Pilots with following benefits that offers them much needed assistance with insurance and pension.

- Free life insurance against death (any type) of Rs. 200,000 /-
- Pension facility / Retirement plan for the members
- Finance facility with subsidy to purchase auto rickshaw
- PCO sets to generate additional revenue
- Bank Account (Zero Balance) to encourage saving
- Engine oil at discounted rate
- Children of auto drivers get educational allowance every month
- Retailing of Newspaper and magazine for additional source of revenue

G-Auto concept brings forth safety and comfort to passengers while providing income and job satisfaction to G- Pilots. The G-Pilots receive training to ensure safety and comfort of passengers. It offers on demand auto rickshaw service to passengers. This service is especially useful for senior citizens, differently able citizens, tourist and others needing door to door service. Passengers can call reservation facility round the clock and request the auto-rickshaw. The fare is charged as per government norms with additional nominal fee of Rs 15 as a facility charge. Auto rickshaws have free newspaper and magazine available for passenger to read during travelling as well as local map with important destination. Additionally the rickshaws have bill book, feedback book & public call facility for customers. The complaint and suggestion number is also prominently displayed. In summary, G-Auto programme meets its objectives of insuring safety, security and reliability in para-transit system; making the service passenger friendly; ensuring social and financial insurance of auto drivers.

4.3 MULTIMODAL INTEGRATED AND CITY WIDE PUBLIC TRANSPORT NETWORK

Transport is inherently multimodal. Transport demand varies from corridor to corridor and so does the capacity of various modes. For an economic public transport network the mode for a corridor should suit the demand level on that corridor. NUTP requires that public transport system is coordinated and well integrated with efficient inter-change infrastructure and should offer a seamless journey to the users (Para 21). The aim therefore is to provide integrated multimodal transport to the city. The public transport network should be city-wide so that the commuter is assured that he can complete his journey all the way by using public transport.

An essential adjunct of Multimodal Transport is the interchange points where commuters shift from one mode to the other. Efficient interchange points that avoid conflicting movements and impose minimum time penalty have a very important role in providing seamless travel to the commuter. This will make the commuter decide to use the public transport network as a matter of choice.

A city as a first step should organize the existing public transport into an integrated network in a grid pattern to cover the whole city. These services can be operated by buses of various sizes as appropriate to demand level. Actual ridership will guide adjustments in the capacity needed and to be provided on each route. When the demand level exceeds the capacity of bus services, other guided MRT modes should be introduced.

The most important aspect is Multimodal integration; Physical integration, Network integration, Fare integration, Information integration and Institutional integration. Besides the Passenger information display system, integrated ticketing for all modes (Common mobility card) and interchange facilities, Use of Intelligent Transport System, Facilities for handicapped, Safety and security against hooliganism, vandalism and terrorism are critical to promote public transport and should be a part of planning.

A city wide public transport network including feeder services and easy availability of information about available services will help promote public transport. A Few immediate options are:

a) Metros operating their own mini buses as feeder services
b) Making these feeder services free for the commuters.
c) Better passenger information systems (via several media)
d) Advertising of these services (for public awareness).
e) Expanding the metro network to cover wider areas, and ultimately the whole metro region (this may be a long term goal) with linear or limited metro networks, the personal vehicle trips are hard to contain.
f) Convincing the bus companies to play the role as feeder system

4.3.1 STATION/STOP ACCESSIBILITY

Door to door' planning should be done in terms of time, cost and convenience to commuter. Improved accessibility of stations/stops or the last mile connectivity should be a vital feature of public transport planning. It involves six main steps:

- Footpaths for Walk and cycle lanes within about 500 m of stations/stops
- Road access for vehicles within about 3 km of stations/stops
- Feeder service within about 5 km of stations/stops
- Drop off & pick up facilities at stations/stops
- Park and ride facilities at stations/stops
- Land use control around stations/stops to avoid congestion at entry/exit

4.4 REGIONAL AND SUBURBAN TRANSPORT

The influence of urban centers extends to towns both in the immediate neighborhood and those at some distance. These requirements should be met by suburban and regional services respectively. An important criterion in suburban and regional transport planning is the trip time and the level of comfort during travel. Average trip time for such travel should be about one

hour from origin to destination. It is essential that all commuters travel in comfort and are provided with a seat.

Once the suburban rail enters the city, it becomes a part of the urban transport system. Regional/suburban transport services should be integrated with the city network for easy dispersal. Institutional mechanisms need to be put in place to enable this integration. Currently the Suburban rail is under the Ministry of Railways and the contribution of the State/city in the development of the stations is nil. There needs to be put in place a corporate institution, with the agreement of both the Railways and the city transport system, which will articulate the integration of the suburban rail services with the city mobility services. The area around the stations can be developed by the corporate entity on the principles of Transit oriented development and it could be the platform for enabling common protocols like the common Mobility Card.

4.5 FREIGHT TRAFFIC

Freight traffic and movement of goods within the city and 'passing through' intercity traffic affects overall city mobility. Passenger movements are concentrated in the morning and evening peak hours; freight movements are spread over a 24 hour period. While goods vehicles and their size, low maneuverability, noisiness, and high pollution output make their presence particularly objectionable. Goods pick-up and delivery in city centres is particularly problematic because of limited parking. At the same time goods vehicles are vital to the economy and well-being of society. Commerce is dominated by goods vehicles, and the logistics industry in particular is dependent on road transport for pickup and delivery. Garbage pickup and fire protection are among many essential services that are vehicle oriented.

As a largely private sector activity it is difficult to control, and many of the decisions that affect goods vehicles are made by the industry itself. Several cities are seeking to limit goods vehicles as pressures keep mounting. In many jurisdictions limits on heavy goods vehicles in urban areas are in place, and there are restrictions on the times of delivery and pick up, which in some cities

extend to the exclusion of all trucks in the urban core during daytime hours. There needs to be a much greater focus on planning for movement of goods overall, since it is almost universally recognized that transport of goods is important and will grow with economic growth. The subject needs to be studied in depth to evolve planning norms that permit goods movement without affecting passenger movement.

4.6 ROAD INFRASTRUCTURE

The main infrastructure for urban transport is the road and associated facilities. Water and Rail transit have dedicated infrastructure and terminals. As a first step, it is important to put the existing road infrastructure to best use. Surveys in Indian cities have shown that on the average 1/3rd of the carriageway and ½ of the right of way of a road could be encroached by parked vehicles, hawkers and roadside businesses. The pedestrians are forced to walk on the road carriageway and obstruct vehicular traffic and at the same time endangering themselves.

While directing investments in improving road infrastructure, a word of caution is necessary. Expansion of roads and linked infrastructure is, at best, a temporary solution because the capacity created is soon filled up by generated and induced transport demand. Hence road improvements should be directed primarily at improving accessibility of pedestrians, cyclists and public transit users.

4.6.1 ROAD CROSS SECTION

Road cross-section should be organized for equitable allocation of space to various modes including NMT. Measures to maximize the use of existing transport infrastructure will provide immediate relief to mobility in the city. Facilities should be planned for Off-street Parking and Hawkers, and other road right-of-way encroachments removed. These are low cost and affordable measures that can be quickly implemented with minimum planning time.

4.6.2 ROAD SURFACE

The other commonly noted feature that inhibits free traffic flow is the poor quality of road surface. Road surface is frequently cut by utility agencies and left un-repaired or badly repaired. Road Shoulders**/**berms are generally in poor condition. All these deficiencies slow down traffic, reduce road capacity and increase road congestion. Maintenance and upkeep of the road surface at all times should receive higher priority than even augmentation of infrastructure. The main reason for deterioration in the quality of road surface is poor drainage. Priority should be given to improve drainage of the road cross-section.

4.6.3 COMPLETED NETWORK

A sizeable proportion of streets in Indian cities are not utilized to their full potential as they are closed to traffic. This adds to congestion on arterial roads and longer trip distances for pedestrians and many modes of transport. This happens mostly when a residential block is surrounded by arterial roads to which direct access is limited to one or two points. It is not possible to estimate the extent of such roads in cities. However during planning of roads, this aspect should be assessed first and before adding new roads. Also in planning urban development many more direct accesses to arterial roads should be provided.

4.6.4 COORDINATED PLANNING

Roads in a city may be owned by Central Government, State PWD and local bodies. Planning of the city road network and linked infrastructure should be coordinated to get best value for money. Construction of missing road links, Grade separated entries for regional traffic and bye-passes are most effective in improving traffic flow.

4.7 PARKING

Parking demand is insatiable, entails enormous cost and uncontrolled parking supply encourages car dependency. Conventional policy making takes this as the yardstick and plans only for more parking supply.

The National Urban Transport Policy (NUTP) has advocated levy of high parking fee that represents value of land occupied and to allocate parking space to public transport and non-motorized transport on priority. It treats parking as an essential infrastructure that must service all buildings and ties public infrastructure funding with it.

Under the on-going reform process in India, cities are expected to make the transition from the conventional approach to using parking as a demand management tool. The strategy should be to minimize and avoid serving each building with its own parking. It is more judicious to build parking for the neighbor-hood. If the policy can be reoriented to provide parking for each development area instead of each building then the parking requirement will also be modest. Standards can vary from zone to zone or city to sub-urban areas within the city and may be reviewed periodically and revised if necessary. The principles of parking as a demand management tool can be summarized as follows:

i.) Private Vehicle must be parked on 'a fully-paid rented or owned' space. Proof of the same must be furnished before registering a private vehicle.

ii.) Parking Management is to be used as a demand management tool – to decrease use of private vehicles and thus reduce overall demand of parking, and shift travel to public transport, para-transport & non-motorized modes.

iii.) Parking is a consumer commodity, not a legal right. No subsidized parking is to be provided in public spaces. User must pay full cost of parking facility based on land opportunity cost, capital cost, O&M costs and temporal demand.

iv.) Spaces already designated for parking must be utilized to highest efficiency and financial viability. New parking facilities may be developed as a multi-use shared amenity, to increase efficiency in use of space, time and finances.

v.) To ensure accessibility to maximum number of people, parking for para-transport / feeder modes is to be prioritized and subsidized. In areas designated for private parking, short term parkers must be prioritized over long-term parkers, in order to maximize turnover and enable economic vibrancy.

vi.) In the influence zones of the MRTS stations, a maximum limit on parking spaces should be imposed so as to enable shift to public transport from personal transport.

vii.) On street parking should be dis couraged to the maximum extent possible or should be highly priced as compared to the off street parking.

viii.) Off street parking must be provided with park and ride facility and the responsibility of keeping the streets, in the vicinity of multistory parking, free from unauthorized parking with the help of traffic police should be with the multistory parking operator.

Parking Management strategies need to be a combination of design and technology, fiscal strategies and transit-oriented-development. The following is a list of strategies that need to be implemented:

1. Eliminate long-term street parking to ease congestion
2. Limit off-street parking ratios in job centres with access to public transport to 0.2 spaces per worker
3. Remove all parking-space minimums for residential buildings and establish citywide parking-space maximums consistent with targets for private car use.
4. Enforcement of parking policy aided by Design and Technology
5. Reclaim street space, especially footpaths and cycle-tracks, from car parking for other needed public uses such as cycling lanes, cycle-rickshaw stands, para-transport/TSR stands, widened sidewalks, hawker zones or multi-utility zones.

6. Differentially provide for "Short-Term" and "Long term" Parking of private modes, including private buses, cars, 2-wheelers, cycles, etc.
7. Parking and Pedestrianization to go hand in hand – provide "Park Once-and-Walk"/ "Park Once and Ride"/ Shared Parking facilities in busy areas.
8. Curb Spillover Parking of large commercial or public facilities.
9. Mandatory % of cycles, 2-wheelers and shuttle buses to be part of ECS requirements for all private and public development projects.
10. Park-and-Ride Facilities for private modes ONLY at Terminal MRTS Stations or major Multimodal Interchanges
11. True Pricing of Parking based on real-estate values
12. Variable Time-based Pricing, as per market demand
13. Unbundling of Parking Costs from Properties and provision of consolidated shared parking options
14. Coordinated Off-Street and On-Street Pricing (customized to commercial and residential areas)
15. Provide parking caps in TOD Zones based on PTAL and/or distance from MRTS Stations.

4.8 TRAFFIC ENGINEERING MEASURES

Traffic engineering and Management is least cost and can keep the city moving for a long time. A traffic management unit is therefore essential in each city. Typical functions and responsibilities of a traffic management unit are tabulated below:

Table 5: Typical Functions and Responsibilities of a Traffic Management Unit

Division	Functions and Responsibilities
Traffic Management Policy	Formulate and Implement city wide "Traffic Management Policy" to comply with objectives defined by the "city council" which would include, at least such areas as determination of (i) a functional road hierarchy; (ii) the appropriate balance between transport system users (private transport/public transport/NMT/pedestrians; (iv)

Division	Functions and Responsibilities
	priority programs for action and, (iv) a "5 year" investment plan".
Traffic Research	Assemble/survey, monitor, analyze and evaluate all traffic and accident data to enable trends to be identified, problems quantified and traffic management plans and improvements to be prepared.
Traffic Management Plans and Improvements	Plan, design, implement, monitor, evaluate, fine-tune and continuously up-date traffic schemes and policies to realize the agreed Traffic Management Policy. The program would cover all motorized road based modes (cars, public transport, trucks, etc.) and all non-motorized modes (pedestrians, cycles). Plans and improvements would range from simple junction improvements or marking and signing programs through to far reaching city wide strategies such as extensive bus priority or pricing. Safety considerations are part of any scheme planning and design process but specific safety programs and accident counter measures would be a responsibility.
Traffic Control Devices	Plan, design, install, operate, and maintain all traffic control devices including (i) traffic signal systems including computer controlled systems; (ii) road markings; (iii) road signs and, (iv) enforcement devices (cameras etc.)
Traffic Regulations	Formulate traffic regulations to realize the proposed Traffic Management Plans and Improvements, for enactment by city government and for enforcement by the traffic police.
Parking Management	Prepare off and on street parking policies and programs including approval for the location of and access to parking areas proposed by others. Parking enforcement and administration (for example, where paid parking applies) would be carried out by a separate parking authority" or equivalent.
Approvals and Co-ordination	Evaluate and advise city government on all schemes (e.g., new roads) and developments (developed both by public and private sector agencies and including major new land or building developments) which have a significant traffic impact to ensure that they are consistent with agreed traffic policy. In effect carry out traffic impact studies for all major development proposals.
Consultation	Consultation with the public and stakeholders on traffic policy and on the impacts of specific schemes and measures.

Division	Functions and Responsibilities
Budget	Preparation of an annual budget for submission to city government for (i) implementation of Traffic Plans and Improvement Schemes; (ii) traffic operations and maintenance of control devices; and, (iii) the continuous work of the traffic management agency itself.

[2]World Bank, Washington DC 2002 "Cities on the Move– An Urban transport Strategy Review"

5 SOCIAL AND ENVIRONMENTAL ASPECTS

5.1 SAFETY

The need to improve safety in cities in India does not need any justification. Fatalities in India per million of population have increased from 79 in 2001 to 101 in 2007. The actual situation may be much worse as a number of accidents are not even reported. With growing traffic, lack of driver discipline, and inadequacy of the existing road infrastructure to handle the ever increasing traffic, road safety is deteriorating rapidly and requires urgent attention. An MORTH Committee on Road Safety and Traffic Management (February, 2007) estimated about 50% increase in road accidents over a 10 year period (2005-15).

Some of the major concerns regarding road traffic safety are (Mohan et al., 2009):

- Traffic fatality rates have been increasing in most cities;
- Pedestrians, bicyclists and two wheeler riders comprise of 60-90% of the total fatalities;
- Motorcyclists represent a large portion of urban fatalities (about 25%);
- Several studies indicate that the involvement of trucks in fatal crashes is high;
- Nighttime driving in India is substantially riskier than daytime driving.

Some factors that contribute to declining safety are;

- Quality of Infrastructure
- Driver training, testing and licensing
- Registration, Testing and *Certification* of Vehicles
- *Road Accidents Data Collection and Analysis*
- Enforcement of *Traffic Rules and Regulations*
- Institutional Arrangements and *Accountability*

Program to improve safety involves the following steps;

- All road design standards to be reviewed (2 years)
- All traffic management standards to be reviewed(2yrs)
- RSA for hazardous location(year 1-10)

- Crash data base on standard format(1 year)
- Segregated NMV lanes to be constructed on all arterial roads (10% road length every year, 100% to be covered in 10 years)
- Capacity building city engineers, town planners, safety auditor, traffic police(every year)

5.1.1 SAFETY AUDIT

Road Safety Audit (RSA) is an examination of an existing or planned road network by an independent and well qualified auditor who reports on any deficiencies in safety aspects and prepares recommendations on improvements that may be necessary. Cities should undertake safety audit for hazardous location (yr 1-10) to reduce accidents, fatalities and injuries. The program for safety audits will be as follows:

a. Select some 5 or 10 most hazardous roads / locations / intersections every year on the basis of accident records in each city / state / district.
b. Get road safety audit done for these locations
c. Apply recommendations as provided by safety auditors
d. Monitor the effectiveness of countermeasures

Today no single agency or department is responsible for improving safety in a comprehensive, scientific and a systematic manner in a city. The organizational framework to deal with all road safety related issues should be provided by creating a Safety Board at State level with safety cells in cities with dedicated personnel and budget (at least Rs. 10 crores/year). Relevant R&D shall be a part of the research program to minimize injury and the consequences in the event of an accident. Rescue services shall be organized to provide relief in the fastest time possible. Also, a National Road Safety Commission at the central level needs to be set up to set standards and parameters for Road Safety in the country.

5.2 SECURITY

The need for security against vandalism, crime and terrorism is increasing by the day. Security is needed for commuters, particularly women, operators against vandalism and graffiti and staff

on duty. It needs to be dealt with in a systematic manner. Personal security covers all parts of the journey: stations, stops, shelters and on-vehicle. It covers both passengers and operators.

The presence of young people and people who have been drinking tends to make other passengers more uneasy. Young people are more likely to be bullied or intimidated by other young people than by adults. People with learning disabilities are particularly subject to harassment and bullying. Majority of incidents of harassment or intimidation on bus travel go unreported. Developing an Effective Strategy will include:

- Design solutions such as use of robust materials, good lighting, clear sightlines;
- Management solutions such as the presence of trained staff, effective surveillance, procedures for reporting incidents; and
- Partnership initiatives such as effective liaison with the police, work with schools, and sponsoring initiatives which promote public transport to young people.
- Planning for security should become a part of urban transport planning

5.3 UNIVERSAL ACCESSIBILITY

The Constitution of India ensures equality, freedom, justice and dignity of all individuals and implicitly mandates an inclusive society for all including persons with disabilities. In the recent years, there have been vast and positive changes in the perception of the society towards persons with disabilities.

It has been realized that a majority of persons with disabilities can lead a better quality of life if they have equal opportunities and effective access to rehabilitation measures.

Universal accessibility needs to be provided, by the urban transport systems, both at the systemic level and the Infrastructure level.

- Accessibility at Systemic level implies that components of public transit systems like trains and buses, their stations and stops, the ticketing and any other user interfaces should be within reach of people with different types of impairments.

- At the infrastructure level, pedestrian paths and crossings, parking facilities and access to public land uses should be inclusive in their design for differently-abled persons.

5.4 VEHICLE AND FUEL TECHNOLOGY

Vehicle efficiency improvements, regulation of fuel and vehicles, Vehicle emission standards, and the modernization of taxi, truck, bus and other commercial fleets generates exceptional economic returns. Use of new fuels and vehicle technologies should be supported by suitable tax concessions. Inspection and certification of old vehicles should be made mandatory. Regular maintenance of vehicles should be enforced.

5.4.1 VEHICLE TECHNOLOGY SPECIFICATIONS

Appropriate technology for different types of vehicles should be standardized with detailed specifications. An example is the urban bus specifications detailed out by the MoUD as a part of its Bus Funding Stimulus Package launched in 2009. Both funding mechanisms and tax concessions were tied up with the package enabling 61cities to invest in state-of-the-art buses.

There also needs to be put in place a system for ensuring inspection and certification of in use vehicles to ensure that their performance remains consistent.

5.4.2 EFFICIENCY IN FUEL USE

Efficiency in fuel use can be brought about by:

- Promoting lighter vehicle weight, aerodynamic designs, fuel-efficient tires, renewable energy and engine efficiency improvement;
- Providing greater incentives for innovation, research and deployment of advanced transport technologies including Hybrid technology;
- Fuel efficiency standards should be laid down including adoption of Euro V, VI norms with matching improvements in fuel standards country wide.

6 INSTITUTIONAL FRAMEWORK AND CAPACITY

The present institutional framework to manage urban transport is quite fragmented and the responsibility is diffused. At the city level, several agencies are involved in the management of various components of urban transport. At the State level, UT is managed either by the Urban Development or by the Transport Ministry. At the Central Govt. level, urban transport is being managed by three Ministries i.e. Urban Development, Railways and the Road transport and Highways. Laying down standards and norms for items such as roads is being done by the Indian Roads Congress.

Urban transport, which is presently a constitutional and institutional orphan, has to be properly recognized in the constitution as well as in the institutional mechanism. Urban transport professionals, as a rule are not employed by cities. For the huge investments needed, the institutional framework for urban transport has to be extensive and more importantly effective. Accordingly, it would require important policy interventions to effectively drive the urban transport agenda for the next 20 years. The important policy interventions proposed are as follows:

To undertake the huge challenge and to manage the massive investments needed in urban transport, two vital steps needed are as follows:

- *Create a strong institutional framework in cities, states and at the center*
- *Upgradation of skills*

- Urban transport to be provided in the concurrent list (List III of Schedule VII) of the Constitution of India;
- A new department of urban transport to be set up in the Ministry of Urban Development at Government of India level and in Municipal Administration and Urban Development Department in each state / union territory within full time Secretary in charge;
- Setting up of Commission for Urban Road Transport Safety to cover safety certification and audit of road vehicles and road infrastructure in urban areas;
- Setting up of a Commission for Metro Railway Safety;

- Setting up MPC/DPC as envisaged in the 74th constitutional amendment for inter-sectoral coordination and setting up Unified Metropolitan Transport Authority in all million plus cities under the MPC/DPC duly supported by Transport Cell manned by trained Urban Transport professionals;
- The funds flow for urban transport projects to various implementing agencies (as they exist today) to be routed through UMTA;
- Providing infrastructure status to bus transport;
- Setting up of a National Urban Rail Transit Authority;
- Corporatization of suburban rail services – both existing systems and new systems;
- Tax exemptions to be provided for public transport, both for Metro rail as well as for buses so as to make provision of quality public transport cost effective;
- Setting up of Dedicated Urban Transport Fund at National, State level and city level;
- Taking up maintenance of major urban roads (arterial and sub arterial roads) on BOT Annuity mode with the concept of final road level;
- To provide seamless connectivity across various modes of transport, National Common Mobility Card and National Public Helpline with Helpline Nos. 155220 and 155221 to be introduced across all cities in India, covering all modes including parking, toll, etc.;
- Central Road Fund, especially the component generated from sale of petrol, to be used primarily for urban transport;
- All cities with a population of one lakh plus to have organized public transport;
- Introduction of a system of annual validation/renewal of driving license as well as registration certificate and annual road tax instead of life time rod tax;
- Taking up of new Central Sector schemes for innovation, research and development in guided transit to promote indigenization and development of low cost technologies, pilot projects, public bicycle scheme, improvement of para-transit through Intelligent Transport Systems and setting up of a research, design, standardization and standard setting cell for Metro Railway;
- Continuing the existing schemes of Urban Transport Planning and capacity building in urban transport with additional allocation and scope;
- Cities to be empowered to take care of its needs including Urban Transport;
- Creation of separate NMT cell in each Municipal corporation/ Municipality;
- Tying of small cost projects with large size projects for improving the effectiveness of large size projects;
- Making separate budgetary allocation for different components in the budget especially pedestrianization, cycle facilities, ITS etc as whatever get budgeted gets done.

By 2030, it is envisaged that cities would have taken full charge of their own urban transport needs. MPC/DPC, UMTA and existing city agencies will constitute a 3-tier set up in cities. The Central Government should take care of issues such as financing, PPP, capacity building, developing a data base and R&D. State Government should empower the city with an institutional framework, legislation, a resource generation policy and professional staff. A safety board should be set up in each state to deal with safety issues in a comprehensive, scientific and a systematic manner. It should be supported by relevant R&D. Rescue services should be organized for fast relief.

UMTA should be a full time professional body working under a city council with representation from all city agencies and stakeholders including the surrounding region. It should undertake; integration and approval of proposals by city agencies such as the Municipality, Development Authority, Regional development authority and Traffic police; Strategy and Policy Functions; Regulatory Functions; Transport Demand Management; Organizing urban transport services; Providing Common Services; Resolution of day to day matters and Monitor the work assigned to implementing agencies both for the city and the surrounding region.

6.1 PROPOSED INSTITUTIONAL FRAMEWORK

Multiple agency control of urban transport and no dedicated attention are not conducive to the provision and growth of urban transport along a sustainable path. Rectification of this weakness has become all the more urgent in view of the huge investments projected (Average Rs 1 lakh crore per year) in urban transport.

In order to provide dedicated attention to urban transport to enable it to grow along a sustainable path and to incur the level of expenditure envisaged, the institutional framework to deal with this sector is proposed as follows:

- A new department of Urban transport in the Central Government under a secretary
- A new department of urban transport in each state/union territory under a secretary.
- A safety Board in each state

- Setting up MPC/DPC as envisaged in the 74th constitutional amendment for inter-sectoral coordination
- A dedicated Urban transport authority in million plus cities or a group of small cities including traffic management and engineering cells
- Existing city agencies engaged in implementation and operation of UT related projects to continue in their present roles
- A regulator

6.2 PROPOSED ROLES OF DIFFERENT STAKEHOLDERS

There are different institutional stakeholders at different levels and sectors of governance the roles and responsibilities need to be clearly defined.

6.2.1 CENTRAL GOVERNMENT

In India, the Ministry of Urban Development is the nodal ministry for urban transport at the center. Two joint secretary level posts with some support staff are currently functional in the Ministry. No specific cells for urban transport, however, exist in the Ministries of Railways and Road transport and Highways. The time however has come when a separate department of Urban Transport is created at the center and the roles presently assigned to the Ministries of Urban Development, Railways and Road transport and Highways are transferred to it.

Similar action was taken by China in 2008. China was also facing similar problems associated with 'multiple management'. Eleventh National People's Congress (2008) emphasized organization of the Ministry of Transport. It further decided that responsibilities of the Ministry of Communications, Civil Aviation Administration of China, responsibilities of the Ministry of Construction for guiding urban passenger transport be integrated and transferred into this Ministry **(Annexure F**).

The Central Government should lay down National policy, enact laws, draft regulations, lay down planning standards and norms, prepare guidelines and manuals including those for private sector participation, design, install and maintain a data base, and disseminate data, promote research in UT including safety issues and organize capacity building.

The second important role for the Central Government is to supplement the financial support provided by the States to the Cities on a pre-determined basis to enable them to plan and coordinate the implementation of major infrastructure augmentation schemes including bus and rail transit. In addition, the Central Government may help with the setting up of an effective Institutional framework.

The question of involvement of the private sector is complex and skills and experience are limited. This role should therefore continue to be played by the Center and the State Government.

6.2.2 STATE GOVERNMENT

Urban transport is intertwined with urban development which is primarily a State subject and hence the State Government should play a pro-active role in the growth of facilities for urban transport in its cities. It should create a separate department to deal with urban transport with a full time secretary to lead it. The State Government should lay down policies, administer laws, rules and regulations, organize education and enforcement and allot funds to cities on a pre-determined basis. It should assist the cities with guidelines and manuals to plan and provide good urban transport.

The division of functions related to urban transport between the Transport and the Urban development Ministry at the State headquarters should be defined. The regulatory functions of licensing, vehicle inspection and enforcement may continue with the Transport commissioner. All other functions related to planning and provision of services in the city should be looked after by the newly created Department of urban transport.

In respect of traffic safety the establishment of high level, multi agency working group, generating comprehensive safety programs, has led to very significant and rapid improvements in road safety in cities as widely spread as Melbourne, Australia, Durban, South

Africa and Brasilia, Brazil. A safety board should be set up in each state to deal with safety issues in a comprehensive manner.

6.2.3 CITY GOVERNMENT

The center and the state cannot be directly responsible for urban transport in each city. The primary responsibility for providing good mobility to the City and the surrounding area i.e. suburban/regional services has to lie with the city that is the prime beneficiary. The city has to be made to realize this because most actions to improve urban transport in the cities lie with the city. This is the international practice. The arrangement in London is placed at **annexure G** for ready reference.

However, the city has to be empowered to take charge of its urban transport. The city has to be provided with a strong institutional framework, an effective organizational set up with a dedicated agency in the city to look after planning coordination and implementation of urban transport services, legislation, a resource generation policy and adequate skills. A three level organizational set up is proposed for the city.

- Metropolitan/District planning committee
- Dedicated authority for urban transport (UMTA)
- Other existing city agencies

6.2.3.1 METROPOLITAN PLANNING COMMITTEE

The constitution of the 'Metropolitan/District planning committee' as envisaged in the 74th constitutional amendment for the metropolitan area will take care of the inter-sectoral coordination needed particularly with urban growth policies.

6.2.3.2 DEDICATED AUTHORITY FOR URBAN TRANSPORT (UMTA)

UMTA is proposed for intra-sectoral coordination. Large metropolitan cities say with population in excess of one million should set up the 'Unified Metropolitan Transport Authority' (UMTA) as

envisaged in the National Urban Transport Policy 2006. Small cities should come together to form UMTA.

This authority should take care of the connectivity with the surrounding suburbs and region as well. UMTA should report to the proposed Secretary of urban transport in the State Government. Similar agency should be created to take care of a group of small cities.

NUTP 2006 envisages UMTA primarily as a coordinating body to bring about Policy, Planning and Service Co-ordination, to decide on capital financing and long term investments and to monitor implementation. The UMTA act enacted by Andhra Pradesh Government states that 'UMTA shall ensure effective implementation and coordination of various traffic and transport measures undertaken by functional departments and public agencies in Hyderabad Metropolitan Region'.

The National Urban transport policy 2006 further requires UMTA to be supported by a professional body that will study and make recommendations on various issues for consideration and decision by UMTA. Rather than have two separate bodies it is now proposed that UMTA is a full time professional body working under a city council with representation from all city agencies and stakeholders including the surrounding region. It should undertake all work related to urban mobility in the city. This will include; Strategic and Policy Functions; Regulatory Functions; Integrated planning; Transport Demand Management; Organizing services; Providing Common Services; Resolution of day to day matters and Monitor the work assigned to implementing agencies both for the city and the surrounding region. To undertake the huge challenge and to manage the massive investments needed in urban transport, two vital steps are needed; creating a strong institutional framework in cities, states and the center and upgrade of skills.

Operation of Bus, Rail and other guided transit modes, Bus Priority Schemes, Water transport etc. are often entrusted to specialist agencies. This should continue. Construction of infrastructure, operation and maintenance thereafter will be by the relevant agency. Permits for stage carriage operation including para-transit should be issued only as approved by UMTA.

To enable the proposed institutional framework to deliver, it must be provided with adequate means and authority. The best way of imparting the desired strength to institutional framework essentially UMTA is to give it the authority for allocation of funds to various agencies in the city to undertake various UT related activities. The performance of UMTA can be measured in terms of parameters such as the travel speed and the level of air pollution in the city. Thus the aim should be to have an authority with full powers, but be accountable.

For UMTA to be effective it should be backed by legislation and the entire funding for urban transport should be routed through UMTA.

6.2.3.3 OTHER EXISTING AGENCIES

Existing agencies managing various components of urban transport will continue to be a part of the institutional framework as the third level in the cities for executing works as per the prioritized program approved by UMTA. The professional skill with existing agencies in implementation and operation will be much needed. It is important that the large number of agencies presently involved do not feel left out. The respective city agency will be responsible for maintenance of assets as well.

6.2.4 URBAN RAIL TRANSIT SERVICES

Lack of capacity in different states in conceptualizing and executing the projects can pose a serious constraint in faster expansion of MRTS network in Indian cities. At national level there is no expert body which can suggest choice of technology, thrust of the innovation effort, best international practices and safety measures.

As per the Allocation of Business Rules of the Government of India in regard to rail based urban transport, the Ministry of Urban Development is the nodal agency for policy and planning at the national level while the technical planning and safety for rail based urban transport systems is the responsibility of the Ministry of Railways. The Metro Railway (Operation and Maintenance)

Act'2002 also provides that the Central Government in respect of technical planning and safety for Metro Railway is Ministry in Government of India dealing with Railways. The technical expertise of Rail based systems basically lies with Ministry of Railways and RDSO. However the focus of Ministry of Railways is on long distance travel of passengers and goods; and accordingly it does not have adequate experience about planning, constructing or operating a metro system except that of Kolkata Metro. Modern metro technology has advanced considerably from the Kolkata days. To keep abreast with all the new and emerging metro technologies, which sometimes may not be in use in Railways, it is, therefore, proposed that a special body be set up which would be the repository of metro technology.

It is suggested the Central Government should form NURTA on the lines of NHAI to plan, design and implement rail transit projects for city/state Government. Cities may entrust such projects to NURTA on a turnkey basis on deposit terms or take NRUTA as a partner in its SPV which it may set up for implementing and operating a rail transit project.

NURTA will also help the State Government to train persons for the operation of metro system or monitor the safety and quality of services of the operator in case O&M is outsourced. NURTA should be manned by experienced engineers drawn from Delhi Metro, Railways, CPWD and other Government Organizations and it should be headed by a very experienced and competent professional. The functions of NURTA may inter alia include:

- Careful examination of a proposal for a rail transit project in accordance with the guidelines specified;
- Periodic review and modification in the guidelines for choosing a mode;
- Encourage and supervise research for indigenization and cost saving innovations in rail transit projects;
- To disseminate best practice documents;
- Creation of a pool of trained personnel for implementation and operation of rail transit projects. For this, NURTA may collaborate with Ministry of Railways and Centres of Excellence to use their existing facilities and create its own facilities wherever shortfall emerges;
- To function as a nodal agency to ensure that rail transit projects across the country have access to professional project and transaction adviser;
- To function as a body for technical evaluation of DPR of a rail transit Project;

- To examine and evaluate the City Mobility Plans;
- To recommend optimal utilization of Urban dedicated MRTS Fund;
- To aid MoUD, MoR and State urban Planning bodies to integrate land use pattern with transport Planning;
- To address all other strategic issue on which States and Cities lack capability and look for guidance;
- To provide capacity building of State and City governments for effective development, operations, maintenance and management of rail transit projects.

An 'Urban Transport fund' should be set up to receive funds from various sources to finance urban transport projects.

To enable NURTA to have lateral technical support, it is suggested a special wing in RDSO should be set up fully funded by the Ministry of Urban Development solely for the technical assistance to NURTA. This Cell will be fully under the administrative and technical control of the Ministry of Urban Development.

6.3 LEGISLATION

There is no legislation at present that covers the requirements of urban transport comprehensively. The Motor Vehicles Act deals with the licensing of vehicles, Railway Act covers inter-city traffic, Metro Construction Act deals with the specific issues related to construction of the metro rail, Tramways Act deals with tramways within the road surface with free access across it. Other modes of mass rapid transit such as the bus rapid transit, the light rail transit the mono rail and several other guided modes of transport and issues of transport planning, multi-modal integration, safety, tariff and financing are not covered under any act.

Urban transport affects all aspects of city life and the working of nearly all other city agencies. It affects the safety of people traveling in the city. Its fare structure has socio-economic implications. A quality transport quality infrastructure provides stimulus to inclusive economic growth in its catchment area. Its modal share composition affects the environment. Its economics depends on the effectiveness of multimodal integration. UT plans have to be implemented over a period of time and hence require continuity. To take care of these and

several other aspects, an agency needs to be made responsible for providing UT needs legislative support. A comprehensive UT act to cover all aspects of urban transport is essential. Contents of such an act are listed in **annexure H**. The act should be enacted by the Central Government and States may draft rules under it as per its needs as in the case of Motor vehicles act.

6.4 RESOURCE GENERATION POLICY

Government makes budgetary allocations both in the revenue and the capital account. This is linked to the overall Government budgeting and not necessarily to the needs of urban transport in a city and hence is seldom adequate. A policy on budgetary allocations, user charges and tapping other source of funds based on taxation of non-user beneficiaries, land development and vehicle taxation on the 'polluter pays principle' should be provided to the city. All cities should have a formula based funding from Central and State governments, and should leverage debt as well.

Involvement of the private sector is a potent source for financing and managing urban transport services in the city. This source should be used for services that yield direct revenue to the private entrepreneur to recover his investment with commercial profit.

6.5 CAPACITY BUILDING

The second important requirement in meeting the challenge is to provide skills to the city/state. Urban transport is made up of several components such as several private and public modes of transport, roads network and all associated infrastructure and other related activities such as multi-modal integration. Unfortunately the capability for undertaking a coordinated approach and a complete understanding of issues involved is lacking at the State Government and City level. There is an urgent need for capacity building; both at institutional and individual level. For institutional strengthening NUTP has identified Institute of Urban Transport (IUT) at the

Central Government level. Similar institutional strengthening should be undertaken by State Governments.

Individual capacity building should be in two parts; city officials and university educated professionals. The focus of training for existing city officials should be to develop awareness, skills and a deeper understanding of the requisite issues in urban transport. The focus of the education component should be to create a pool of skilled manpower to be available in the country for recruitment by various organizations engaged in urban transport. Alumni from such programs would be potential recruits for State Transport Corporations, State Transport Departments, Municipal bodies etc. Simultaneously State Governments should be encouraged to create jobs for such professionals.

The Ministry of Urban development Government of India has already established four centers of excellence one each at IIT Delhi, IIT Chennai, CEPT Ahmedabad and NIT Warangal. Perhaps there is a need to set up more centers of excellence. These should be aided by incentives from the Ministry of Human Resources Development along with financial outlays from the Ministry of Urban Development for creation of new faculty positions and provision of research scholarships, in order to ensure healthy growth of these centers. The curriculum in universities should be reviewed so that the professionals coming out have skills in tasks needed today such as planning and design of Bus rapid transit, facilities for NMT etc.

A concerted effort is needed to upgrade skills all round. With regard to skills, most planning is done by consulting agencies appointed by cities. It now appears that neither the consultants always have the desired level of skill in the assigned task nor do the cities have the necessary skills to supervise and monitor the work of the consultant. A compulsory system of certifying experts to handle specific tasks perhaps needs to be introduced. Capacity building is an ongoing need and hence should be institutionalized.

Accordingly MOUD has launched a comprehensive scheme for capacity building for urban transport. It involves the following 10 activities:

- Training
- Education; Development of curriculum and faculty development of academic Institutes
- Dissemination of information - Conferences and Journals
- Development of legal and administrative frameworks,
- Development of manuals, codes and standards,
- Development and strengthening of Institute of Urban Transport (India), a national level institute for, training, coordinating research and dissemination of information,
- Development of a National database,
- Promotion of National level consultancy organizations to provide a pool of professional manpower to assist State/city Governments,
- Setting up of institutions for the Research and Design; and safety certification of externally guided rail based transit systems and other new systems that may be developed for urban transport,
- Setting up of Unified Metropolitan Transport Authority (UMTA) and Urban Transport Cell in various mission cities.

Presently urban transport is not the responsibility of any dedicated organization in the City or the state. Urban transport professionals are generally not employed. There is a general lack of urban transport skills amongst city/state officials of other departments involved in urban transport. The issue is who to train.

For the training and skill building program to be beneficial, states should be mandated to immediately constitute a dedicated agency for urban transport in each city and at the state level, identify officials to be appointed to these agencies, send them for training and on return post them to these agencies/departments.

6.6 RECRUITMENT AND RETENTION OF PROFESSIONAL STAFF

Recruitment and retention of trained urban transport professionals in various cities is essential to promote good urban transport. The main reason for lack of professional skill in cities is that the urban transport professionals today do not have career growth prospects in states/cities. Institutional framework must therefore be such that the urban transport professionals get their due place in the scheme of things in the city and are offered reasonable career prospects.

It is proposed that the State creates a new State cadre of urban transport professionals to be posted to various cities and managed by the proposed Urban transport department to be set up in the State headquarters. The professionals of urban transport cadre from the States should have access to the top posts at the Center in the Ministry of Urban Development.

The table below suggests the initial staff strength of such agencies for different size cities and the associated cost. Suitable staff strength will also be needed in each state/UT HQ. The staff strength will need to be increased based on need and with experience.

Table 6: Estimated Staff per city

S No.	Population Range in Million	No. of Cities 2017	Assumed no. of staff per city	Estimated Cost/city for 5 yrs. In Rs crores	Total no. of Staff	Total cost For 5 yrs. Rs crores
1	> 10	4	20	15	80	60
2	4 to 10	10	16	13	160	130
3	1 to 4	42	12	10	500	420
4	0.5 to 1.0	125	5	3.5	625	435
5	< 0.5	425	3	2.0	1275	850
	Total	**606**			**2640**	**1895**

6.7 KNOWLEDGE MANAGEMENT AND DATABASE

The virtual lack of a **database** in urban transport has severely constrained the ability to formulate sound urban transport policies and plans and reliably assess the impact of different initiatives that have been taken. Action has been initiated by MOUD to set up a 'Knowledge Management and data base Center' (KMC) with the support of GEF and UNDP under the sustainable urban transport project. The National urban transport policy has identified the Institute of Urban Transport India to be developed as a National level institute to build up a database for use in planning, research, training, etc in the field of urban transport and be a

National store house for all urban transport sector related data and information. Similar database centers should be set up by State Governments and large cities as well.

This 'Knowledge management and data base center' will have a full fledged library and a publishing wing. The library will include not only books but also National and International Journals and Periodicals, Project Reports, Study Reports, Manuals, Tool Kits and all other such material. The library is to provide a single window for accessing relevant text and reference material, particularly by Professionals, Students, Planners and Researchers, in the field of Urban Transport with an e-catalogue on website with appropriate linkages. Data from Masters and PhD thesis work at academic institutes will be channeled into the database.

Regular update of the database and information will be one of the important task. Regular collection of data and information, both from primary and secondary sources to keep the data base and the library at the proposed Knowledge Management Center up-to-date should be institutionalized.

6.8 RESEARCH AND DEVELOPMENT AND TECHNOLOGY UPGRADE

Research in urban transport in India is being undertaken mainly as an academic exercise without any coordination with each other and without trying to match it with the need of the user. Over the last 10 years nearly 1400 research projects undertaken by 20 organizations are reported in the CRRI reports. These include 11 research organizations such as CRRI and 9 academic institutes. Only about 200 projects relate to urban transport. The need for coordination of research activity in urban transport and its dissemination is urgent. The research agenda in urban transport has been taken forward by the Ministry of Urban development Government of India by providing 4 'Centers of Excellence' with funds for research. The Ministry also sponsored a half day Research Symposium at its 3rd annual 'Urban Mobility Conference' 2010 held in Delhi from December 3rd to 5th. Considering the overwhelming response, the Ministry has decided to extend this Research Symposium to full

day at the 4th annual 'Urban Mobility conference cum Expo to be held in Delhi from December 3rd to 6th.

The Central Government should initiate new schemes for innovation, research and development in **guided transit to promote indigenization and development of low cost technologies, pilot projects, public bicycle scheme, improvement of para-transit through Intelligent Transport Systems and setting up of a research, design, standardization and standard setting cell for Metro Railway**.

Research in urban transport in the country needs to be stepped up in a coordinated manner duly linked with the needs of the cities and its dissemination organized. A coordinated research program should be developed, implemented and institutionalized.

7 INTELLIGENT TRANSPORT AND COMMUNICATION SYSTEMS

The expectations and demands have changed significantly; people are demanding high level of service quality and value for money. The easy availability of real time information such as maps, GPS systems and other travel related information, people want to plan their routes based on distance, time and cost. The existing urban transport infrastructure will require a major overhaul in order to meet the demand.

Therefore along with investment in transport infrastructure, investment should be made in adapting new technology and ICT enabled transport management systems. Implementation of ICT systems will optimise operational efficiency through improved data collection and analytics leading to better decision making in urban transport planning and management. New vehicle technology will be required to achieve significant reduction in pollution. ICT can help in managing a Public Bicycle System, from registration, payments, tracking to maintenance.

The information technology infrastructure will be managed separately from the application software and the data, recognizing that each component—application software, data, infrastructure—has a distinct life cycle. ICT systems will be implemented in a phased manner taking into account capability and technology maturity of the transport organisation, investment requirement and prioritise the ICT intervention based on the operational requirement and passenger preferences. Implementing a comprehensive ICT system may be disruptive for organisations with low level of Technology maturity.

ICT systems can help in planning and visualization through simulation and modeling, improve passenger experience through PIS and fare integration, Improve transport agency's efficiency through better vehicle tracking and asset management, improve passenger safety and security, reduce fuel consumption and emissions, aid in better traffic and congestion management, support policy making and infrastructure planning and increasing accessibility and quality of life.

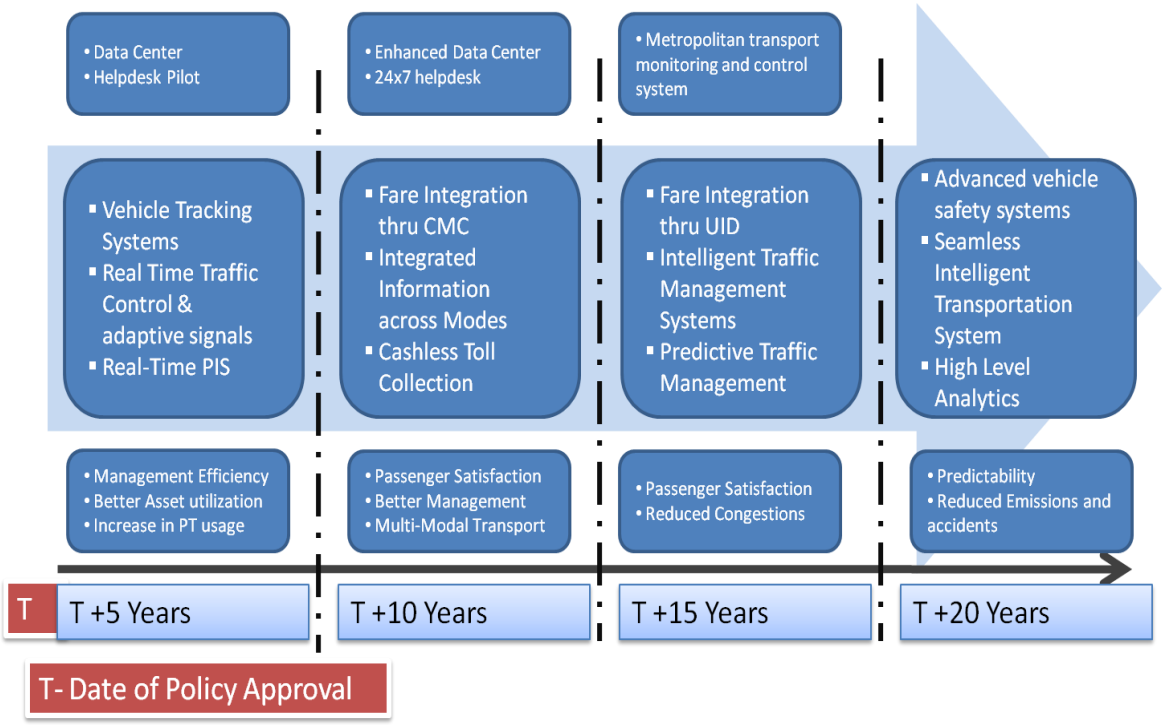
7.1.1 ICT SUB-SYSTEMS

ICT systems comprises of devices in the transport system supported by Data Centers, Hardware, Software, Networks, Analytical Tools, etc. IT is a Part of a larger plan to drive the expected changes and is not a magic-wand. ICT in urban transport comprises of the following key systems:

- **Information Collection Systems:** These systems help in collection of various types of data, including data related to infrastructure, transport activity levels, emissions, energy use, accidents, vehicles etc. Data collection is done using a variety of technologies, including sensors, induction loops, GPS, cameras and information from police or road users.
- **Analytics & Decision Support Systems:** DSS is a specific class of computerized information system that supports business and organizational decision-making activities. Data from the above system is presented in such a way, that the decision makers can view the data to make meaningful policy decisions. For example Data on road congestion or average speed in a particular area will help the authorities to plan the required infrastructure or add more public transport to de-congest the area.
- **Communication Systems:** Communication systems ensure reliable and secure delivery of all information throughout the transport network Communication systems include vehicle to vehicle, vehicle to infrastructure, infrastructure to people, vehicle to people, etc. The communication system can be through satellite, mobile, broadband, fibre optic, etc.
- **Automation and Control Systems:** These systems include Intelligent Electronic Devices (IED) and other control devices in the field deployed on the vehicles, traffic signals, road infrastructure, etc. These components automatically control the flow of traffic on the roads and intersections based on the traffic volume, automated toll collection, automated lane control, automated speed control within the vehicle, etc.

These ICT solutions would help address the needs of the current and future urban transport requirements.

7.1.2 ICT IMPLEMENTATION PLAN

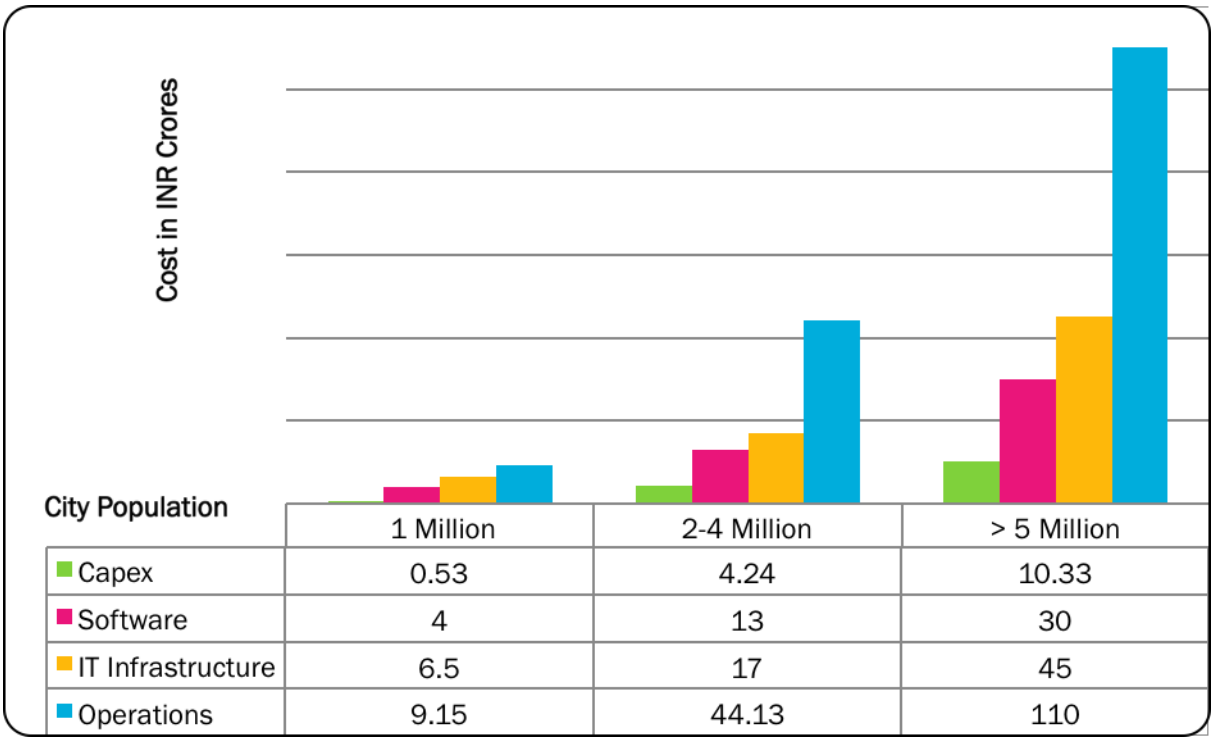


The Government needs to devise transport policy to include mechanism to Incentivize technology adoption through innovative funding mechanism; Enable common payment gateway mechanism in transport; Protection of passengers' personal information and discontinue paper based tickets

The policy also needs to make it mandatory for the Transport operators to establish a Central Command center to monitor and manage the system with 24x7 Help Desk; Training to drivers on use of new technology; GPS (or similar) devices, Speed Governors along with Driver Feedback systems; Internet hotspots and kiosks at bus and train stations; Surveillance and security systems; Contact less smart card system for payment and to provide service related updates thru electronic means.

7.1.3 COST ESTIMATE

The graph below shows the estimates of cost per city for implementing ICT systems in cities with population of 1, 2 to 4 and above 5 million. The expenditure consists of capital and operating expenditure and also expenditure required for IT infrastructure and for implementing software systems.



City Population	1 Million	2-4 Million	> 5 Million
Capex	0.53	4.24	10.33
Software	4	13	30
IT Infrastructure	6.5	17	45
Operations	9.15	44.13	110
Total (Rs Crores)/city	20.18	78.37	195.33

7.1.4 TECHNOLOGY FOR ENFORCEMENT

Enforcement needs to be strengthened by the use of technology. A traffic enforcement camera system, consisting of a camera and a vehicle-monitoring device, is used to detect and identify vehicles disobeying a speed limit or some other legal requirement and automatically ticket offenders based on the license plate number. Traffic tickets are sent by mail. Applications include:

a. Speed cameras that identify vehicles traveling over the legal speed limit. Many such devices use radar to detect a vehicle's speed or electromagnetic loops buried in each lane of the road.
b. Red light cameras that detect vehicles that cross a stop line or designated stopping place while a red traffic light is showing.
c. Bus lane cameras that identify vehicles traveling in lanes reserved for buses. In some jurisdictions, bus lanes can also be used by taxis or vehicles engaged in car pooling.
d. Level crossing cameras that identify vehicles crossing railways at grade illegally.
e. Double white line cameras that identify vehicles crossing these lines.
f. High-occupancy vehicle lane cameras for that identify vehicles violating HOV requirements.
g. Turn cameras at intersections where specific turns are prohibited on red. This type of camera is mostly used in cities or heavy populated areas.
h. Video recording of public transport vehicles is increasingly used both to protect passengers and to allow bus companies to prosecute offenders. The installation of equipment is often sufficient to deter delinquents even if it is not in operation. Some 20 years ago one British regional bus company installed boxes on all of its vehicles, but only had working equipment on 10% of them. Taken with a vigorous attitude to prosecution of offenders and appropriate severity in the courts a wave of vandalism was rapidly eliminated. Jaipur City's low floor buses will soon be equipped with high definition cameras and global positioning system (GPS). Security cameras and GPS will be installed in 246 low floor buses.

7.1.4.1 TECHNOLOGY FOR VEHICLE INSPECTION AND MAINTENANCE

Ensuring proper maintenance of road vehicles is essential to reduction of congestion and vehicle emissions. Most countries therefore require regular maintenance and certification of vehicles. In many, however, the system does not work effectively because of the corruption of testing officials. This has largely been overcome in Mexico City, which, as part of a wider reform program used modern computer possibilities to automatize the testing process.

The key elements of the system are as follows:

a. Within the test-only centers, there is centralized operation. Staff in a central room can see the emission test results while the employee in the test lane conducting the test is “blind” to the results, thus discouraging any tampering with the test equipment or vehicle or otherwise manipulating the test.
b. Tests are computer controlled, and all data are recorded electronically. There is no paper record keeping that invites fraud or inadvertent error.

c. Test centers relay data to a central authority in real time, as generated. Elaborate electronic security measures discourage data tampering.
d. The data allows remote electronic auditing of test centers and even of individual employees.
e. Remote video surveillance and recording provides an additional check on performance.
f. Independent and frequent calibration audits of test centers ensures that test equipment is properly maintained and provides accurate emission measurements (Walsh, 2004).

8 CONCLUSIONS & RECOMMENDATIONS

The conclusions of the deliberation of the working group and the recommendation based on the analysis are summarized below.

1. **Conclusions** derived from the deliberation on the urban transport scene as listed as follows:

- Urban transport scene in Indian cities, today, is headed in the wrong direction.
- The 'Business As Usual' Growth Scenario projected to 2030 will be worse.
- Successful urban transport systems not only increase commercial and labour market efficiency, but also increase access to amenities, improve general mobility and add to quality of life.
- Massive investments (Rs 75000 to Rs 100,000 crores) are needed to build up urban transport infrastructure and services in cities to enable them to play their role in the desired economic growth of the country.

2. **Recommendations** of the document for the goals to achieve the vision 2030 as listed below.

For augmentation of public transport following **goals** should be adopted:

- Organised city Bus service as per Urban bus specifications i.e VTS and PIS in all 1 lakh+ cities and state capitals;
- Add BRTS @ 20 km/1 Mn population in cities with pop. > 1 Mn;
- Cities with population >2 Mn to start planning rail transit projects, with 3 Mn to start construction. Estimated requirement 10 km per Mn;
- In existing mega cities, Metro rail to be expanded @ minimum 10 km per/year
- Suburban rail to be provided in urban agglomeration with population > 4 Mn

Other Goals are:

- Walk and cycle lanes to be provided in all 2 lakh+ cities and state capitals
- Creation of an effective institutional and Implementation framework as well as capacity building to manage projected investments
- Road network in all 2 lakh + cities to be completed with missing links and with good surface and effective drainage.
- Work of utility agencies to be regulated
- Safety, safety audit and security to be upgraded
- Technology to be used for integration, Enforcement and traffic management

3. Rolling program and Financing Strategy needs to be as follows:

- The rolling program should be adopted as per annexure D**.**
- Financing strategy should be based on consortium approach with the participation of Central and State Govt. / City Development Authorities, Property Developers, Private Sector, Debt from Multilateral / Bilateral institutions and Debt from domestic financial institutions contribute.
- All forms of public transport should be treated as infrastructure and tax concessions extended to them
- Urban development funds should be set up at the city and National level
- Transit oriented development should be promoted
- Financing of buses, both capital and revenue should be placed on a firm footing

4. **Institutional framework for Urban Rail transit projects** should be:

- A National Urban Rail Transit Authority under the Ministry of Urban Development, Government of India to help urban Rail transit projects
- An R&D Cell to be set up under the control of Ministry of Urban Development, Government of India
- Suburban Rail systems to be corporatized to become a part of the city transport system
- Technical control of Rail Transit projects should remain with the Ministry of Railways as per the current allocation of business rules.

5. **Institutional framework** should be created as follows;

- A new department of Urban transport at the Centre under a full time secretary,
- A new department of urban transport in each state and union territory under a full time secretary including a 'Safety Board'.
- Setting up MPC/DPC in cities as envisaged in the 74th constitutional amendment
- A dedicated unified metropolitan transport authority (UMTA) in million plus cities or for a group of small cities including traffic management and engineering cells
- Existing city agencies engaged in implementation and operation of UT related projects to continue with their present roles
- A Regulator

6. **Cities should be empowered to take care of its urban transport needs as follows**

- State should create a new State cadre of urban transport professionals to be posted to various cities and managed by the proposed urban transport department at the State headquarters.
- A comprehensive UT act to cover all aspects of urban transport should be enacted by the Central Government and States may draft rules under it as per its needs
- A policy on budgetary allocations, user charges and tapping other source of funds based on taxation of non-user beneficiaries, land development and vehicle taxation on the 'polluter pays principle' should be provided to the city.

City should have a three level **organizational set up** as follows;

- Metropolitan/District planning committee
- Dedicated authority for urban transport (UMTA)
- Other existing city agencies

7. **A Capacity building program** with the following components should be implemented;

- Training of city officials and other stakeholders to enable them to undertake small planning assignments and to supervise and monitor the work of the consultant,
- Institutional capacity building at the Central/State Govt. level
- A data base and knowledge management center
- Development of manuals, codes and standards for UT
- R & D to be organized and findings disseminated
- M techs and Ph.Ds should be generated by universities with appropriate curriculum. State Governments should create jobs to absorb these professionals

Steps initiated by The Ministry of Urban Development, Government of India for capacity building, setting up a knowledge management cum data base center, and organized R&D. are ongoing activities and should be institutionalized.

8. **The following policy interventions to achieve 'Vision 2030'**

- Effective and holistic planning for the city and the surrounding region
- Facilities for walk and bicycle to be citywide and to be given priority in funding
- Public transport to be integrated, multimodal and citywide with efficient interchanges and should provide a high level of service
- Bus services for all cities above 1 lakh population
- Cycle rickshaw to be a part of the public transport network
- Intermediate public transport modes to be upgraded technologically
- Congestion management and steps to control the use of cars and 2-wheelers
- Safety, safety audits and security upgrade
- Incentivizing use of technology for integration, enforcement and traffic management

9 INVESTMENT REQUIREMENTS AND FINANCING STRATEGIES

The recent report on 'Indian Urban Infrastructure and services' by the High Powered Committee appointed by the Ministry of Urban Development Government of India (HPEC report) has projected an investment in urban infrastructure of Rs 51,000 crores (at 2009-10 prices) in the base year 2011-12 which is assumed to increase at 15% per annum during the 12th Five Year Plan (FYP) beginning 2012-13 (para 1.8.15 page 35).The share of urban roads and transport including traffic support infrastructure and street lighting in the future total investment in urban services has been estimated as 74% (Table 3.4 page 76 of the HPEC report) i.e. about Rs. 40,000 crores in the year 2011-12. Adding inflation at 5%, this figure would be Rs 45,000 crores. It is therefore assumed that the level of investment in urban transport and roads is Rs 45000 crores in the year 2011-12. Activity in the urban transport sector has picked up during the last 5 years. Assuming that over the duration of the 11th FYP investment increased at the rate of average Rs 5000 crores per annum, from Rs 25,000 to Rs 45,000, an investment of Rs 1,65,000 crores can be assumed to have taken place during the last 5 years i.e. the 11th FYP period. During the 10th FYP, activity in urban transport was relatively slow. It can therefore be assumed that annual investment in this period varied from Rs 15000 crores to Rs 25000 crores per year i.e. a total investment of about Rs 100,000 crores during the 10th FYP.

9.1 GOALS

For augmentation of public transport goals are as follows (as per 2011 Census);

- Organised city Bus service as per Urban bus specifications i.e with all ITS features including VTS and PIS in all 1 lakh+ cities and state capitals
- Add BRTS @ 20 km/1 Million (Mn) population in cities with population > 1 Mn
- Cities with population >2 Mn to start planning metro rail projects and with 3 Mn to start construction. Estimated requirement 10 km per Mn.
- In existing mega cities, Metro rail to be expanded @ minimum 10 km per/year
- Suburban rail services to be provided in urban agglomerations with population > 4 Mn.

Other goals are:

- Walk and cycle lanes to be provided in all 2 lakh+ cities and state capitals
- Creation of an effective institutional and Implementation framework as well as capacity building to manage projected investments
- Road network in all 2 lakh + cities to be completed with missing links and with good surface and drainage.
- Work of utility agencies to be regulated
- Safety, safety audit and security to be upgraded
- Technology to be used for Multimodal integration, Enforcement and traffic management

9.2 INVESTMENT REQUIREMENT

The investment requirements by 2030 for all of 8150 cities with population upto have been estimated for these 3 scenarios. These are;

Scenario 1: Business as usual scenario; Rs 22.78 lakh crores

Scenario 2: Intermediate scenario; Rs 17 lakh crores

Scenario 3: Desired scenario; Rs 15 lakh crores

The investment requirements vary across scenarios. Average annual outlays are in the range of Rs. **75000 Crores to 100,000 Crores /Year**.

Investment of the order envisaged in the future far exceeds what has been achieved so far (Figures of total expenditure incurred by cities in the last 5 years are not available). It will therefore take time to scale up the expenditure that can be incurred. It will be noted that the investment required in the desirable Scenario is much reduced compared to the BAU scenario. Which scenario is achieved depends on how fast and how effectively various policy interventions needed to achieve the vision 2030 are implemented. Assuming the intermediate scenario 2 is achieved, the investment during every 5 year period in the next 20 years will be Rs (In lakh crores) 3.5, 4.5, 4.5 and 4.5.

9.2.1 COMPONENT-WISE REQUIREMENT:

- Roads take away large share of investments (70-80 %).
    - On an average, 10-15000 km of new streets need to be developed
    - Another 10000 km of road is to be reconstructed
    - 20% of estimated expenditure on roads is required for NMV and pedestrian facilities
- Public transport requirements in terms of network and fleet requires majority investments (20-30 %)

a. Every Year 500 to 700 km of Mass Rapid Transit Network needs to be built

b. To sustain growth 50-60% of trips should be on public transport.

c. Buses form the backbone of transport in major cities (30-40% share).

d. Tempos/Auto-rickshaws are major modes of public transport especially in many small and medium sized cities. The fact that about 40% of the urban population will reside in small and medium towns, this mode will continue to play a critical role as public transport provider (5-10% share).

e. Rail transit system is likely to meet about 10-15% of aggregate demand. It is assumed that its role is limited mainly to mega cities. It may also be relevant to some extent in 20 lakh+ population cities.

f. Every year 8-10000 buses need to be added to take care of the replacement needs as well as to accommodate new demand.

Difference in the 3 scenarios in terms of type of infrastructure and the corresponding investment needs is shown in the table below:

Table 7: Percentage share of Investment

Scenarios	SCN-1	SCN-2	SCN-3
Street Infrastructure	70.08%	71.90%	78.48%
Buses	1.19%	1.63%	2.00%
BRTS Network-km	3.37%	4.07%	3.95%
Rail Transit-km	23.74%	19.77%	12.25%
Depot	0.51%	0.74%	0.86%
Terminals	0.29%	0.50%	0.65%
Workshops	0.08%	0.13%	0.15%
ITS &ATC	0.42%	0.72%	0.95%

Scenarios	SCN-1	SCN-2	SCN-3
Parking	0.29%	0.50%	0.65%
Capacity Building	0.03%	0.05%	0.06%
Grand Total	100%	100%	100%

It will be noted from the table above that between the BAU to the desired Sustainable Transport Scenario the use of bus and bus rapid transit increases while the use of rail transit decreases. The spending on roads as a %age of total however keeps rising. Considering that roads is a temporary solution, there is a case for increasing the use of environment friendly modes at the time of detailing.

9.2.2 COMPARISON OF INVESTMENTS IN 3 STUDIES

The table below compares the investments projected in Study reports by the **McKinsey Global Institute (MGI),** the **High Powered Expert Committee (HPEC)** appointed by the Ministry of Urban Development and the study by the Need Assessment sub-group of the Working group on urban transport. Relevant extracts form the first two reports explaining the basis of their projections are placed at A**nnexure C.**

Table 8: Comparison of Investments in 3 Studies

ITEM	MGI	HPEC	Sprawl	Intermediary	Desired
Urban Roads	8.90	17.29	12.08	9.41	9.17
Transit	17.64	4.49	10.55	7.44	5.56
Others	0.50	0.90	0.15	0.15	0.27
TOTAL	27.04	22.68	22.78	17.00	15.00

The investments estimated by all three studies/reports are comparable at aggregate level. However MGI study focuses much more on Mass Rapid Transit while HPEC report lays much

more emphasis on Urban Roads, both attributing it to the huge backlog. The estimate by the Working group on urban transport is more in line with the HPEC projections.

9.2.3 ROLLING PROGRAM

The rolling program is based on the 'service level bench marks' issued by MOUD. The SLBMs provide for four levels of service. It is assumed that all cities are at the starting point and will move up one notch every five years up to 2030. Different size cities require different infrastructure. A strategy for action in cities of various size and type has been developed and is placed at **annexure B**. Short and long term actions are required to encourage use of Public Transport and to retain the existing modal share of NMT and walk.

The strategy for funding of urban transport should be based on consortium approach in which Central and State Govt. / City Development Authorities, Property Developers, Private Sector, Debt from Multilateral / Bilateral institutions and Debt from domestic financial institutions contribute. The funds should be channeled into Dedicated Urban Transport funds to be set up at National and State level. Operating and Maintenance losses in public transport services are inevitable. Mechanism for covering these expenses needs to be specified. Buses are the main component of public transport even when rail transport is provided. It is, therefore, essential that the financing of buses, both capital and revenue is placed on a firm footing because a very large number of small and medium size cities will not need rail transit.

Six key funding sources identified are user charges, support from Government, tax concessions & dedicated levies, Land Monetization, non-user beneficiaries & Debt and PPP should be used for generating funds for UT development.

9.3 FINANCING THE INVESTMENT NEEDED

The estimates of investment outlined above need a financing strategy to support them. This strategy needs to account for all possible sources of funding and methods to capitalize on them.

9.3.1 STRATEGY

Given the distribution of taxation powers between the Centre, the States and Local Bodies, the only practical method of financing the establishment of new mass rapid transit infrastructure may be through capital grants by the Centre (or State) to the new project. Mass-transit projects are of long gestation and those funded by the Government itself, would be on better financial footing during their early years of operation.

The strategy for funding capital cost of urban transport projects is two-folds; consortium approach in which center state and city along with various agencies and the private sector participate and secondly setting up an urban transport fund. Buses are the main component of public transport even when rail transport is provided. It is, therefore, essential that the financing of buses is placed on a firm footing because a very large number of small and medium size cities will not need rail transit.

Operating and Maintenance losses in public transport services are inevitable. These, however, are more easily borne out of the value generated by the project itself. Indian projects, especially in the larger metropolitan areas, have had no difficulty finding lenders for their operational costs. However, Mechanism for covering these expenses needs to be specified.

9.3.2 BASIC SOURCES

Financing of the investment needed will come from six key funding sources; user charges, support from Government, tax concessions and dedicated levies, Land Monetization, recovery from non-user beneficiaries and Debt and PPP. The main source of direct funds is the user charges. The level of affordability of a large section of society and political considerations do not permit full cost recovery through user charges. Support from Government is linked with the Nation’s budget, hence unpredictable and mostly inadequate. However, CRF (central road fund) now needs to be used primarily for UT as about 80% of petrol is used in urban areas.

Additional funding has to be generated from the last four sources. Tax concessions off-set nearly 20% of the project cost. Dedicated levies can be levied on non-user beneficiaries mainly property and users of private modes. The value created in the proximity zones can be recovered through land monetization; i.e. a 'Betterment Levy' or 'Land Value Tax' or enhanced property tax or grant of development rights. Transit Oriented Development (TOD) will help make public transportation viable and attractive. With increasing limitations on Government funding, private sector is being involved. Both the Government and the private partner contribute equity and raise debt for the balance amount. Bilateral soft loans should be tapped and funding from multi-lateral agencies should not be ruled out.

It appears that Central and State taxes constitute up to 15% of the cost in rail transit projects and up to 19 % in the case of buses. Since public transport is a social necessity, it should not be treated as a business venture. In the case of Delhi Metro, remission of taxes was extended for Phase-I and Phase-II of the project. To improve the financial viability of public transport, Central and State taxes concessions should be extended to all public transport systems at least for the next 10 to 15 years by which time public transport will become the preferred mode of transport. These tax and duty remissions should be extended to projects undertaken by the private sector as well.

Besides these sources of indirect revenue for transport projects, in recent years another school of thought has emerged, pointing to other funds that can be harnessed. It is widely recognized that governments should (for ecological, equity and economic reasons) make a distinction between investments that generate value for public good, and those that generate value for private benefit. The incidental private benefit that accrues to private modes of travel from public investments in infrastructure should be tapped either to recover a portion of the investments or to develop new funds for future investments.

The source of income from private vehicles is through taxes levied on their consumption of fuel. Typically, cities can add taxes or cesses applicable within their jurisdiction, collecting money for use in making improvements to public transport schemes. Given the rising use of private

vehicles, and the large amounts of money that can be collected by even a small cess on fuel purchases, this could be an important source of money for cities.

Congestion pricing, parking fees, fuel taxes and cesses all have one important feature – they are easy connectors between private use of scarce resources (space, fuel) and their application for public use (in transport systems, for pedestrian improvements, bicycle paths, etc). As such they have considerable acceptance among the public, especially in these days of increasing consciousness about the environmental impacts of human activity.

Another source of funds that has emerged in recent years is carbon credits. However, the overall trading scenario around such credits is full of uncertainty. Effective planning around these trading regimes is complex, and they cannot be counted upon as consistent sources of revenue and funding.

9.3.3 PUBLIC PRIVATE PARTICIPATION

The experience of PPP has been mixed, with no clear lessons to be drawn from global experiences for the rail based MRTS projects. One consensus view that emerged within the sub-group was that Build-Operate-Transfer project concessions over long periods have not been as successful. It may be prudent, given this, to divide public-private partnerships in the transport sector into two phases – one, early-stage PPPs during the establishment of a project (say, during the first 5 to 7 years) to bring in specific expertise pertaining to the creation of infrastructure, and two, for long-term operations, the terms for which can be identified after a running stability has been achieved for the project.

Consider for example a typical metro rail project. Most project finance for such projects is available in the form of 20-30 year loans, with the result that the borrower is under pressure to show the viability of the operations over this period, with sufficient margin to repay loans as well. But this is an unnecessary restriction on projects whose anticipated lifetime of operation is two to three times the loan period itself, if not more. Rather than creating infrastructure for 90-

100 years that must be paid off in 20-30, it would be much simpler to spread the cost of borrowing over the longer period. (IDFC expressed the view that 'Loan life need not match life of assets. This should be left to the market'). The government could facilitate this by under-writing the roll-over of such loans into multiple borrowing periods sequentially. In fact, if this were done, it is quite possible that even some of the capital expenditure that is now written off by governments at the birth of new projects could be financed instead by the project itself.

The financing model for different components of urban transport taking into account the financial viability of the category of projects is proposed as follows:

Table 9: Financing model for each mode / Component

Mode/ component	Proposal
Urban Rail Transit	Primarily Government (Govt) funded except in case of high density and above ground construction where PPP may be feasible
Bus Rapid Transit System	Infrastructure provisioning by Govt. Bus provisioning, O&M preferably on PPP with revenue risk with Govt
City Bus Service	Bus provisioning, O&M preferably on PPP with revenue risk with Govt
Public Cycle Scheme	Cycle stations and Control centre by Govt, Cycles , O&M by PPP
Bus depots/ Terminal and work shops	Land by Govt, Development preferably on PPP
Roads and NMT facilities	New roads as part of Urban Development through self financing. Existing roads upgradation by Govt.

9.3.3.1 BUILD OPERATE TRANSFER (BOT)

BOT finds extensive application in the transport infrastructure projects and in public private partnership. In the BOT framework a Public Administration or any Institution, which does not have adequate capabilities, resources or inclination to raise resources, execute and manage large projects by itself, delegates to a private sector entity, to design and build infrastructure and to operate and maintain these facilities for a certain period. During this period the private

party, mostly SPV (special purpose vehicle) has the responsibly to raise the finance for the project and is entitled to retain all or major revenues generated by the project but is not the owner of the regarded facility. This enables the project proponent to recover its investment, operating and maintenance expenses in the project and earn a satisfactory ROI. The facility/infrastructure so created, will be then transferred to the public administration/Institution at the end of the concession agreement, with/without consideration.

The revenue/compensation for the proponent is often tied to a combination of internal and external variables, allowing the proponent to reach a satisfactory internal rate of return for its investment.

In general, a project is financially viable for the private entity if the revenues generated by the project cover its cost and provide sufficient return on investment. On the other hand, the viability of the project for the host government/institution depends on its efficiency in comparison with the economics of financing the project with public funds/borrowings. But other factors like, the expertise and efficiency that the private entity is expected to bring as well as the risk transfer would warrant a BOT Model.

Thus, it makes immense practical sense to consider BOT Model for the project under consideration, thus use of private expertise by the government to undertake the project in terms of capabilities on project execution, commercial expertise, resource raising & putting together a whole lot of other ancillary requirements. Thus get into a BOT agreement with a SPV, steered by anchors, who would possess the experience, expertise, relevant strengths and capabilities to execute the project and mobilize all the resources required for the same.

9.3.4 NATIONAL URBAN TRANSPORT FUND

Since the huge investment needs at Central Government level cannot be met from traditional budgetary sources alone, innovative financing mechanisms will, therefore, require to be tapped if we have to not only catch up with the backlog but also provide for future. With the

traditional methods we shall continue to move from one crisis to another rather than being in control of the situation. Learning from the global examples, a dedicated (non lapsable and non fungible) Urban Transport fund should be set up at National level as envisaged in NUTP-2006. The National Urban Transport Fund (NUTF) apart from meeting capital needs will have to cater for possible support to certain systems during the operations stage.

The three principles which were followed to arrive at the sources whose accruals will be used for setting up the NUTF are:

a) **High Impact**- in terms of actual annual contribution to the NUTF
b) Uses **"Polluters pay Principle"** and
c) **Reduce** the use of personal vehicles.

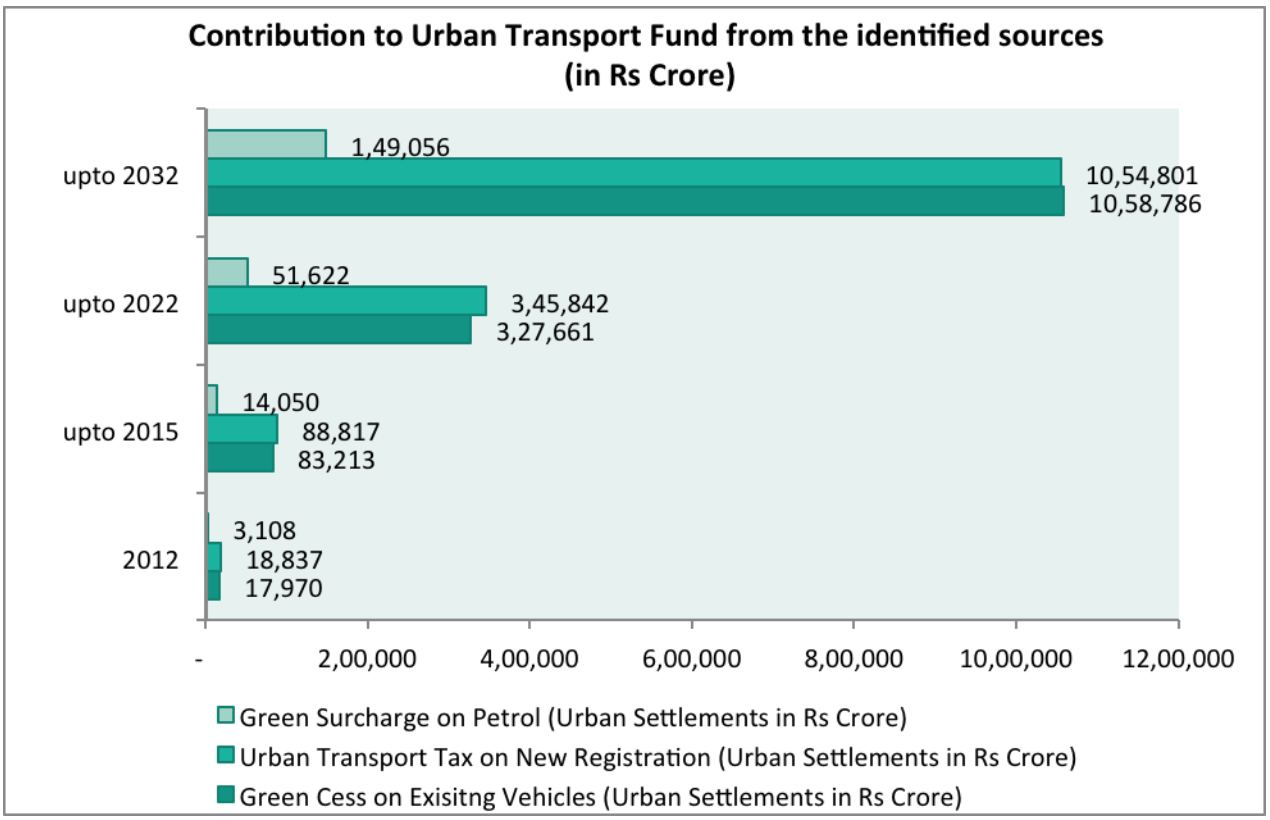
After much deliberation, the three sources which qualify on the above mentioned principles have been identified. The proposals for the same are as below:

a) **A Green Surcharge of Rs. 2 on petrol sold across the country:** Knowing the fact that petrol (or motor spirit) is exclusively consumed by the personalized vehicles and its other uses are limited, a Green Surcharge on Diesel (or high speed diesel) is not recommended. Diesel in India has its multiple uses and it is difficult to segregate diesels sold to personalized vehicles. Based on the estimates, this green surcharge on sale of petrol in the country will generate about Rs. 3,100 Crore in the base year and about Rs 14,000 Crore over the period of first four years.
b) **A Green Cess on existing personalized vehicles:** All vehicles in India are required to be insured every year. There are several public and private sector enterprises in India which provides insurance to the vehicles at the rate of 3 percent of the annual insured value both for car and two wheelers. It is proposed that an additional 4 percent of the vehicle's insured value shall be collected as Green Cess. It is estimated that during first year the total collection from this source in urban areas would be of about Rs. 18,000 Crore and the amount over first four years will total to about Rs. 83, 200 Crore.

c) **Urban Transport Tax on Purchase of New Cars and Two Wheelers:** As Urban Transport Tax on purchase of new personalized vehicle, a 7.5% additional tax on petrol vehicles and additional 20% in case personalized diesel vehicles is proposed. This will be help in collecting about Rs 18,800 Crore in the first year and about Rs 88,800 Crore over first four years. In case of diesel cars, the urban transport tax has been recommended at 20% in order take care of the fact that diesel is available at substantially subsidized price and will continue to be so in near future. For arriving at the estimates, diesel cars have been assumed to be about 30% of the total cars as against 35% indicated by the present annual sales figures.

The above levies will not only help in generating dedicated pool of resources for taking up urban transport projects but would also serve as a great disincentive for use of personalized vehicles. This will serve the twin purpose of providing quality public transport infrastructure and services at affordable cost but also reducing congestion and curtailing travel demand on account of use of personalized vehicles. All the above sources have high impact and high feasibility in terms of actual annual accrual to the national urban transport fund.

At a time when the exchequer faces the dilemma of meeting ever growing demand from various sectors amidst constrained government sources of finances and in an environment where PPP can only very partially meet the financing needs of urban transport, the proposed National Urban Transport Fund presents itself as an effective means for funding the urban transport need. In fact the actual potential of this source is much higher than what even the calculations project. **The total annual yield from the select three sources above will be about Rs 40,000 Crore in the first year while the cumulative collection will be about Rs 186,000 Crore in first four years. The estimate also suggests that if these three sources are continued up to next twenty years, the cumulative contribution of the three sources to NUTF would be whopping Rs 2,262,000 Crore**. Detailed calculations and assumptions made are listed in **Annexure E.**



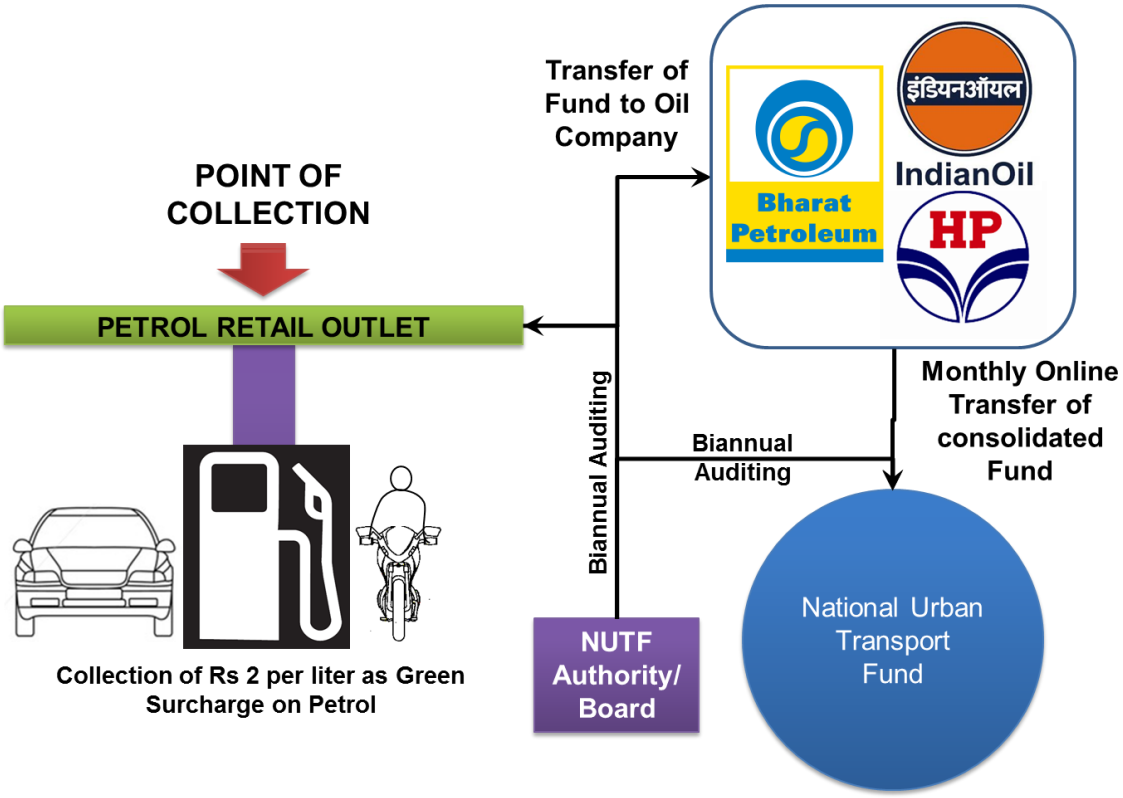
9.3.5 IMPLEMENTATION PLAN FOR THE NATIONAL URBAN TRANSPORT FUND

While selecting the above mentioned three sources for NUTF, the simplicity and possibility of their implementation models was also kept in mind. Ease of collection and further its accruals to NUTF are the two parameters which are focused on while designing the implementation model. The subsequent section elaborates on the implementation model of the three identified sources.

A. Green Surcharge on Petrol

On lines of the Central Road Fund and other State Road Funds (Kerala, Maharashtra etc.), the Green Surcharge on petrol will be collected by oil companies in India through their retail outlets (like Hindustan Petroleum, Bharat Petroleum etc.). The oil companies will perform the consolidated fund transfer of collected surcharge to the NUTF every

month using an online medium. A month time is assumed as the reconciliation time for the oil companies with their retail outlets and regional offices. A snapshot of the model is presented in the figure below:

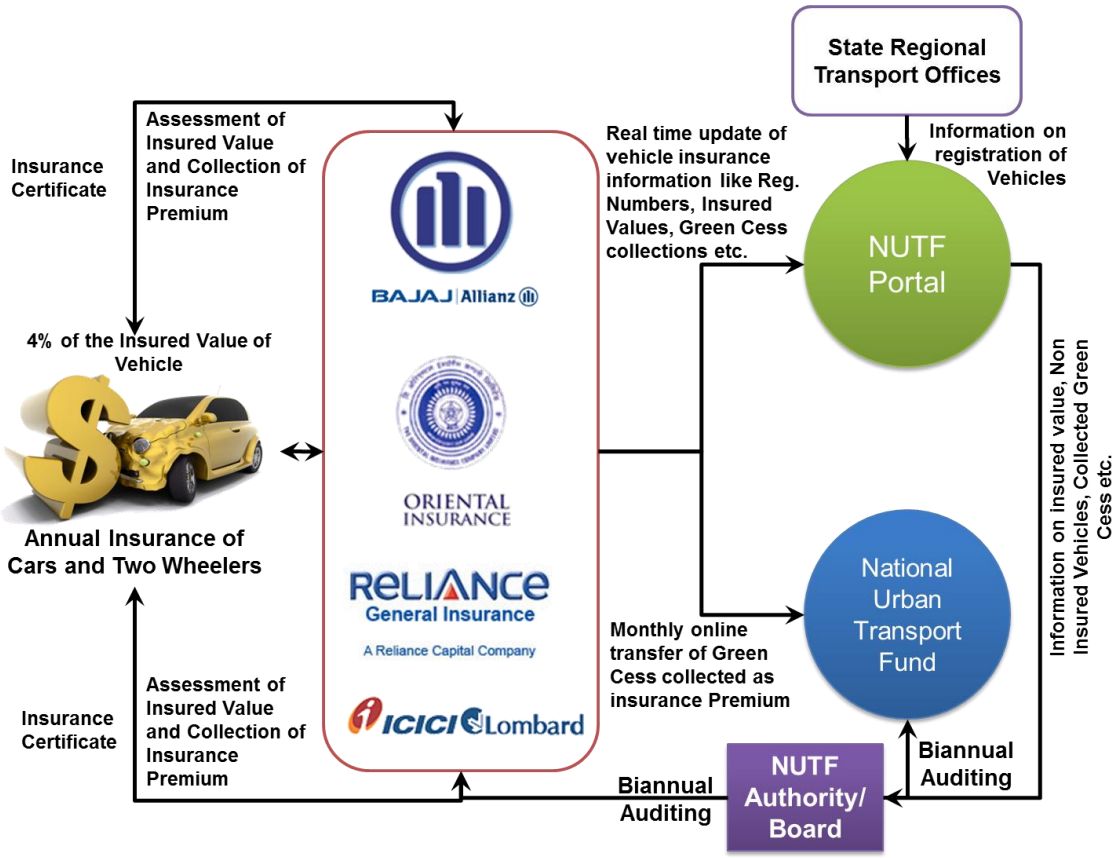


NUTF Authority/Board will regulate and perform biannual auditing of the petrol (motor spirit) sales figures as well as the transfer of funds from oil companies to the NUTF. Any delay in monthly transfer of the consolidated funds in NUTF will attract an interest penalty on the oil company.

B. Green Cess on existing personalized vehicles

For the ease of collection Green Cess on existing personalized vehicle will be collected through insurance companies. Insurance companies will collect the additional proposed 4% cess on the insured value of vehicle as a part of their insurance premium.

Since, in India, there is not such mechanism in place through which first the number of vehicles getting insured and secondly their insured value can be regulated, thus it is a challenge to implement this Green Cess. The said problem can be solved using Information Technology (IT). The implementation of this cess shall require creation of a comprehensive yet simple online portal. A snapshot of the model is presented in the figure below:



The portal will be a medium of correspondence between Insurance companies and will help in getting queries like:

a) City and State wise number of insured vehicles every year (both two wheelers and cars)

b) The total insured value of two wheelers and cars separately

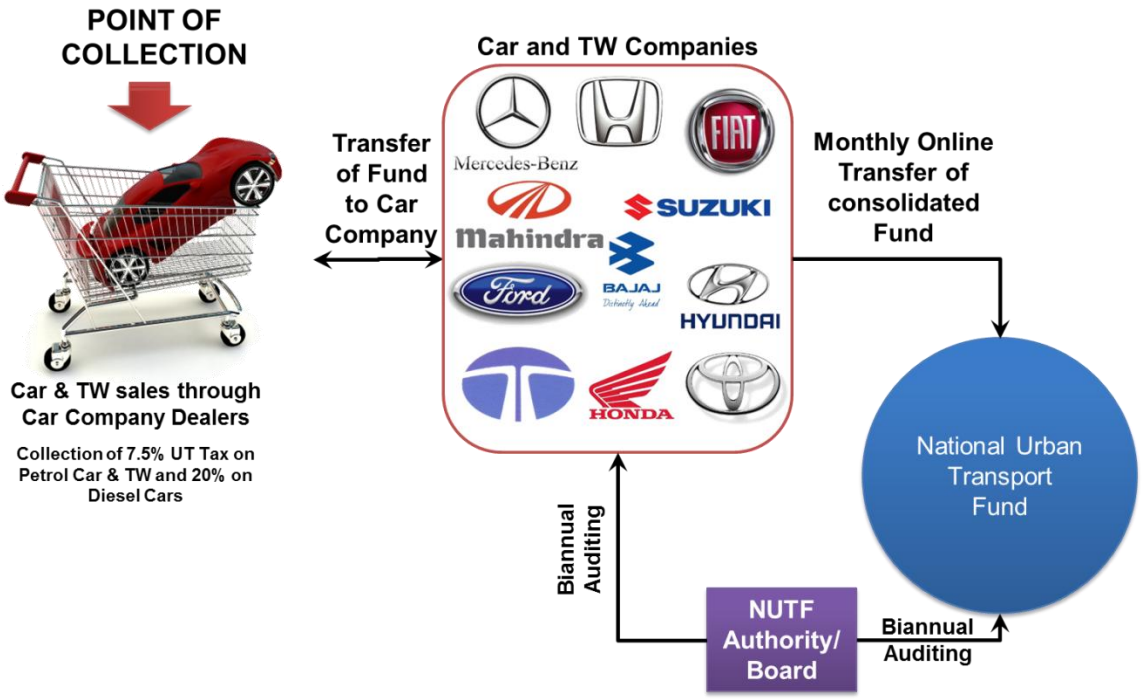
c) List of vehicles which remained uninsured during the year or those whose insurance certificate has lapsed.

The portal will also be linked to the state Regional Transport Offices (RTO's) to get a real time update on the newly registered as well as the total registered vehicles. Since both the RTO's as well as the insurance companies are using online systems for their day to day affairs, thus it would not be very difficult to implement the proposed portal.

The NUTF Authority/Board will perform a biannual audit of insurance companies as well as the transferred Green Cess to the NUTF. It will also provide notification against those vehicles which have not been insured or whose insurance has lapsed. The portal will also help in implementing penalties on non-insured vehicles as well as any leakage in the Green Cess collection. As an incentive, the insurance companies will receive 0.15% of the collected Green Cess as brokerage charges which will incentivize them to insure more vehicles every year.

C. Urban Transport Tax on Purchase of new vehicles:

The implementation of Urban Transport Tax would not be a big challenge as the total monthly vehicle sales figures would be made available by the car & TW companies to the NUTF Authority/Board. This UT Tax will be recovered from the buyer at the point of sale i.e. at the car showroom which will later be transferred to the car company. The company then will perform a monthly online transfer of the consolidated UT cess amount to the NUTF. A month time is assumed as the reconciliation time for the car & TW companies with their dealers and regional offices. A snapshot of the model is presented in the figure below:



NUTF Authority/Board will perform the auditing of the annual sales figure of the car & TW companies and will also do the auditing of the transferred funds to NUTF. . Any delay in monthly transfer of the consolidated funds in NUTF will attract an interest penalty on the car & TW companies.

9.3.6 DEDICATED URBAN TRANSPORT FUND AT THE STATE AND CITY LEVEL

A dedicated urban transport fund would also need to be created at the State level and city level through other sources, especially land monetization, betterment levy, land value tax, enhanced property tax or grant of development rights, advertisement, employment tax, congestion, a cess on the sales tax, parking charges reflecting a true value of the land, traffic challans etc. Pimpri-Chinchwad Municipal Corporation has already set up a dedicated urban transport fund through land monetization and advertisement rights. Similarly, Karnataka has set up a dedicated urban transport fund through MRTS cess on petrol and diesel sold in Bangalore which is being used to fund the metro rail projects.

Certain items like- employers' tax have not been considered because they do not contribute much to the NUTF and have difficulties of collection. However, cities may also examine its applicability in local context. Similarly certain demand management measures- like congestion charges have not been included because its annual contribution is small and presently there are challenges in implementing it in absence of the correct ownership details and residential addresses for a major portion of the registered vehicles..

9.3.7 OTHER OPTIONS

Waiving of taxes, subsidy in the form of cheaper electricity, etc.: The present paradigm is to treat public transport and intermediate public transport as commercial activities and accordingly, revenue generating activities. However, the fact is that these are social services and accordingly required to be viewed differently with the appreciation that all sections of the population are to be provided with safe, speedy, comfortable modes of public transport at affordable prices. Presently, taxes and duties at Central and State Government level constitute to about 25% of the total project cost. Accordingly, it is in the interest of the nation and the concerned State that public transport is exempted from all taxes both for metro rail as well as for buses so as to make provisioning of quality public transport cost effective. This exemption needs to be extended for at least the next 10 to 15 years so that quality public transport is provided in all the cities and this becomes a preferred mode of transport. These exemptions should extend to private sector as well so long as they are providing public transport.

Annual Fees in lieu of lifetime taxes: There needs to be annual validation of driving licence as well as registration certificate; and annual road tax instead of life time road tax. This is as per global practices and can be implemented now with the advent of technology and possibility of payment through net etc.

10 IMPLEMENTATION PLAN- WAY FORWARD

10.1 TIME SCALE

The new organizational, legislative or financial frameworks will evolve over a period of time in order to bring changes in a phased and practical manner acceptable to all stakeholders at any point of time. This will include the phasing of the work programme, investment and bringing in policy interventions. In addition, the instruments such as urban road design standards and other codes of practice that will be needed and the steps involved in the process of implementation to achieve the vision laid out for 2030 are outlined on a time scale in the table below.

Table 10: Organizational, Legislative and Financial Framework

ITEM	2012-13	2014	2015	2016	2017
FRAMEWORK, EVOLUTION AND PHASING					
Organizational,	Fix Nodal officer, Create UT department in Center/State	Set up UMTA and Empower The city	Set up Safety Boards in States and cells in cities	Transfer traffic Police to UMTA	Cities in full command
Legislative; A comprehensive UT act	Prepare draft	Move for Enactment	Enact legislation	Set up safety commission	Amend existing acts as needed
Financial authority,	Present pattern continues	Transfer control	Set up urban transport	Define sources of funding UTF	Cities to Become

ITEM	2012-13	2014	2015	2016	2017
		Of funds to UMTA	fund		Self-supporting
PHASING					
Work program,	See rolling program (**Annexure D**)				
Investment	See rolling program (Annexure D)				
Time frame of the policy measures	Transport planning, Capacity building, Data base and R&D	Facilities for walk & bicycle, Introduce bus services Upgrade IPT	ITS for integration, enforcement and traffic management	Integrated road network planning and maintenance	Administrative and fiscal measures to control use of car and 2-W
IMPLEMENTATION					
Instruments	Review of existing codes	New Codes of practice	New Codes of practice	New Codes of practice	New Codes of practice
Process	Planning	Design	Sanctions and financing	Construction	O&M

10.2 STUDIES NEEDED TO IMPLEMENT THE PROPOSALS

Several studies are needed to implement the foregoing proposals as follows;

1. **Planning:** To develop guidelines for:

   a. *Smart city growth strategy and Integrated land use transport planning.*
   b. *Developing citywide walk and bicycle facilities*
   c. *Planning Public transport network*
   d. *Upgrade of Intermediate Public Transport*
   e. *Planning of Regional/suburban transport and integration*
   f. *Improving accessibility of public transport*
   g. *Planning Road network and associated infrastructure such as Parking*
   h. *Planning Goods movement*
   i. *Upgrade of safety and planning for Security*
   j. *Transport Demand Management*
   k. *Consultation with public*

2. **Operation**

   a. *How to improve drainage of Roads*
   b. *Measures to Control the use of personal motorized vehicles*

3. **Technology**

   a. *Use of technology for Traffic engineering, management and enforcement;*
   b. *Standardization of Technology for electronic road pricing and congestion pricing and Intelligent Transport Systems.*

4. Institutional

a. *Developing an effective institutional framework at Center/State and city level including Safety Boards and traffic engineering and management*
b. *Drafting and enacting a comprehensive Urban Transport ac*

5. Financials

a. *Developing a resource generation policy;*
b. *Developing an Urban Transport fund;*
c. *Guidelines for involvement of Private sector;*
d. *Mechanisms for Funding of buses both capital and revenue*

Annexures

ANNEXURE A: WORKING GROUP ON URBAN TRANSPORT FOR THE NATIONAL TRANSPORT DEVELOPMENT POLICY COMMITTEE (NDTPC): Terms of Reference

1. Determine the role of urban transport in meeting transport requirements of the economy over the next two decades and develop a rolling for2030 in consonance with the National Urban Transport Policy. The plan should cover urban agglomerations as well as satellite towns, including integrated suburban rail based systems, and should be based on the following considerations.
    a) Promote access of all citizens to jobs, education and recreation at affordable costs and within reasonable time.
    b) Minimise overall production of green house gases and pollution (well to wheel) per passenger km.
    c) Minimise financial costs of transportation.
    d) Minimise overall demand for transportation.
    e) Achieve minimum service level benchmarks.
    f) Aim towards zero traffic fatalities.
2. Estimate the growth in passenger traffic by 2020 and 2030 in the context of economic demographic and technological trends and local, national and global level.
3. Consistent with the above, assess the current capacity and recommend the magnitude and type of capacity creation/ augmentation / modernization required in urban transport.
4. In light of the above,
    a) Assess the investment required to achieve the projected urban transport capacity.
    b) Identify sources of funding and assess fund requirements from budgetary, non-budgetary and private sources for different areas in urban transport.
5. Identify the roles of state, the private sector and the financial sector in meeting the investment needs of the urban transport sector. This would include examination of the current modes of financing urban transport and review of the public Private Partnership (PPP) experience, which is designed to attract greater private participation.
6. Assess the full costs of urban transport, including the costs of externalities. Suggest appropriate pricing regimes including appropriate taxation measures, that would achieve the desired mode mix keeping in view affordability and access.
7. Estimate the energy requirements necessary for urban transport and suggest measures to put the urban transport sector on a sustainable low carbon path and promote energy efficiency, emission reduction and environment protection.

8. Assess the availability of human resource for urban transport and suggest measures for skill development and capacity building for various stakeholders.
9. Suggest measures for promotion of research and development and technology upgradation in urban transport sector, including institutional development.
10. Indicate broad areas and investment for IT in urban transport to improve customer interface/ satisfaction and internal efficiency.
11. Identify data deficiencies in urban transport sector and suggest measures for improving, maintaining and updating the database, including institutional measures.
12. Review status of quality and safety measures and ways to ameliorate accidents and make urban transport more user friendly.

ANNEXURE B: STRATEGIES FOR DIFFERENT SIZE CITIES

City Size	Strategies		Actions required	
Population in lakhs	**Short term**	**Medium & long term**	**Short term**	**Medium and long term**
< 5	NMV (public and private)	NMV, Motorized IPT	Road design standards to be provided by PWD and Development authorities. Capacity building required for creating NMV infrastructure.	Master plans and target setting for NMV, Regulatory authorities required for setting performance standards. PT authorities for formal bus system
5 - 10	NMV (public and private)	NMV, Motorized IPT, PT (Buses)	Special design cells in Development authorities and municipalities, NMV and safety audit mandatory.	Master plans with targets for achieving safe accessibility. Public transport authority for planning NMV, Motorized IPT(feeder trips),BRT, PT (Buses), rationalize private vehicle parking
10 -80	NMV, Motorized IPT, PT (Buses)	NMV, Motorized IPT(feeder trips),BRT, PT (Buses), rationalize private vehicle parking	NMV, Motorized IPT(feeder trips), BRT,PT (Buses), rationalize private vehicle parking	NMV, BRT expansion and integration with rail based system
> 80	NMV, Motorized IPT(feeder	NMV, taxi system with IT support, BRT expansion	NMV audit mandatory for all infrastructure, SPC for preparing	Urban transport authority for integrating land-use with transport plans,

City Size	Strategies		Actions required	
	trips), and taxi systems, BRT, PT (Buses), rationalize private vehicle parking	and integration with rail based system serving intercity trips with satellite towns, congestion pricing	master plans and priority implementation for BRT, PT (Buses), Regulatory authority for Motorized IPT(feeder trips), and rationalize private parking	planning taxi system with IT support, BRTS expansion and integration with rail based system, congestion pricing. Interdisciplinary5-6 research groups in research institutes.

ANNEXURE C: EXTRACTS FROM MGI AND HPEC REPORTS

MGI basis for suggesting high investment in Mass Transit are as follows;

- Transportation demand model was developed using a three stage process to estimate total transportation volume, splitting this volume into different modes and consequently forecasting the capacity required to meet the generated demand. The MGI Report also states that target share of public transportation was determined based on global benchmarks or as residual of increase in private transportation (P195).
- The report defines three scenarios (P196)
    - Private Sprawl (Scenario-1): Mono-centric city structure with FAR values in line with current trends and little investment in PT.
    - Public Sprawl (Scenario-2): Mono-centric city structure with FAR values in line with current trends and high investment in PT.
    - Public Compact (Scenario-3): Poly-centric city structure with high FAR values and high investment in PT.
- In scenario 2 and 3, the report fixed a target for public and NMT transport modal share and treated the private modal share as a residual.
- It has been assumed that rail based mass transit infrastructure will be provided in each of the top 35 cities in India. For top 13 cities, requirement is immediate, while for the rest, infrastructure may be phased over the next 20 years. The report further assumes that public bus transport is applicable to all cities and that BRTS is provided in all cities above the population of 1 million (P198).
- MGI analysis reveals that more than half of the amount needs to be devoted to capital expenditure. Within capital expenditure, almost half the amount is necessary to erase India's existing infrastructure backlog in its cities and to their future needs (P.63).

REPORT ON INDIAN URBAN INFRASTRUCTURE AND SERVICES BY HPEC; REASONS FOR MOST INVESTMENT IN ROADS ARE AS FOLLOWS;

Local and sub-local roads are included in the definition of roads for this exercise(Pg.75, Article 3.3.2.) In many other estimates (11th FYP) for roads, only collector and major roads are included.

The large share for urban roads is on account for two factors. First, the service backlog for this sector is higher than those for other sectors' services. The backlog for this sector is very large ranging from 50 to 80% across all Indian cities. Second, unlike sectors such as water where efficiency gains can be quantified, for example, by lowering the proportion of non-revenue water, in urban roads this is difficult. The efficiency gains in roads and transport are more external in nature (like better productivity through greater mobility or reduction in negative externalities of pollution and congestion) and do not necessarily translate into financial gains for the sector itself(Pg.76, Article 3.3.3 & 3.3.4.)

However, densification of urban areas can reduce the investment requirement substantially. The densities in the estimation exercise vary across city size classes but are assumed to remain the same over time for the same city size class. A sensitivity analysis with respect to population densities, assuming other variables remain constant, highlights the possibility of reducing investment costs in urban roads and urban transport sectors. For example, an increase in population density by 2500 per sq. km across all city size classes could reduce the investment requirement for urban roads and urban transport by about Rs 4 lakh crore, while a decrease in population density by 2500 per sq. km could increase the investment requirement by about Rs 6.5 lakh crore.

ANNEXURE D: ROLLING PROGRAM FOR 2030

CALCULATION AS PER SERVICE LEVEL BENCH MARK GUIDELINES

Description	2015	2020	2025	2030
Level of service	**4**	**3**	**2**	**1**
PUBLIC TRANSPORT				
RAIL TRANSIT, BUS RAPID TRANSIT ON EXCLUSIVE ROW AS % OF TOTAL ROAD CUM RAIL LENGTH	<10	10-20	20-30	>=30
NO. OF BUSES /1000 POPULATION	<0.2	0.2-0.4	0.4-0.6	>= 0.6
IPT in all cities	Organize	Upgrade		
NMT AND ACCESS				
FOOTPATHS/ROAD LENGTH AS %AGE	< 25	25-50	50-75	>= 75
STREET LIGHTING (LUX LEVEL)	<4	4-6	6-8	>= 8
BICYCLE LANES; NETWORK LENGTH AS %AGE OF LENGTH OF ROAD NETWORK	<15	25-15	50-25	>= 50
PARKING FACILITIES FOR NMT AS %AGE OF MAJOR TERMINALS	<25	25-50	50-75	>= 75
TRAFFIC MANAGEMENT				
TRAVEL SPEED KMPH				
PERSONAL VEHICLES	<15	15-25	25-30	>= 30
PUBLIC TRANSPORT	<10	10-15	15-20	>= 20
ROADS AND LINKED INFRASTRUCTURE				
%age of Area under roads	<10	10-12	12-15	>=15

Description	2015	2020	2025	2030
PARKING SPACES PAID AS % OF TOTAL	<25	25-50	50-75	>= 75
TERMINALS				
INTERMODAL	Plan	Implement		
BUS	Plan	Implement		
TRUCK	Plan	Implement		
ITS				
SURVEILANCE; CCTV PROVIDED AS % OF NEEDED	<25	25-50	50-75	>= 75
PIS AS % OF NEEDED	<25	25-50	50-75	>= 75
GPS/GRPS AS % OF TOTAL NO. OF PT VEHICLES	<25	25-50	50-75	>= 75
SIGNAL SYNCHRONIZATION AS % OF NEEDED	<25	25-50	50-75	>= 75
MODES IN INTEGRATED TICKETING AS % OF TOTAL MODES	<25	25-50	50-75	>= 75
TDM				
INTEGRATED LANDUSE TRANSPORT PLAN				
PERSONS PER HECTARE	<125	125-150	150-175	> = 175
MIXED LAND USE ON MAJOR TRANSIT CORRIDORS (%AGE AREA UNDER NON-RESIDENTIAL USE	<5	5-15	15-30	< = 30
INTENSITY OF DEVELOPMENT CITY WIDE	<1	1.0-1.5	1.5-2.0	< = 2.0
INTENSITY OF DEVELOPMENT ALONG TRANSIT CORRIDOR-RATIO OF FSI ON TRANSIT	<1-5	1.5-2.0	2.0-3.0	< = 3.0

Description	2015	2020	2025	2030
CORRIDOR TO CITY FSI				
SAFETY				
FATALITY RATE PER LAC POPULATION	> 6 PERSONS	4-6 PERSONS	2-4 PERSONS	<= 2 PERSONS
FATALITY RATE FOR NMT AS % OF TOTAL	>60	40-60	20-40	<=20
SECURITY	Ongoing			
SAFETY AUDIT	Ongoing			
INSTITUTIONAL FRAMEWORK				
LEGISLATION	Enact			
ENVIRONMENT				
ENERGY EFFICIENCY	Implement			
LOW CARBON PATH	Implement			
POLLUTION	14-16	10-13	6-9	< = 5
GHG EMISSIONS	Implement			
CAPACITY BUILDING (as %age of present planning)				
TRAINING	60%	40%	Ongoing	Ongoing
EDUCATION	60%	40%	Ongoing	Ongoing
R&D	60%	40%	Ongoing	Ongoing
DATA BASE	60%	40%	Ongoing	Ongoing
INVESTMENT NEED				
FINANCIAL SUSTAINABILITY OF BUS TRANSPORT				
EXTENT OF NON FARE REVENUE AS %AGE OF TOTAL REVENUE	<=10	10-20	20-40	>40
STAFF PER BUS RATIO	<10	8-10	5.5-8	< = 5.5
OPERATING RATIO	>= 1.5	1-0-1.5	0.7-1.0	<0.7
INVESTMENT (Sc. 2)	Rs 2 lakh cr.	Rs 4 lakh cr.	Rs 5 lakh cr.	Rs 6 lakh cr.

ANNEXURE E: FINANCING of URBAN TRANSPORT

Financing Urban Transport: National Urban Transport Fund (NUTF)

The subject of financing urban transport is vexed one-

- At the upper end of the hierarchy i.e. metro rail, LRTS for metropolitan cities and cities for population above a particular threshold (say 3 million) the sub-sector becomes by and large incontestable resulting in very limited applicability of financing through PPP as compared to other sectors
- For other forms of city transport –BRTS, normal buses, Non-Motorised Transport, urban transport infrastructure and pedestrian facilities both institutional set up and financial structure of state governments and city governments do not provide much hope for generation of sufficient finances on their own

On the other hand total financing requirement for Urban Transport over next two decades is pegged at around Rs. 20, 00,000 Crores.

Nature of NUTF

It is in this connection that the choice falls on a statutory "Non-lapsable Non-fungible" National Urban Transport Fund" which has clearly earmarked sources of funding the fund at a sustainable level. It is very important that such a fund is long term fund where accruals of one year can be used in subsequent years (non-lapsable) and that the money accrued to the fund is not used for any other purposes (non-fungible). It is because of this critical requirement of non-lapsable non-fungible nature of the fund that it is needed to be created and maintained as a special statute. Also inter-se allocation of the fund can be fixed either as part of the statute or rules made under it. The fund apart from capital creation needs also will have to cater for possible support to certain systems during the operations stage.

Sources of Financing the Fund

Many countries have used various innovative sources to finance urban transport and one of the most successful cases in recent history has been the success of France using what is known

as Versement Tax (Tax on Employers), which has approximately funded forty percent of total expenditure on urban transport. In the Indian context various sources were examined and three items were selected based on certain criteria including but not limited to: (a) High Impact- in terms of actual annual contribution to the Fund (b) Polluters pay Principle (c) Reduce-Reduce-buy, the use of personalised vehicles- fully knowing the fact that given low per capita incidence of personalised vehicles, increasing income and aspiration level the purchase of personalised vehicles in future will grow at a rate much faster than in the past. An attempt is needed for purchase and use of personalised vehicles a tad more difficult and costlier proposition while improving the public transport simultaneously. Certain items like- employers' tax have not been considered because they do not contribute much to the Fund and have serious difficulties of collection. Similarly certain demand management measures- like congestion charges though recommended to contain demand have not been included here because its annual contribution is not sufficient:

The assumptions which are taken while arriving at the estimates of the accruals from the three identified sources to NUTF are explained below:

1. **A Green Surcharge on petrol sold in the country:** Based on the Basic Statistics on Indian Petroleum & Natural Gas 2010-11, published by Ministry of Petroleum and Natural Gas (http://petroleum.nic.in/petstat.pdf), Government of India, a five figure average growth rate in consumption of Motor Spirit (commonly petrol) and High Speed Diesel (commonly Diesel) is calculated. No cess has been proposed on diesel due to its multiple uses. It is felt that in the case of petrol, the cess should be levied on the entire consumption of petrol because petrol is primarily used by personalised vehicles and where ever they are purchased essentially the personalised vehicles (even if owned by nearby villagers) ultimately land up plying on city roads. For the purpose of cess calculation, the average annual growth rate in consumption of petrol has been assumed at 8.3% in the base year which has been decreased by 0.2% every alternate year. On total consumption derived based on the assumed growth rates, Rs 2 per liter green surcharge has been assumed.
2. **A Green Cess on Existing Personalized Vehicles:** Category wise annual registrations of motor vehicles are picked from Road Transport Year Book (2007-2009), Volume I, published by Ministry of Road Transport & Highways (MoRTH).

The above information is then used to calculate the annual growth in the vehicle registration and further the composition of Two Wheelers and Cars in the total registrations. A modest rate of growth of vehicles based on average of last five years has been assumed. For the purpose of cess calculations, new vehicle registration is derived using an annual growth rate of 9.6% in base year which is then subsequently declined by 0.2% every alternate year. Out of the total registered vehicles cars are assumed to be 13% and TW as 71.8% of the total vehicles in the base year. The share of cars has been increase by 0.2% every alternate year whereas on the other hand the share of TW has been declined by 0.5% every alternate year. These assumptions are taken after accounting for the GDP growth rate, alternatively the increase in per capita income, which will promote the use of cars.

On all existing vehicles an annual green cess has been assumed at the rate of 4% of the insured value of the personalized vehicles. For calculating the insured value of vehicles, it has been assumed that about 80% of the vehicles would be less than 10 year old and with reducing life of the vehicle its insured value goes down by 5% every year. A weighted average insured value of all the vehicles has been assumed at 72%. Since it is evident from the facts that not all vehicles are insured on time (or sometime not at all insured) especially in rural areas, thus a 50% leakage has been assumed while calculating the cess accruals.

Further since the creation of NUTF will serve the development of transportation infrastructure in urban areas only thus only 60% of the total collections are assumed to be part of NUTF.

3. **Urban Transport Tax on Purchase of New Cars and Two Wheelers:**

As discussed in the previous section, similar approach and numbers are used to derive the growth in total vehicular population and then the annual growth in number of cars and TW in India. Data of previous year's car and two wheeler sales and the annual growth rate has been used to arrive at the annual number of new cars and two wheeler purchases. However it is safe to assume that given the present low level of penetration of personalized vehicles future growth of personalized vehicle sales will be at much higher level. As such the annual car and two wheeler sales assumed is at conservative level. The Urban Transport Tax or Cess has been assumed at the level of 7.5% of the total cost of the vehicles. In case of diesel cars the differential rate of tax has been put at 20% on account of the substantially cheaper rate of diesel prices and inability to separately increase the green cess on sale of diesel. There is a case for

substantially higher percentage of Cess on diesel cars at least till such times the diesel is available at substantially subsidized price.

For purpose of cess calculations, diesel cars are assumed as 30% of the total car sales which at present is nearly equal to 35%. Further since the creation of NUTF will serve the development of transportation infrastructure in urban areas and most of the personalized vehicles are getting registered in these areas thus 90% of the total collections from this source are assumed to be part of NUTF.

At a time when exchequer faces the dilemma of meeting ever growing demand from various sectors amidst constrained government sources of finances and in an environment where PPP can only very partially meet the financing needs of urban transport, the proposed National Urban Transport Fund presents itself as an effective means for funding the sectoral need. In fact the actual potential of this source is much higher than what even the calculations project. The total annual yield from the three sources is shown in table below. Starting from a total collection of about Rs. 40,000 Crore in the first year, the sources can collect Rs 186,000 Crore in first four years and a whopping Rs. Rs. 2,262,000 Crore in next twenty years.

Sources	2012	upto 2015	upto 2022	upto 2032
Green Cess on Existing Vehicles (Urban Settlements in Rs Crore)	17,970	83,213	327,661	1,058,786
Urban Transport Tax on New Registration (Urban Settlements in Rs Crore)	18,837	88,817	345,842	1,054,801
Green Surcharge on Petrol (Urban Settlements in Rs Crore)	3,108	14,050	51,622	149,056
Total of three sources (Urban Settlements in Rs Crore)	**39,914**	**186,080**	**725,125**	**2,262,643**

Detailed calculations are summarized as follows:

1. VEHICLE POPULATION (IN '000)

a. Vehicular Population (in '000)

Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
1951	306	27	159	34	82	4
1956	426	41	203	47	119	16

Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
1961	665	88	310	57	168	42
1966	1,099	226	456	73	259	85
1971	1,865	576	682	94	343	170
1976	2,700	1,057	779	115	351	398
1981	5,391	2,618	1,160	162	554	897
1986	10,577	6,245	1,780	227	863	1,462
1991	21,374	14,200	2,954	331	1,356	2,533
1996	33,786	23,252	4,204	449	2,031	3,850
2001	54,991	38,556	7,058	634	2,948	5,795
2002	58,924	41,581	7,613	635	2,974	6,121
2003	67,007	47,519	8,599	721	3,492	6,676
2004	72,718	51,922	9,451	768	3,749	6,828
2005	81,501	58,799	10,320	892	4,031	7,459
2006	89,618	64,743	11,526	992	4,436	7,921
2007	96,707	69,129	12,649	1,350	5,119	8,460
2008	105,353	75,336	13,950	1,427	5,601	9,039
2009	114,951	82,402	15,313	1,486	6,041	9,709

Source: March 2011, Road Transport Year Book (2007-2009), Volume I, Table 1.1 Total Number of Registered Motor Vehicles in India - 1951-2009, Ministry of Road Transport & Highways

b. New Vehicle Registration (in '000)

Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
1951						
1956	126	15	47	14	39	12
1961	248	48	111	11	51	26
1966	447	140	152	17	94	44
1971	788	355	235	22	89	87

Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
1976	872	493	111	23	15	231
1981	2,745	1,582	397	49	210	507
1986	5,294	3,679	643	68	320	583
1991	11,009	8,080	1,210	109	510	1,100
1996	12,839	9,336	1,309	125	702	1,368
2001	**21,881**	**15,769**	**2,938**	**194**	**958**	**2,022**
2002	**5,033**	**3,796**	**696**	**14**	**85**	**442**
2003	**9,261**	**6,770**	**1,138**	**99**	**577**	**677**
2004	**7,051**	**5,353**	**1,024**	**61**	**327**	**286**
2005	**10,237**	**7,915**	**1,058**	**139**	**357**	**768**
2006	**9,747**	**7,120**	**1,412**	**118**	**486**	**611**
2007	**8,881**	**5,681**	**1,354**	**378**	**772**	**697**
2008	**10,580**	**7,590**	**1,554**	**104**	**584**	**748**
2009	**11,705**	**8,573**	**1,642**	**88**	**552**	**851**

Source: Figures are derived from Table 1.a: (New Vehicle Registration = Year 2 - Year 1*98% (assuming 2% scrap))

c. Vehicular Population Growth (%)

	Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
5 Year Growth Rates	1951 - 56	39%	52%	28%	38%	45%	300%
	1956 - 61	56%	115%	53%	21%	41%	163%
	1961 - 66	65%	157%	47%	28%	54%	102%
	1966 - 71	70%	155%	50%	29%	32%	100%
	1971 - 76	45%	84%	14%	22%	2%	134%
	1976 - 81	100%	148%	49%	41%	58%	125%
	1981 - 86	96%	139%	53%	40%	56%	63%

	Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
	1986 - 91	102%	127%	66%	46%	57%	73%
	1991 - 96	58%	64%	42%	36%	50%	52%
	1996 - 01	63%	66%	68%	41%	45%	51%
	2001 - 06	63%	68%	63%	56%	50%	37%
Annual Growth Rates	**2001-02**	**7%**	**8%**	**8%**	**0%**	**1%**	**6%**
	2002-03	**14%**	**14%**	**13%**	**14%**	**17%**	**9%**
	2003-04	**9%**	**9%**	**10%**	**7%**	**7%**	**2%**
	2004-05	**12%**	**13%**	**9%**	**16%**	**8%**	**9%**
	2005-06	**10%**	**10%**	**12%**	**11%**	**10%**	**6%**
	2006-07	**8%**	**7%**	**10%**	**36%**	**15%**	**7%**
	2007-08	**9%**	**9%**	**10%**	**6%**	**9%**	**7%**
	2008-09	**9%**	**9%**	**10%**	**4%**	**8%**	**7%**
	Average Last 5 Years	10%	10%	10%	15%	10%	7%

Source: Figures are derived from Table 1.a,
Vehicle Population Growth Rate = (Year 2 Vehicles - Year1 Vehicles)/Year 1 Vehicles

d. **Rate of Growth in Registration of New Vehicles (%)**

	Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
	1951 - 56						
	1956 - 61	96%	229%	135%	-20%	33%	118%
	1961 - 66	81%	192%	37%	57%	84%	67%
	1966 - 71	76%	154%	54%	31%	-5%	98%
	1971 - 76	11%	39%	-53%	2%	-83%	167%
5 Year Growth Rates	1976 - 81	215%	221%	258%	115%	1313%	119%
	1981 - 86	93%	133%	62%	38%	52%	15%
	1986 - 91	108%	120%	88%	59%	59%	89%

	Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
	1991 - 96	17%	16%	8%	15%	38%	24%
	1996 - 01	70%	69%	124%	56%	36%	48%
	2001 - 06	65%	70%	65%	58%	52%	39%
	2001-02						
Annual Growth Rates	**2002-03**	**84%**	**78%**	**64%**	**621%**	**580%**	**53%**
	2003-04	**-24%**	**-21%**	**-10%**	**-38%**	**-43%**	**-58%**
	2004-05	**45%**	**48%**	**3%**	**127%**	**9%**	**169%**
	2005-06	**-5%**	**-10%**	**33%**	**-15%**	**36%**	**-20%**
	2006-07	**-9%**	**-20%**	**-4%**	**221%**	**59%**	**14%**
	2007-08	**19%**	**34%**	**15%**	**-72%**	**-24%**	**7%**
	2008-09	**11%**	**13%**	**6%**	**-16%**	**-6%**	**14%**
	Average Last 5 Years	12%	13%	11%	49%	15%	37%

Source: Figures are derived from Table 1.b,
New Vehicles Registration Growth Rate = (Year 2 Registrations - Year1 Registrations)/Year 1 Registrations

Note: The above table illustrates the year on year incremental growth in the number of vehicles in various categories and not the growth of total vehicle population. The above table is derived based on the year on year registration of new vehicles in various categories.

e. **Vehicular Composition (%)**

Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
1956	100.0%	9.6%	47.7%	11.0%	27.9%	3.8%
1961	100.0%	13.2%	46.6%	8.6%	25.3%	6.3%
1966	100.0%	20.6%	41.5%	6.6%	23.6%	7.7%
1971	100.0%	30.9%	36.6%	5.0%	18.4%	9.1%
1976	100.0%	39.1%	28.9%	4.3%	13.0%	14.7%
1981	100.0%	48.6%	21.5%	3.0%	10.3%	16.6%
1986	100.0%	59.0%	16.8%	2.1%	8.2%	13.8%
1991	100.0%	66.4%	13.8%	1.5%	6.3%	11.9%
1996	100.0%	68.8%	12.4%	1.3%	6.0%	11.4%

Year (as on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps and Taxis	Buses	Goods Vehicles	Others
2001	**100.0%**	**70.1%**	**12.8%**	**1.2%**	**5.4%**	**10.5%**
2002	**100.0%**	**70.6%**	**12.9%**	**1.1%**	**5.0%**	**10.4%**
2003	**100.0%**	**70.9%**	**12.8%**	**1.1%**	**5.2%**	**10.0%**
2004	**100.0%**	**71.4%**	**13.0%**	**1.1%**	**5.2%**	**9.4%**
2005	**100.0%**	**72.1%**	**12.7%**	**1.1%**	**4.9%**	**9.2%**
2006	**100.0%**	**72.2%**	**12.9%**	**1.1%**	**4.9%**	**8.8%**
2007	**100.0%**	**71.5%**	**13.1%**	**1.4%**	**5.3%**	**8.7%**
2008	**100.0%**	**71.5%**	**13.2%**	**1.4%**	**5.3%**	**8.6%**
2009	**100.0%**	**71.7%**	**13.3%**	**1.3%**	**5.3%**	**8.4%**
Average Last 5 Years	100.0%	71.8%	13.0%	1.2%	5.2%	8.8%

Source: Figures are derived from Table1.a,
Composition of Vehicle in Year I = (Total Vehicle in the category/Total Vehicle Population)

2. FUEL CONSUMPTION

	2004	2005	2006	2007	2008	2009	2010
High Speed Diesel Oil (in '000 tonnes)	37,074	39,651	40,191	42,896	47,669	51,710	55,699
Motor Spirit (in '000 tonnes)	7,897	8,251	8,647	9,285	10,332	11,258	12,731
High Speed Diesel Oil (in million liters)	38,557	41,237	41,799	44,612	49,576	53,778	57,927
Motor Spirit (in million liters)	8,213	8,581	8,993	9,656	10,745	11,708	13,240
Growth Rates							
High Speed Diesel Oil		6.95%	1.36%	6.73%	11.13%	8.48%	7.71%
Motor Spirit		4.48%	4.80%	7.38%	11.28%	8.96%	13.08%

Source: Basic Statistics on Indian Petroleum & Natural Gas, MoPNG (http://petroleum.nic.in/petstat.pdf)

3. CESS CALCULATIONS

a. Green Surcharge on Petrol (Pan India)

Year	Growth in Motor Spirit Consumption	Consumption of Motor Spirit (in million liters)	Green Surcharge on Motor Spirit (in Rs Crore @ Rs 2/liter)	Cumulative Green Cess on Petrol (in Rs Crore)
2012	8.33%	15,538	3,108	3,108
2013	8.33%	16,832	3,366	6,474
2014	8.13%	18,200	3,640	10,114
2015	8.13%	19,680	3,936	14,050
2016	7.93%	21,241	4,248	18,298
2017	7.93%	22,925	4,585	22,883
2018	7.73%	24,697	4,939	27,822
2019	7.73%	26,606	5,321	33,143
2020	7.53%	28,610	5,722	38,865
2021	7.53%	30,764	6,153	45,018
2022	7.33%	33,019	6,604	51,622
2023	7.33%	35,439	7,088	58,710
2024	7.13%	37,966	7,593	66,303
2025	7.13%	40,673	8,135	74,438
2026	6.93%	43,492	8,698	83,136

Year	Growth in Motor Spirit Consumption	Consumption of Motor Spirit (in million liters)	Green Surcharge on Motor Spirit (in Rs Crore @ Rs 2/liter)	Cumulative Green Cess on Petrol (in Rs Crore)
2027	6.93%	46,506	9,301	92,437
2028	6.73%	49,635	9,927	102,364
2029	6.73%	52,976	10,595	112,959
2030	6.53%	56,435	11,287	124,246
2031	6.53%	60,121	12,024	136,270
2032	6.33%	63,926	12,785	149,055

b. Green Cess on Existing Vehicles (Pan India)

Year	Vehicular Growth Assumed	Ratio of Cars/jeeps/taxis	Ratio of Two Wheelers	Total Vehicles ('000)	Cars/jeeps/taxis ('000)	Two Wheelers ('000)
2012	9.60%	13.03%	71.81%	151,336	19,724	108,678
2013	9.60%	13.03%	71.81%	165,863	21,617	119,111
2014	9.40%	13.23%	71.31%	181,454	24,012	129,400
2015	9.40%	13.23%	71.31%	198,510	26,269	141,563
2016	9.20%	13.43%	70.81%	216,772	29,119	153,503
2017	9.20%	13.43%	70.81%	236,715	31,798	167,624
2018	9.00%	13.63%	70.31%	258,019	35,176	181,420

Year	Vehicular Growth Assumed	Ratio of Cars/jeeps/taxis	Ratio of Two Wheelers	Total Vehicles ('000)	Cars/jeeps/taxis ('000)	Two Wheelers ('000)
2019	9.00%	13.63%	70.31%	281,239	38,342	197,747
2020	8.80%	13.83%	69.81%	305,988	42,328	213,619
2021	8.80%	13.83%	69.81%	332,914	46,053	232,416
2022	8.60%	14.03%	69.31%	361,543	50,736	250,596
2023	8.60%	14.03%	69.31%	392,635	55,099	272,146
2024	8.40%	14.23%	68.81%	425,615	60,579	292,878
2025	8.40%	14.23%	68.81%	461,365	65,667	317,478
2026	8.20%	14.43%	68.31%	499,196	72,050	341,015
2027	8.20%	14.43%	68.31%	540,129	77,958	368,977
2028	8.00%	14.63%	67.81%	583,337	85,361	395,577
2029	8.00%	14.63%	67.81%	630,003	92,189	427,222
2030	7.80%	14.83%	67.31%	679,141	100,738	457,149
2031	7.80%	14.83%	67.31%	732,112	108,596	492,805
2032	7.60%	15.03%	66.81%	787,750	118,424	526,318

c. Assumptions regarding the life of vehicle and its insured values:

Life of a Vehicle	New &up to1 Y Old	2 Y Old	3 Y Old	4 Y Old	5 Y Old	6 Y Old	7 Y Old	8 Y Old	9 Y Old	10 Y Old	more than 10 Y old
Value of Vehicle (%)	**100**	**95**	**90**	**85**	**80**	**75**	**70**	**65**	**60**	**55**	**50**
Percentage of Vehicles (%)	**8.10**	**8.10**	**8.10**	**8.10**	**8.10**	**8.10**	**8.10**	**8.10**	**8.10**	**8.10**	**19.0**
Weighted Average Insured Value of Vehicles	**72%**										
% leakage in insurance	**50%**										

*Y – Year

d. Calculation of net insured values of vehicles (category wise & total)

Year	below 3 lakh (average Rs 2.5 Lakh)	3 - 7 lakh (average Rs 5 lakh)	7 - 12 lakh (average Rs 9.5 lakh)	12 - 20 lakh (average Rs 16 lakh)	above 20 lakh (average Rs 30 lakh)	Total Insured Value of Car (in Rs Crore)	Total Insured Value of TW (in Rs Crore)	Net Insured Value of Car(excluding leakage in Rs Crore)	Net Insured Value of TW(excluding leakage in Rs Crore)
2012	71,277	320,747	270,853	228,086	213,831	1,104,794	392,736	552,397	196,368
2013	78,119	351,537	296,854	249,982	234,358	1,210,851	430,438	605,425	215,219
2014	86,774	390,482	329,741	277,676	260,322	1,344,995	467,619	672,497	233,809
2015	94,930	427,187	360,735	303,777	284,791	1,471,420	511,574	735,710	255,787
2016	105,230	473,537	399,875	336,737	315,691	1,631,071	554,720	815,535	277,360

Year	below 3 lakh (average Rs 2.5 Lakh)	3 - 7 lakh (average Rs 5 lakh)	7 - 12 lakh (average Rs 9.5 lakh)	12 - 20 lakh (average Rs 16 lakh)	above 20 lakh (average Rs 30 lakh)	Total Insured Value of Car (in Rs Crore)	Total Insured Value of TW (in Rs Crore)	Net Insured Value of Car(excluding leakage in Rs Crore)	Net Insured Value of TW(excluding leakage in Rs Crore)
2017	114,911	517,101	436,663	367,716	344,734	1,781,125	605,753	890,562	302,876
2018	127,118	572,030	483,048	406,777	381,353	1,970,325	655,607	985,163	327,803
2019	138,558	623,511	526,520	443,386	415,674	2,147,649	714,609	1,073,824	357,305
2020	152,962	688,330	581,256	489,479	458,887	2,370,914	771,964	1,185,457	385,982
2021	166,422	748,901	632,405	532,552	499,267	2,579,548	839,895	1,289,774	419,947
2022	183,347	825,063	696,720	586,711	550,042	2,841,883	905,590	1,420,942	452,795
2023	199,115	896,016	756,636	637,167	597,344	3,086,277	983,468	1,543,139	491,734
2024	218,916	985,121	831,880	700,531	656,747	3,393,195	1,058,387	1,696,598	529,193
2025	237,304	1,067,868	901,756	759,373	711,912	3,678,214	1,147,288	1,839,107	573,644
2026	260,370	1,171,666	989,407	833,185	781,111	4,035,739	1,232,342	2,017,870	616,171
2027	281,720	1,267,739	1,070,536	901,504	845,160	4,366,658	1,333,391	2,183,329	666,695
2028	308,473	1,388,127	1,172,196	987,113	925,418	4,781,327	1,429,518	2,390,664	714,759
2029	333,150	1,499,173	1,265,969	1,066,079	999,449	5,163,819	1,543,875	2,581,910	771,938
2030	364,043	1,638,193	1,383,363	1,164,937	1,092,128	5,642,663	1,652,022	2,821,332	826,011
2031	392,437	1,765,967	1,491,261	1,255,799	1,177,311	6,082,775	1,780,874	3,041,387	890,437
2032	427,955	1,925,796	1,626,227	1,369,455	1,283,864	6,633,296	1,901,982	3,316,648	950,991

** Net Insured Value = Total Insured Value *(1-%ge Leakage)*

e. Calculation of Green Cess @4% of Net Insured Value of Vehicles

Year	Cars (in Rs Crore)	Two Wheelers (in Rs Crore)	Total Green Cess (in Rs Crore)	Cumulative Green Cess (in Rs Crore)
2012	22,096	7,855	29,951	29,951
2013	24,217	8,609	32,826	62,776
2014	26,900	9,352	36,252	99,029
2015	29,428	10,231	39,660	138,689
2016	32,621	11,094	43,716	182,404
2017	35,622	12,115	47,738	230,142
2018	39,407	13,112	52,519	282,661
2019	42,953	14,292	57,245	339,906
2020	47,418	15,439	62,858	402,763
2021	51,591	16,798	68,389	471,152
2022	56,838	18,112	74,949	546,102
2023	61,726	19,669	81,395	627,496
2024	67,864	21,168	89,032	716,528
2025	73,564	22,946	96,510	813,038
2026	80,715	24,647	105,362	918,400
2027	87,333	26,668	114,001	1,032,401
2028	95,627	28,590	124,217	1,156,618

Year	Cars (in Rs Crore)	Two Wheelers (in Rs Crore)	Total Green Cess (in Rs Crore)	Cumulative Green Cess (in Rs Crore)
2029	103,276	30,878	134,154	1,290,772
2030	112,853	33,040	145,894	1,436,665
2031	121,655	35,617	157,273	1,593,938
2032	132,666	38,040	170,706	1,764,644

4. URBAN TRANSPORT TAX ON NEW REGISTRATION (PAN INDIA)

a. Calculation of New Vehicle Registration (in '000)

Year	Cars assuming 1% scrap	below 3 lakh (average Rs 2.5 Lakh)	3 - 7 lakh (average Rs 5 lakh)	7 - 12 lakh (average Rs 9.5 lakh)	12 - 20 lakh (average Rs 16 lakh)	above 20 lakh (average Rs 30 lakh)	Two Wheelers assuming 2% scrap
2012	1,908	382	859	382	191	95	11,502
2013	2,091	418	941	418	209	105	12,606
2014	2,611	522	1,175	522	261	131	12,671
2015	2,497	499	1,124	499	250	125	14,751
2016	3,113	623	1,401	623	311	156	14,771
2017	2,970	594	1,337	594	297	149	17,192
2018	3,696	739	1,663	739	370	185	17,148
2019	3,518	704	1,583	704	352	176	19,956
2020	4,369	874	1,966	874	437	218	19,826

Year	Cars assuming 1% scrap	below 3 lakh (average Rs 2.5 Lakh)	3 - 7 lakh (average Rs 5 lakh)	7 - 12 lakh (average Rs 9.5 lakh)	12 - 20 lakh (average Rs 16 lakh)	above 20 lakh (average Rs 30 lakh)	Two Wheelers assuming 2% scrap
2021	4,148	830	1,867	830	415	207	23,070
2022	5,144	1,029	2,315	1,029	514	257	22,828
2023	4,871	974	2,192	974	487	244	26,562
2024	6,030	1,206	2,714	1,206	603	302	26,174
2025	5,694	1,139	2,562	1,139	569	285	30,458
2026	7,040	1,408	3,168	1,408	704	352	29,886
2027	6,628	1,326	2,983	1,326	663	331	34,783
2028	8,183	1,637	3,682	1,637	818	409	33,980
2029	7,682	1,536	3,457	1,536	768	384	39,557
2030	9,471	1,894	4,262	1,894	947	474	38,471
2031	8,865	1,773	3,989	1,773	887	443	44,799
2032	10,914	2,183	4,911	2,183	1,091	546	43,369

b. Calculation of Category Wise Newly Registered Petrol & Diesel Cars (70% Petrol & 30% Diesel Cars):

Year	Petrol Cars	below 3 lakh	3 - 7 lakh	7 - 12 lakh	12 - 20 lakh	above 20 lakh	Diesel Cars	below 3 lakh	3 - 7 lakh	7 - 12 lakh	12 - 20 lakh	above 20 lakh
2012	1,336	267	601	267	134	67	573	115	258	115	57	28
2013	1,465	293	659	293	146	74	626	125	282	125	63	31
2014	1,828	365	823	365	183	92	783	157	352	157	78	39
2015	1,748	349	787	349	175	88	749	150	337	150	75	37
2016	2,180	436	981	436	218	109	934	187	420	187	93	47
2017	2,080	416	936	416	208	104	891	178	401	178	89	45
2018	2,587	517	1,164	517	259	130	1,109	222	499	222	111	55
2019	2,463	493	1,108	493	246	123	1,056	211	475	211	106	53
2020	3,059	612	1,376	612	306	153	1,310	262	590	262	131	65
2021	2,905	581	1,307	581	291	145	1,244	249	560	249	124	62
2022	3,601	720	1,621	720	360	180	1,543	309	694	309	154	77
2023	3,410	682	1,534	682	341	171	1,461	292	658	292	146	73
2024	4,221	844	1,900	844	422	211	1,810	362	814	362	181	91
2025	3,985	797	1,793	797	398	200	1,709	342	769	342	171	85
2026	4,929	986	2,218	986	493	246	2,111	422	950	422	211	106
2027	4,640	928	2,088	928	464	232	1,989	398	895	398	199	99

Year	Petrol Cars	below 3 lakh	3 - 7 lakh	7 - 12 lakh	12 - 20 lakh	above 20 lakh	Diesel Cars	below 3 lakh	3 - 7 lakh	7 - 12 lakh	12 - 20 lakh	above 20 lakh
2028	5,728	1,146	2,577	1,146	573	286	2,455	491	1,105	491	245	123
2029	5,377	1,075	2,420	1,075	538	269	2,304	461	1,037	461	230	115
2030	6,630	1,326	2,983	1,326	663	332	2,841	568	1,279	568	284	142
2031	6,205	1,241	2,792	1,241	621	310	2,660	532	1,197	532	266	133
2032	7,640	1,528	3,438	1,528	764	382	3,274	655	1,473	655	327	164

c. Urban Transport tax Rates and Estimated Collections

Year	UT Tax Rate on Petrol Cars	UT Tax Rate on Diesel Cars	UT Tax Rate on Two Wheelers	Collections from Cars (in Rs Crore)	Collections from Two Wheelers (in Rs Crore)	Total Urban Transport Cess (in Rs Crore)	Cumulative Urban Transport Cess (in Rs Crore)
2012	7.5%	20.0%	7.5%	16,616	4,313	20,930	20,930
2013	7.5%	20.0%	7.5%	18,221	4,727	22,949	43,878
2014	7.5%	20.0%	7.5%	22,761	4,752	27,513	71,391
2015	7.5%	20.0%	7.5%	21,762	5,532	27,294	98,685
2016	7.5%	20.0%	7.5%	27,155	5,539	32,694	131,379
2017	7.5%	20.0%	7.5%	25,920	6,447	32,367	163,746
2018	7.5%	20.0%	7.5%	32,221	6,431	38,652	202,398
2019	7.5%	20.0%	7.5%	30,698	7,483	38,181	240,579

Year	UT Tax Rate on Petrol Cars	UT Tax Rate on Diesel Cars	UT Tax Rate on Two Wheelers	Collections from Cars (in Rs Crore)	Collections from Two Wheelers (in Rs Crore)	Total Urban Transport Cess (in Rs Crore)	Cumulative Urban Transport Cess (in Rs Crore)
2020	7.5%	20.0%	7.5%	38,063	7,435	45,497	286,076
2021	7.5%	20.0%	7.5%	36,149	8,651	44,800	330,876
2022	7.5%	20.0%	7.5%	44,833	8,560	53,393	384,269
2023	7.5%	20.0%	7.5%	42,470	9,961	52,431	436,700
2024	7.5%	20.0%	7.5%	52,613	9,815	62,428	499,128
2025	7.5%	20.0%	7.5%	49,643	11,422	61,065	560,193
2026	7.5%	20.0%	7.5%	61,383	11,207	72,590	632,782
2027	7.5%	20.0%	7.5%	57,780	13,043	70,823	703,606
2028	7.5%	20.0%	7.5%	71,343	12,742	84,085	787,691
2029	7.5%	20.0%	7.5%	66,953	14,834	81,786	869,477
2030	7.5%	20.0%	7.5%	82,576	14,427	97,003	966,480
2031	7.5%	20.0%	7.5%	77,296	16,800	94,096	1,060,576
2032	7.5%	20.0%	7.5%	95,162	16,263	111,425	1,172,001

5. SUMMARY OF ACCRUALS TO NATIONAL URBAN TRANSPORT FUND (IN RS CRORE)

Year	Green Surcharge on Petrol	Green Cess on Existing Vehicles (Pan India)	Urban Transport Tax On New Registration (Pan India)	Total accruals to UTF (pan India)	Total Cumulative Accruals to UTF (India)	National Urban Transport Fund (NUTF)				
						Green Surcharge on Petrol (100% in Urban Settlements)	Green Cess on Existing Vehicles (60% in Urban Settlements)	Urban Transport Tax On New Registration (90% in Urban Settlements)	Total accruals to UTF	Total Cumulative Accruals to UTF
2012	3,108	29,951	20,930	50,880	50,880	3,108	17,970	18,837	39,914	39,914
2013	3,366	32,826	22,949	55,774	106,655	3,366	19,695	20,654	43,716	83,630
2014	3,640	36,252	27,513	63,765	170,420	3,640	21,751	24,762	50,153	133,783
2015	3,936	39,660	27,294	66,954	237,374	3,936	23,796	24,565	52,296	186,080
2016	4,248	43,716	32,694	76,410	313,784	4,248	26,229	29,425	59,902	245,982
2017	4,585	47,738	32,367	80,104	393,888	4,585	28,643	29,130	62,358	308,340
2018	4,939	52,519	38,652	91,170	485,058	4,939	31,511	34,786	71,237	379,577
2019	5,321	57,245	38,181	95,426	580,484	5,321	34,347	34,363	74,031	453,608
2020	5,722	62,858	45,497	108,355	688,839	5,722	37,715	40,948	84,384	537,992
2021	6,153	68,389	44,800	113,189	802,028	6,153	41,033	40,320	87,506	625,498
2022	6,604	74,949	53,393	128,343	930,371	6,604	44,970	48,054	99,627	725,125
2023	7,088	81,395	52,431	133,826	1,064,197	7,088	48,837	47,188	103,113	828,238
2024	7,593	89,032	62,428	151,460	1,215,656	7,593	53,419	56,185	117,197	945,435

Year	Green Surcharge on Petrol	Green Cess on Existing Vehicles (Pan India)	Urban Transport Tax On New Registration (Pan India)	Total accruals to UTF (pan India)	Total Cumulative Accruals to UTF (India)	National Urban Transport Fund (NUTF)				
						Green Surcharge on Petrol (100% in Urban Settlements)	Green Cess on Existing Vehicles (60% in Urban Settlements)	Urban Transport Tax On New Registration (90% in Urban Settlements)	Total accruals to UTF	Total Cumulative Accruals to UTF
2025	8,135	96,510	61,065	157,575	1,373,231	8,135	57,906	54,958	120,999	1,066,434
2026	8,698	105,362	72,590	177,951	1,551,182	8,698	63,217	65,331	137,246	1,203,680
2027	9,301	114,001	70,823	184,824	1,736,007	9,301	68,401	63,741	141,443	1,345,123
2028	9,927	124,217	84,085	208,302	1,944,309	9,927	74,530	75,677	160,134	1,505,257
2029	10,595	134,154	81,786	215,940	2,160,249	10,595	80,492	73,608	164,695	1,669,952
2030	11,287	145,894	97,003	242,897	2,403,145	11,287	87,536	87,303	186,126	1,856,078
2031	12,024	157,273	94,096	251,369	2,654,514	12,024	94,364	84,686	191,074	2,047,152
2032	12,785	170,706	111,425	282,130	2,936,644	12,785	102,423	100,282	215,491	2,262,643

ANNEXURE F: STUDY ON THE REFORM OF TRANSPORT INSTITUTIONAL SYSTEM IN CHINESE CENTRAL CITIES

NAME OF AUTHOR: JIANG Yulin, FENG Liguang, HaoJixiu, PENG Hu, WU Hongyang

CoE affiliation:

China Urban Sustainable Transport Research Centre (CUSTReC)

China Academy of Transportation Sciences (CATS) , Ministry of Transport (MOT)

240 Huixinli, Chaoyang District, Beijing, P. R. China, 100029

Telephone: +86-10-58278509 , Fax: +86-10-64964252

E-mail details: Jiangyulin@vip.sina.com

SHORT BIOGRAPHY:

Dr. Jiang Yulin is a professor and vice chief general engineer of the China Academy of Transportation Science (CATS). Her research focuses on sustainable transport policy study and transport information technology. Dr. Jiang is recognized as a leading international expert on sustainable transport, environmental protection in the fields of highway development, and transport policy. She coordinated the CCICED Task Force (funded by China Council for International Cooperation on Environment and Development) on Policy and Strategy for Sustainable Transport (2003-2005) Environmental Governance in the Transportation Sector (2006-2007) and Energy Efficiency in Transport and Building Sector (2008-2009) .

Summary

It is of great importance to promote the transport institutional reform in Chinese local cities by taking the opportunities of the local institutional system reform in combination with the spirit of central institutional system reform. In the process of this project research, theoretical study

is combined with actual surveys and data collection, and international experience is combined with actual circumstances in Chinese cities. Through deep investigation and study, system and mechanism issues that restrict the urban transport development are studied comprehensively; systematic summary of experiences in the international transport institutional system and analysis of typical cases in domestic cities provide references for the government; All these tasks, combine to form reform objectives, reform modes and important issues of the urban transport institutional system that can be analyzed, and consummated comprehensively.

Background

The 36 central cities (4 municipalities, 27 provincial capitals, and 5 coastal cities including Dalian, Qingdao, Ningbo, Xiamen, and Shenzhen) are the national and/or regional centers of the policy, economy, culture, technology and business. Moreover, they are large, heavily populated hubs with immense transactions of goods, services and information. Thus, they have special status and functions in promoting regional harmonious development while also encouraging a new economical growth axis.

The central cities usually have an abundance of transport resources, including the largest airports, railway hubs, ports, and advanced road networks in the region. Thus, they are the most significant transport hubs for national integrated transport, the centers of the regional integrated transport, and the connecting centers of various transport models. Therefore, they are paramount in accelerating the construction of convenient, fluent, highly-efficient, and safe modern integrated transport systems, and can be used to ultimately create city agglomeration with greater radiant effect.

The transport administrative agency of the central cities is a connecting link between the upper and lower levels. Compared with the transport administrative institution of provincial and other cities, the transport administrative institution of the central city faces more complex problems and is thus more eager to construct an integrated transport administrative institution.

Scientific, efficient transport institutional systems and operating mechanisms are important guarantees for realizing sustainable development of urban transport, and are fundamental in constructing modern comprehensive transport systems. However, there are many problems of urban transport institutional systems in China. The internal organizational setups and operating mechanisms are not scientifically based, functions are not oriented clearly, and the problems associated with multiple management are very obvious. These issues influence the government departments to fulfill their functions comprehensively and correctly, influence the increase of transport governing capacity and transportation service levels, and do not meet the requirements of economic society and modern comprehensive transport system. They have become important obstacles that restrict sustainable development of urban transport.

In 2008, "*Opinions on Further Reforming the Government Institutional systems"* was adopted in the Second Plenary Session of the 17th Central Committee of the Communist Party of China. It pointed out the need to *establish a relatively perfect socialist administrative system with chinese characteristics by 2020*. The *State Council's Institutional Restructuring Plan* was adopted in the First Session of the Eleventh National People's Congress emphasizing *organization of the Ministry of Transport,* responsibilities of the Ministry of Communications, Civil Aviation Administration of China, responsibilities of the Ministry of Construction for guiding urban passenger transport will be integrated and transferred into this Ministry. The central institutional system reform provides important opportunities for local transport institutional system reform. In this situation, it is very essential to study how to establish urban transport institutional systems and operating mechanisms in line with the specific characteristics of Chinese cities, define responsibilities and authority of transport departments and relevant bodies scientifically, thus enhancing administration efficiency and speeding up the construction of a modern and comprehensive transport system.

CURRENT STATUS OF TRANSPORT INSTITUTIONAL SYSTEM IN CENTRAL CITIES

As an important component of the Chinese institutional system, certain similarities exist in the developmental of transport institutional systems in central cities and the economic institutional

system in China. After the *opening and reform policy*, the central cities have constantly promoted transport administration reform according to the overall requirements of establishing a socialist market-economy system. The governments of central cities actively promote reform, and some central cities have established integrated transport administrative institutions of *integration of urban-rural transport* or *one city one transport* system. As a result, the whole quality of service has been raised significantly. Now there are three management models in Chinese central cities as listed below:

Model 1: *Traditional model* with overlapping management by various sectors

Transport administration is managed by various sectors including transport, urban construction, city affair management, urban management, and public security. There are eighteen cities applying this model, including Nanjing, Kunming, Fuzhou, Nanjing, and Hangzhou.

Model 2: Integrated urban-rural transport management

The transport authority manages the road and water transport, urban public transport, and highway passenger transport around the city. There are eight cities applying this model, including Shenyang, Harbin, Urumqi, and Xining.

Model 3: One city, one transport authority mode

The transport authority is in charge of design and plan, road (city and highway) and water transport, urban public transport, taxi management, and railway and civil aviation in the city. There are ten cities applying this model, including Beijing, Guangzhou, Chongqing, Chengdu, Shenzhen, and Wuhan.

ANNEXURE G: AN INTEGRATED UNITARY AUTHORITY – THE CASE OF LONDON

As part of local government reorganization in London, in July 2000 the "Greater London Authority" (GLA) was created. The GLA is responsible for:

- Transport for London (TfL)
- London (Economic) Development Agency (LDA)
- Fire and Emergency Services (LFEPA)
- Police (MPA)
- London Transport Users Committee (LTUC)

The GLA is lead by a Mayor who is responsible for developing strategies for the development and management of the city including for transport, building/land use (spatial development), economic development, culture and some aspects of environment. The GLA annual budget is in excess of US$5 billion.

In the transport sector, Transport for London (TfL) is responsible for:

- developing/implementing the Mayor's transport strategy
- managing the network of major roads termed the Transport for London Road Network (TLRN) (580 km)
- managing/operating/owning all traffic signals (about 4800 installations)
- managing London Buses currently through London Bus Services Ltd which regulates the service (provided by over some 3730 kms of bus routes), contracts the routes to the private sector (operating some 7000+ buses); TfL provides and owns infrastructure (stops, terminals) and finances on-road bus priority (currently 1000 bus lanes totalling 240+ kms) on both its own TLRN roads and Borough (2nd tier authority) roads
- managing London Underground (the metro system)
- Managing/Operating/Owning some lesser public transport services such as London River Services, Trams (28kms), Docklands Light Rail (26kms) etc

Traffic management is thus very closely integrated with the urban transport strategy, and particularly with the management of public transport within that strategy. Although not

responsible for sub-urban rail, the Strategy promotes a policy of partnership with the responsible agency (the Strategic Rail Authority).

To fulfill its responsibilities for implementing the Mayor's Transport Strategy, TfL carries out the planning, design, implementation and maintenance functions with respect to traffic management through consultants.

Even where a good strategic planning function and capability already exists within the municipality or conurbation, it is usually still considered beneficial to establish a separate authority to deal specifically with public transport matters. This is called a Passenger Transport Authority (PTA) in Britain and the US, a "Verkehrsverbund" in German speaking countries, an "autoriteorganizatrice" in France, and a "consorceo" in Spain and Brazil.

ANNEXURE H: PROPOSED SCOPE OFURBAN TRANSPORT ACT

The proposed urban transport act should facilitate the following;

SETTING UP A DEDICATED AUTHORITY (UMTA)/CELLS FOR URBAN TRANSPORT

- An autonomous authority; 'Unified Metropolitan Transport Authority' in cities with population in excess of one million and an UMTA for a group of smaller cities. When a city is too small to support a professional team by itself, the State Government should provide such a cell either at its HQ or region wise when the State is large.
- UMTA should be an executive body governed by a Board made up of heads of various departments in the city, local elected leaders and eminent citizens. It should be supported by a team of professionals with a Chief Executive. UMTA should be based in the city and should report to the MPC/DPC envisaged under the 74th amendment to the constitution for inter-sectoral coordination. Until MPC/DPC is constituted, this authority should report to the relevant department at the State HQ.
- The cells for small cities should be located in the Municipality or the Urban development authority depending on who carries the responsibility for UT.
- UMTA should be empowered to set up 'Special Purpose Vehicles' for various functions or components of urban transport.

UMTA/CELLS SHALL BE EMPOWERED TO UNDERTAKE THE FOLLOWING TASKS;

- **Policy functions such as** formulation of Policy, Strategy and financing for the city
- **Regulatory Functions** excluding those currently assigned to RTOs under the Motor Vehicles act such as setting Standards, adherence to safety standards, adherence to environmental standards, Fixation of fares/tariffs. Registration, Licensing, Inspection and Testing of vehicles and drivers and Enforcement of rules and regulations (Including removal of Encroachments) is presently the job of the transport department and will continue to be so.
- **Integrated and holistic planning for urban transport such as** comprehensive integrated transport planning of all components of Urban Transport on a city/agglomeration wide basis for implementation including Integrated land-use transport planning with inputs from the urban development authority. This will include planning for an Integrated city wide multimodal public transport system for the city, mass rapid transit, Planning of bus routes, terminals and interchange points, intermediate public transport, NMT and Transport Demand Management. It will also plan goods movement in the city.

- **Planning of road network and associated infrastructure** in conjunction with planning of city wide public transport system. Infrastructure includes roads and associated facilities such as road furniture, Traffic Signals, Road Intersections, Flyovers, Grade Separators, Bridges, Bye Passes and facilities for Pedestrians, Bicycles, Terminals for Inter-modal Transfers and Parking.
- **Organizing and coordinating services i.e.** franchising/route allocation, Contract Monitoring, coordination of services, Ensuring supply of services to meet demand, Provisioning of new supplies, Monitor the work assigned to implementing agencies. All service providers including rail transit and BRT will be controlled by UMTA. Transport department and Municipality should issue permits to buses, Para transit and personalized transport as advised by UMTA. (**Note;** Construction, operation and maintenance of mass rapid transit modes, bus services and all other infrastructure will continue through existing city agencies.)

- **Common Services such as** Inter- modal coordination and integration, Resolution of day to day matters, Dispute resolution, Public relations, Security services, Management of revenue sharing arrangement. Provision and management of common facilities i.e. depots and terminals, 'Passenger Information System', integrated ticketing, data management, Management of multimodal Interchanges, Last mile connectivity, planning movements around MRT stations, co-ordination with other agencies, and planning of future extensions.

  Traffic Engineering and Management; traffic police should be responsible for enforcement. The planning of traffic engineering and management measures should be with UMTA/cells. The road markings and installation of traffic signs should continue with the Municipal Corporation and the Public Works Department.

  Safety, security, environment, education and training and the need to conserve energy are important and crucial issues that need coordinated and dedicated attention.

- **Miscellaneous such as** Capacity building to upgrade skills of city officials, Creating a Date base for the city, Participating in country wide Research, Technology upgrade and use of Technology to manage urban transport.

FINANCIAL MATTERS

UMTA shall be empowered to undertake the following tasks;

- Receive all funds for providing urban transport services and infrastructure and allocating them to various city agencies to implement/operate all UT related activities as per a phased plan and prioritization of projects
- Raise capital; acquire, hold and develop land; utilize the space on its land for commercial purpose; lease the properties developed by it; carry out all incidental and ancillary activities
- Fix its fare tariff and revise it from time to time.
- Receive loans and grants by Central/State Government, maintain the necessary reserve funds and publish its accounts that will be audited by the appropriate authority.
- Determine Liability of the Authority in cases of death and injury to passengers, and the procedure of determination of compensation.
- Impose penalties for offences and irregularities concerning travel without proper ticket, drunkenness, smoking, making nuisance, obstructing UT services, attempting to cause hurt to the traveling public, endangering their safety, carrying of dangerous and offensive goods and destroying properties of the Authority.
- Setting up co-ordination committees,
- The act should exempt the Authority from electricity tax, income tax, stamp duty, taxes by local bodies and introduction of dedicated levies (through governmental action) on non-user beneficiaries.

SAFETY ISSUES

- Act should specify appointment of commissioners of safety who would inspect the fitness of the UT system and recommend sanctioning their opening for public carriage
- Act should detail the powers of Government to sanction opening of MRT system, closing an opened section of MRT and its re-opening after fulfillment of conditions laid down for the purpose.
- Act should specify the requirement to keep accident records in a specific format and to carry out enquires into accidents

ANNEXURE I: SUMMARY OF POLICY INTERVENTIONS FOR THE 'DESIRED SCENARIO 2030'

PLANNING

1. **Smart city growth;** should be adopted to restrict trip length and hence pollution and green house gas emissions.

2. **City growth strategy** should be adopted with short and long term actions to encourage use of Public Transport in mega cities and retain the existing modal share of NMT in medium and small sized cities.

3. **Integrated land use transport plan;** should be prepared to minimize transport demand.

4. **Comprehensive Mobility Plans;** i.e. a vision statement for the city should include all factors that affect traffic flow, urban mobility and accessibility.

5. **Order of priority in planning;** should be Non- motorised transport (NMT) i.e. Walk, bicycle and cycle rickshaw, Mass rapid transit, other motorized transport and Personalised transport, in that order.

6. **Public transport network;** should be User friendly, Multimodal, Integrated and City wide with efficient interchange points with provision for future growth in demand and absorption of new technology.
7. **Road vs rail based modes;** Considering that roads is a temporary solution, there is a case for increasing the use of environment friendly modes at the time of detailing.
8. **Intermediate Public Transport;** have a potential of providing clean mobility, low emissions and improved safety. Manufacturers should be encouraged to invest in improving the technology of these vehicles.
9. **Regional/suburban transport;** services should be simultaneously planned and integrated with city transport.

10. **Accessibility;** Door to door planning for last mile connectivity should be the norm.

11. **Road infrastructure;** Road network and linked infrastructure should be planned on a city wide basis for all road owning agencies in conjunction with the city wide multi modal transport network and prioritized for implementation. Dead end roads should be avoided.
12. **Parking;** facilities in a city should be planned taking into account the future plans for provision of public transport. Building byelaws should require parking to be provided within the premises. Parking should be shared, common and not individually owned, and it should be priced.

13. **Goods movement;** both intra-city and inter-city should be planned and regulated alongside commuter movement.
14. **Security;** Security against vandalism, crime and terrorism should be a part of urban transport planning.
15. **Safety audits;** Cities should undertake safety audit on a regular basis for hazardous locations.
16. **Improve safety**; All road design and traffic management standards should be reviewed
17. **Transport Demand Management** should be an essential part of planning to control demand
18. **Consultation with public;** and other stakeholders should be an essential part of formulating policies and projects.

OPERATION

19. **Road infrastructure;** As a first step, the use of existing infrastructure should be improved by removing encroachments of road right of way. Work of Utility agencies should be controlled and coordinated.
20. **Congestion management;** Reliable Public transport services with predictable travel time should be provided to commuters.
21. **Control in the use of personal motorized vehicles;** various administrative, fiscal and regulatory measures should be used to control the use of personal motorized vehicles.
22. **Traffic engineering and management;** Planning for traffic management and smooth flow of traffic should be in professional hands. Traffic police should continue to be responsible for enforcement of traffic rules.

TECHNOLOGY

23. **Enforcement of Traffic rules** should make extensive use of technology.
24. **Use of Technology;** Use of technology such as electronic road pricing, road tolls and congestion pricing should be examined by cities particularly large cities before mooting proposals for augmentation of infrastructure.
25. **Intelligent Transport Systems;** It should be mandatory for cities to explore and use ITS to maximize efficiency and output of existing infrastructure before posing projects for augmentation of infrastructure. The Government needs to devise transport policy to include mechanism to Incentivize technology adoption through innovative funding mechanism; Enable common payment gateway mechanism in transport; Protection of passengers' personal information and discontinue paper based tickets

INSTITUTIONAL

26. **Cities to carry primary responsibility**; City should be empowered with legislative support and a resource generation policy to take care of its urban transport needs.
27. A dedicated 'Unified Metropolitan Transport authority (UMTA)' supervised by a Board and supported by urban transport professionals shouldbe set up in each city or a group of cities. It should be responsible for coordinated planning and delivery of services and traffic engineering and management.
28. **UMTA;** should be based in the city and report to State Ministry in-charge of Urban Transport. Other city agencies should continue to perform their present functions, but as per priority laid down by UMTA.
29. **Urban Transport act;** should be enacted by the Central Government to cover all aspects of urban transport and States should draft their rules under it.
30. **Safety;** A Safety Board should be set up in each State to deal with safety issues in a comprehensive, scientific and a systematic manner. it should be supported by relevant R&D. Rescue services should be organized for fast relief.
31. **Capacity building;** the comprehensive scheme for capacity building launched by MOUD should be institutionalized. State Governments should initiate similar action.
32. **Job creation;** State Governments should create jobs to absorb the transport professionals to be generated under the MOUD scheme.
33. **Data base;** the initiative taken by MOUD to set up a 'Knowledge Management cum data base Center' to be managed by Institute of Urban Transport India at National level should be institutionalized. This should include arrangements for regular update of information and data base. Similar database centers should be set up by State Governments and large cities.
34. **Research and development**; the initiative taken by MOUD to promote research in UT in an organized manner should be institutionalized as R&D is an ongoing need.
35. **Nodal officer**; should be appointed, in the interim, in each city to deal with urban transport related issues.

FINANCIALS

36. **Resource generation policy;** should be in place. It should include budgetary allocations, user charges and funds based on taxation of non-user beneficiaries, land development and vehicle taxation on the 'polluter pays principle'.
37. **Urban Transport fund;** should be set up in each city to receive funds from various sources to finance urban transport requirements of the city.

38. **Private sector;** should be involved in financing and management of urban transport infrastructure and services in the city.

39. **Smart city growth;** Fiscal disincentives should be formulated to be imposed on cities that grow as urban sprawls.

40. **Non-motorized transport;** Funds allocation for major transport infrastructure should be linked to achieving targets for creating facilities for NMT.
41. **Road infrastructure;** Funds allocation for mmaintenance and upkeep of the road surface and improved drainage should receive priority over augmentation of infrastructure.
42. **Use of technology;** should be given priority in funding before augmentation of infrastructure.
43. **Fuel and vehicle technology** improvements should be supported by tax concessions.
44. **Funding of buses;** should be assured being the main mode for medium and small cities.
45. **Funding for safety;** should be assured

ANNEXURE J: CRITERIA FOR CHOICE OF THE MODE OF MASS RAPID TRANSIT

Mode choices	PHPDT in 2021	Population (Million)as per 2011 census	Average Trip length (km) for motorized trips
Metro Rail	>=15000 for at least 5km continuous length in a corridor	>=2	>7-8
LRT primarily at grade	=<10,000	>1	> 7-8
Monorail	=<10,000	>2	About 5-6
Bus Rapid Transit System	>=4,000 and Upto 20,000	> 1	> 5
Organised City Bus Service		>1 lakh hilly towns (50,000)	>2 to 3

NOTES:

Metro Rail: As per the National Metro Rail Policy approved by Committee of Secretaries in July, 2009, the figures are 20000 PHPDT (year not specified) and population of more than 3 million as per 2001 census. The Detailed Feasibility can be examined and DPR can be prepared even for 2 million plus cities as it would take a total of about 5 years for the DPR preparation and project sanction and another 5 years for project implementation.

A city with smaller population may also require Metro if its shape is linear, ridership on the projected corridor is high and Metro is justified as per Comprehensive Mobility Plan and Alternatives analysis.

LRT: Would also depend upon availability of land on the Right of Way.

Monorail: Suitable for narrow right of way with high rise buildings on the sides as well as sharp curves. Has almost same cost of construction as elevated metro with less than half the carrying capacity and high maintenance cost. Can at best used as a feeder network.

BRT: Can be provided for higher PHPDT also with overtaking lanes. For smaller cities also, BRTS may be provided if the ridership on certain corridors is high and transit oriented development is planned.

City Bus: The buses should be provided as per urban bus specifications only with all ITS and Passenger information features. Fuel and emission standards to be conforming to auto fuel policy of Govt of India. In order to promote introduction of new technology, Hybrid and Electric trolley buses should also be introduced in selected cities.

ANNEXURE K: NATIONAL TRANSPORT DEVELOPMENT POLICY COMMITTEE

NOTES RECORDED DURING THE MEETING OF THE WORKING GROUP ON URBAN TRANSPORTON SEPTEMBER 2011 AND ACTION TAKEN

1. Presentation made to the Working Group on September 2, 2011. The comments recorded during the meeting and action taken are summarized below:

S. No.	Comments	Action taken
1	**By Shri S. Sunder, Former Secy., Surface Transport**	
	i) Vision for 2030 should emerge	Accepted and included
	ii) Proposal should be focused rather than go into details.	Details are developed to estimate investments
	iii) Specific figures are not needed in choice of mode.	These are for guidance. Choice will depend on an alternat analysis and he based on a CMP f the city
	iv) Recommendations should be left somewhat open.	The recommendations are for for guidance only
	v) The share of public transport would depend on the size of the city	Agreed and incorporated
	vi) There should be greater emphasis on non-motorized Transport including provision for separate funding.	Accepted and incorporated
	vii) A very large number of motorized two wheelers should be taken into account	Accepted and incorporated
	viii) The variations in the 3 estimates of investment need should be explained.	Accepted and incorporated
2	**By ShriArvind Kumar, Ministry of Surface Transport**	

S. No.	Comments	Action taken
	i) Today motorization in India in low. How are we going to deal with growing motorized.	Administrative and fiscal measures are included to control the use of cars
	ii) There should be greater emphasis on rail transport.	Accepted and included
	iii) SRTUs can become financially viable by use of Technology.	Accepted and included
	iv) Municipal finances need to be strengthened.	Accepted and included
	v) There should be no need for contract carriages.	UMTA will control this
3	**By Shri Rajiv Chaudhry, Ministry of Railway**	
	i) Trip Length & Trip time should be taken into account.	Estimate of investment takes this into account
	ii) How do we generate Transport Professionals.	Capacity building included
	iii) 5 Km provision in selection of mode needs to be re-worded.	Done
4	**By Shri Subhago, NTDPC**	
	i) Action on various points listed in Mr. Rakesh Mohan's letter should be taken.	Accepted and included
	ii) Financial strategy is not clear.	Accepted and Reviewed
	iii) Macro-economic view is to be taken.	
	iv) The report should avoid too much technical details.	Agreed; what is needed for estimation is included
5	**By Prof. Prasad, Warangal**	
	i) Public Transport share should be variable spending on city size.	Accepted and incorporated
	ii) Demand will keep increasing and should be Catered for	Accepted and incorporated

S. No.	Comments	Action taken
	iii) Lump sum funds should be provided to Academic Institutes for developing professionals.	Centers of excellence have been provided funds
	iv) There should be Traffic Cells in all cities with population of 5 lakh and above.	Accepted and included
6	**By Shri Ramesh Kumar, Director, Central Elec.Authority**	
	i) Technology suitable for Indian conditions should be selected.	Accepted and included
	ii) ITS Architecture should be formulated.	Accepted and included
	iii) Technology should be standardized	Accepted and included
	iv) What is the energy requirement of the projected Metro Rail transit etc.	
	v) World Bank/ADB resources should also be included for Financing.	Accepted and included
7	**By Shri A.K. Saroha, Director, MoUD**	
	i) How will be the views of public be taken into account.	Accepted. Public consultation has been specified
	ii) Data base needs to be developed.	Accepted and included
	iii) There is no need to create a dedicated UT fund.	Not accepted. Funds should not lapse
8	**By Shri Ajay Mathur, MD, UMTC**	
	i) Goals should be prescribed in general terms.	Agreed; what is needed for estimation is included
	ii) Technology should be used.	Accepted and included
	iii) Choice of mode should depend on alternates analysis.	Accepted and included
9	**By Shri B.I. Singal, Director General, IUT**	

S. No.	Comments	Action taken
	i) Institutional Framework has to be extensive and importantly effective to mange the massive investments projected	Accepted and included
10	**By Shri Cherian Thomas, IDFC Foundation**	
	i) Loan life need not match life of assets. This should be left to the market.	A note is added
	ii) No instruments are available beyond 30 years.	Accepted and included
	iii) The report should be general and not specific.	Agreed; what is needed for estimation is included
	iv) The fund resources need not be specific.	
	v) Compact cities should be promoted.	Accepted and included
11	**By Shri Navneet Taneja, Infosys Limited**	
	i) Vehicle tracking is important.	Accepted and included
	ii) Information security is important.	Accepted and included
	iii) Implementation plan should be 20 years horizon.	Accepted and included
12	**By Shri P.S. Kharola, Govt. of Karnataka**	
	i) There is no need to put UT on concurrent list because issues are not legal. These are conceptual.	Not accepted. UT needs to Be recognized
	ii) We should move towards decentralization.	Accepted and included
	iii) Urban Transport Act is not needed.	Not accepted. UT needs legal support
	iv) UMTA should be for planning and advisory role; not for co-ordination.	Not accepted. The problem today is lack of coordination
	v) UMTA should be part of city Government.	Accepted and included
	vi) ITS should be demand driven.	Accepted and included
	vii) Coming mobility cord will entail 15-20% as a cost	Not accepted as the cost is

S. No.	Comments	Action taken
	of collection.	quite low
	viii) The Conductor should be dispensed with.	Yes if possible
	ix) The turn around in Bangalore in BMTC is due to fare revenue and not use of technology.	Noted
	x) In Capacity building planning and operation is more important.	Accepted and included
13	**By Shri Sudhir Krishna, Secretary, MoUD**	
	i) Box a specific item which will not be a part of the Report.	Noted
	ii) Put all data on the website.	Noted
	iii) Start implementation right away where possible	Capacity building has started
	iv) The implementation status of NUTP should be added	No data is available
	v) Vision should propose parameters.	Accepted and included
	vi) Indicate year of the Mackinsey & HPEC report.	Accepted and included
	vii) Add specifications as an Annexure.	Noted
	viii) Regulator would be required.	Accepted and included
	ix) The beneficiaries from the investment should pay.	Accepted and included
	x) Quote examples against 3 scenarios.	Accepted and included
	xi) There is no certainty on CDMs after 2012.	Accepted and included
	xii) For seeking guarantee to raise loan give logic.	Accepted and included
	xiii) There are too many surcharges on the petrol etc.	This is so, but this source is easy to operate
	xiv) Any studies needed to take the recommendations ard forward should be listed.	Accepted and included

Action taken on DO letter no. 8/1/2010-NTDPC dt. 28th July, 2011 from Shri Rakesh Mohan Chairman NTDPC to Shri Navin Kumar Secretary MOUD containing Observations, recommendations and decisions taken during the NTDPC meeting of June 11th 2011

S. No.	Item	Action by
1	You may recall that the working group on urban transport set up under your chairmanship by the NTDPC made a presentation on key issues relating to your sector in the 11th meeting of the committee held on 11th June 2011. On behalf of the committee, I would like to thank you for making a comprehensive presentation.	No action needed
2	The minutes of this meeting have already been circulated. I am reproducing the gist of discussion on the presentation which included observations recommendations and decisions taken during the meeting for your kind attention.	
3	Given the proportion of public transport in Indian cities compared to those in other countries, the aim should be to build on this advantage and achieve 50 per cent share of public transport in motorized transport and 30 per cent share in overall urban transport (which includes trips by walking and cycling).	Duly incorporated in report
4	The Working Group should pay special attention to the new technologies already available globally and those that have a high probability of being available in the future such as trams, hybrid buses among others. Indian cities should avoid getting locked-in to certain current technologies and should rather develop systems that are flexible enough to not only accommodate new resource-efficient technologies as and when they arrive but also to provide seamless connectivity between different modes as part of an overall transport network. Focus should also be given to the comparison of	Duly incorporated in report

S. No.	Item	Action by
	surface and grade separated transport systems in order to facilitate the development of the most user-friendly modes of transport.	
5	The Working Group may study the investment estimate made from a macroeconomic perspective with a view to prioritizing investments needed and arrive at more realistic estimates.	
6	There are significant variations in the investment estimates of the Working Group and those are earlier reports by the High Powered Committee on Urban Infrastructure and by the McKinsey Global Institute. The reasons behinds the differences and the rationale behind the differences need to be documented in order to arrive at realistic estimates.	Duly incorporated in report
7	The Working Group should clearly suggest the sources of funding for each of the various components of the investment requirements estimated. Further, the Working Group should study the investments made in urban transport in the last five years. This would help in assessing the feasibility of the proposed investments.	Duly incorporated in report
8	For each sector measures of raising required financial resources through innovative self-sustaining means within the respective sector or city mechanisms instead of relying heavily on central/state government resources may be recommended.	Duly incorporated in report
9	The gap between the investment expectations and sources available, and the proportion of that gap that could be met by PPPs must be assessed for each scenario presented by the Working Group.	Duly incorporated in report
10	The Group should include in its report key elements that should be part of the new legislative framework being proposed by the group.	

S. No.	Item	Action by
11	All new frameworks, whether organizational, legislative or financial, must be recommended in the form of an evolving setup, in order to bring changes in a phased and practical manner acceptable to all stakeholders at any point of time. Thus, the phasing of the work programme, investment and time frame of the policy measures should also be mentioned. In addition, the Group should clearly explain the instruments (for example, developing uniform urban design standards) that should be used and the process of their implementation in order to achieve the vision laid out for 2030.	Duly incorporated in report
12	It was mentioned that any institutional reforms recommended should ensure that the new urban authorities were extensive, effective and accountable in handling large funds. Also, transport authorities in other cities such as London may be studied in detail to incorporate lessons in the Working Group report.	Duly incorporated in report
13	A sizeable proportion of streets in Indian cities are not utilized to their full potential as they are closed to traffic. This adds to congestion on arterial roads and longer trip distances for pedestrians and many modes of transport. The issue needs to be considered with a view to economizing requirements.	Duly incorporated in report
14	Investments should be planned in research, design and implementation of modern para-transit technologies.	Duly incorporated in report
15	The Urban Centers of Excellence proposed by the Working Group should be aided by incentives from the Ministry of Human Resources Development such as creation of new faculty positions and provision of research scholarships, in order to ensure healthy growth of these centers, along with financial outlays from the Ministry of Urban Development.	Duly incorporated in report

S. No.	Item	Action by
16	Most of the official data available on Indian cities was not accurate and hence new capabilities need to built in data collection and management to facilitate informed policy making. The mechanism for this purpose need to suggested by Working Group.	Duly incorporated in report
17	I hope the report of the working group is at an advanced stage of completion. I propose to discuss the progress towards finalization of the reports and follow up action that needs to be taken for further processing of these reports in the meeting to be held on 2nd August 2011 at 3.30 pm in committee room no. 228 Planning Commission New Delhi. NTDPC Secretariat has already issued a notice for the meeting. I request your personal presence in this meeting	No action needed

Proposal for item 11 above of DO letter from Dr Rakesh Mohan

ITEM	2012-13	2014	2015	2016	2017
FRAMEWORK, EVOLUTION AND PHASING					
Organizational,	Fix Nodal officer, Create UT department in Center/State	Set up UMTA and Empower The city	Set up Safety Boards in States and cells in cities	Transfer traffic Police to UMTA	Cities in full command
Legislative; A comprehensive UT act	Prepare draft	Move for Enactment	Enact legislation	Set up safety commission	Amend existing acts as needed
Financial authority,	Present pattern	Transfer control	Set up urban transport	Define sources of funding UTF	Cities to Become

ITEM	2012-13	2014	2015	2016	2017
	continues	Of funds to UMTA	fund		Self-supporting
PHASING OF					
Work program,	See rolling program (Annexure D)				
Investment	See rolling program (Annexure D)				
Time frame of the policy measures	Transport planning, Capacity building, Data base and R&D	Facilities for walk & bicycle, Introduce bus services Upgrade IPT	ITS for integration, enforcement and traffic management	Integrated road network planning and maintenance	Administrative and fiscal measures to control use of car and 2-W
IMPLEMENTATION					
Instruments	Review of existing codes	New Codes of practice	New Codes of practice	New Codes of practice	New Codes of practice
Process	Planning	Design	Sanctions and financing	Construction	O&M

ANNEXURE L: LETTER OF SECY (UD), GOI TO CHAIRMAN NTDPC FOR INCLUSION OF UT IN INFRASTRUCTURE

डॉ. सुधीर कृष्ण
Dr. Sudhir Krishna

सचिव भारत सरकार
Secretary to the Government of India

शहरी विकास मंत्रालय
निर्माण भवन, नई दिल्ली–110108
MINISTRY OF URBAN DEVELOPMENT
NIRMAN BHAVAN, NEW DELHI-110108
Tel. : 23062377, Fax : 23061459
E-mail : secyurban@nic.in
URL : http://urbanindia.nic.in

D.O. No.K-14011/3/2011-UT (Pt.)
November 29, 2011

Dear Dr Rakesh Mohan,

Public Transport occupies less road space and cause less pollution passenger per-K.M. than personal vehicles. As such, public transport is a sustainable form of transport. National Urban Transport Policy (NUTP) also envisages greater use of Public Transport and non-motorized modes of transport.

For sustaining bus based public transport system in the cities, it is essential to introduce modern quality low floor/semi low floor buses with the help of private participation. However, the high cost of these quality buses is the main bottleneck in attracting private investment in this sector. One of the main components of the total cost of such a bus is the duty structure of the Central Government and the State Governments. About 1/3rd of the cost of these quality buses is accounted for by various taxes and duties whereas on cars it is much lesser.

As of now only rail based urban transport is included under the definition of 'Infrastructure'. Other forms of public transport like Bus Rapid Transit System (BRTS), City Bus Services including buses are not treated likewise. By recognizing various components of Urban Transport as an 'Infrastructure' the right signal would be provided to the various market forces for attracting the required degree of investments.

As already discussed during meeting of NTDPC on 19.11.2011, I would, therefore, request through you that Urban Public Transport including rail based, BRTS, city bus services (including rolling stock and Intelligent Transport Service), be recommended for inclusion in the definition of infrastructure. This will facilitate in cheaper and long tenure priority financing being available for bus transport sector from Financial Institutions so that the dependence on GBS reduces.

With regards,

Yours sincerely,

(Sudhir Krishna)

Dr. Rakesh Mohan,
Chairman,
National Transport Development Policy
Committee (NTDPC),
Planning Commission,
Yojana Bhawan,
New Delhi