

Preface

Urban transport is increasingly becoming important in a developing country like India, wherein urbanization levels are steadily increasing and the growth of urban areas is determined by the prevalence of a good city transport. A variety of transport modes such as, walking, cycling, two-wheelers, para-transit, public transport, cars, etc. are used to meet these urban travel needs.

Following the success of the Delhi Metro as a mass rapid transit system, many cities have implemented or have come up with proposals for metro rail systems. A workshop on Learning's of Urban Rail & Way forward was organised on 11th June, 2016 wherein the following issues were deliberated:

- (a) Institutional and Financial Framework
- (b) Standardization and Indigenization (civil, rolling stock and signalling)
- (c) Methods for increasing Non-Fare Box Revenue
- (d) Models of Private Participation
- (e) Innovative Financing
- (f) Innovative Design to reduce costs.

About 170 participants comprising middle and senior level officers from Ministry of Urban Development and State Governments, Metro Rail Corporations (operational/ under construction/ at planning stage), professionals, consultants, and other people working in the field attended the workshop.

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Executive Summary

A National Level Workshop was organized with the objective to assimilate the various ingredients of a successful urban rail project and to contrive a way forward for action in future. For success in any field there is a need to constantly review, re-design and formulate new strategies. The topics for discussion comprised varied issues from institutional and financial models to innovations in cost reduction. It was attended by around 170 participants from metro companies, state governments etc. The summary of discussions and learnings are as below:

Institutional Framework: The model of 50:50 joint-ventures of Central and State Governments has been successful and is being followed by many States. However, Mumbai has the experience of the other models viz. PPP and complete state ownership. The pros and cons of all models were discussed and no distinct recommendation emerged. It came out that 50:50 model enables professional approach and the complete state ownership gives advantage of quicker approvals.

Public Private Partnership: The PPP projects in the country have experienced difficulties. Specific challenges pertain to delay in eliciting “right of way” and approvals from the local agencies leading time and cost overruns thus making the project unviable for the private partner. Appropriate risk allocation as well as enhanced financial support from the government would help alleviate the challenges. Completely privately funded projects like that of



Rapid Metro in Gurgaon needs government support in enhancing non-fare box revenue and bridging the viability gap. It emerged that a simplified procedure of statutory approvals – online and in time, would go a long way in helping the timely completion of projects. There is a need for an enabling policy/ regulatory framework by GoI/ State Govt. Adequate dispute resolution mechanism is necessary and provision should be made for re-negotiation, if so warranted.

Innovative Financing: Innovative Financing is imperative for all metro projects which are capital-intensive in nature. Innovative financing is largely based on land value capture, station naming rights, enabling Transit Oriented Development with benefits accruing to the metro company, dedicated levies/ taxes, bonds and foreign borrowing. This is best achieved in a joint value – creating exercise between the Government, Local Planning Bodies and Urban Rail Agency. To enhance non-fare box revenue, it was suggested that all restrictions on commercial exploitation of land need to be removed. Integrated development of urban rail and cities including transit-oriented development is essential. Sale from advertisements is also another potential non-fare-box revenue sources.

Standardisation: DMRC listed out steps taken for indigenization of manufacture of rolling stock and other components. Standardisation of urban rail components (civil, rolling stock and signalling) to the extent possible is the first step to benefit from the size of the Indian market and should be initiated. L&T Metro, Hyderabad, suggested that technical specifications & standards should be based on modern technology, such as Communications Based Train Control (CBTC) Signalling and 1:40 Rail inclination, redundancy and life cycle cost analysis. However, it was also mentioned that certain amount of flexibility in the specifications should be provided to cater to the varying topography and landscape of cities.

Cost Effective and Innovative Design and Construction: During the discussions, it emerged that construction, operation and maintenance costs can be controlled through innovative designs and using 'value engineering' techniques as was exemplified by Nagpur. Hyderabad, Chennai and Kochi highlighted their good practices. Hyderabad mentioned that sustainability initiatives, such as harnessing solar energy to reduce operation cost should be included. Chennai listed its best practices in civil engineering and system design. Local innovations (jugaar) to reduce time and cost should be based wherever feasible and without jeopardizing safety. Integrated ticketing over various modes of transport in the city should be the norm in planning. It will provide convenience to commuters, as well as financial savings (Kochi).

Forum for Exchange Ideas and Experience: It was suggested that a common forum for all metro companies in India may be set up for exchanging and assimilating new ideas and learning in the various metro rail projects. It was suggested that more such workshops which would also include technical topics, should be organized.

Important lessons learnt from the World Bank study: The following points emerged from the initial finding of the study on Urban Rail being carried out by the World Bank:

1. Urban rail is a capital investment project that never stops. There is a need to deliver projects in immediate succession and continuation to benefit from the experience gained.
2. Asset management should be planned from "day 1" since assets will be there for more than 100 years.
3. It's never too late to integrate land use and transport. TOD is one way of doing so. This is imperative for financial stability, as well as environmental sustainability.
4. New metro lines cost more than what can be recouped from fares, but the operational expenditure (including renewal) can be self-sustaining if fares are sufficient and there is a good level of non-fare revenue.
5. Fares fixation formula should be transparent. There are two key variables in this formula; one is inflation and the other is the wage level.
6. For reducing O&M cost, one could follow the example of Barcelona Metro where trained generalists drive the train, maintain the ticket machines as well as talk to the clients.
7. PPP is definitely a way of moving forward in urban rail with the lessons we have learnt. However, it should be acknowledged that there is a need for high capital grant for PPP projects. The revenue risk needs to be properly allocated. Internationally, the trend is either to allocate very little revenue risk; may be 5% to the concessionaire or no revenue risk at all.

Introduction

MOUD organized a National Level Workshop on Learning in Urban Rail on June 11th 2016 in Delhi with the objective of discussing learning's so far and charting a way forward. The programme schedule and list of participants are placed at **Annex 1 and 2** respectively. In all 13 presentations made; 1 by MOUD, 11 by different Metro rail organizations and one by the World Bank on 'International experience with urban rail funding, institutional frameworks and PPP'. The list of presentations is placed at **Annex 3**.

Inaugural Session

The session was chaired by Shri. Rajiv Gauba, Secretary (Urban Development), Government of India; the other dignitaries at the dais were Shri. Durga Shanker Mishra, Additional Secretary (Urban Development), Government of India and Dr. Mangu Singh, Managing Director, Delhi Metro Rail Corporation Limited (DMRC).



Opening Address by Additional Secretary, MoUD:

The inaugural session started with a welcome address which included a brief about the metro projects status in the country through a presentation by Shri Mishra.

The presentation highlighted the need for this workshop i.e., the financial and the organizational structure for the metro projects.

He mentioned the following existing models financing of our organizational models available in India:

- The existing 50:50 JV model that is predominantly the major model available for the financing and organization structure was started with DMRC and later followed in other metros like Mumbai Line 3, Chennai, Bangalore, Nagpur, Lucknow, Kochi and Ahmedabad.
- The second model available is 100% central govt. funded. The first metro in the city of Calcutta (now Kolkata) by Indian Railways, then followed by North-South corridor in Kolkata on a 74:26 sharing between Ministry of Railways and Ministry of Urban Development respectively.
- The third model being completely a State Government; the initiative has been taken by the Government of Maharashtra for the Mumbai Mono Rail and the Govt. of Rajasthan for the Jaipur metro.
- The next model is the PPP wherein the Ministry of Finance has through its VGF schemes finances up to 20% of the capital cost. We have the example of the Mumbai metro line 1 promoted by Reliance and Hyderabad metro rail, which is promoted by the L&T.
- The last model is 100% private initiative, it is in the case of Gurgaon Metro.

The current status, of metro was also detailed out w.r.t. the kms operational, under construction and consideration Stage. Details given at **Annex 4**.

He listed the following challenges:

- i. Institutional and Financial Framework for Implementation of upcoming Metro Projects
- ii. Innovative Financing of Metro Rail Projects

- iii. Innovative Design to reduce construction, operation and Maintenance costs
- iv. Methods for increasing Non-fare Box Revenue
- v. Models for successful Private Participation in Metro Rail Projects
- vi. Standardisation and Indigenisation of metro components (civil, rolling stock and signalling) – Make in India

Key Note Address by Secretary, MoUD:

Secretary MoUD in his key note address raised some key issues; “Are we following the best model? Can we cut costs, can we run our metro rail on more sound commercial lines?” He alerted that the demand to commute in our cities will grow exponentially on account of the ongoing rapid urbanization and we should have a plan to avoid the challenge. He expressed concern about the financing needs and the role of private sector. To encourage PPP, the ‘dispute resolution mechanism’ has a

vital role. To raise non-fare revenue restrictions to fully exploit commercially the land resources need to be avoided. He also insisted upon a proper appraisal method on whether a Metro rail is at all needed in a city. He highlighted the importance of knowledge sharing and the need to take advantage of the size of the Indian metro market.



Session 1: Institutional and Financial Framework for Implementation of Urban Rail

Moderator: Dr. Mangu Singh, Managing Director, Delhi Metro Rail Corporation Limited (DMRC)



Presenters:

S. No.	Presenter	Designation	Organisation
1	Shri. U.P.S Madan	Metropolitan Commissioner	Mumbai Metropolitan Regional Development Authority (MMRDA)
2	Shri. S. D. Sharma	Director (Business Development)	Delhi Metro Rail Corporation Limited (DMRC)
3	Shri. Pankaj Kumar Bansal	Managing Director	Chennai Metro Rail Limited

Presentation 1: Institutional and Financial Framework for Implementing Metro Projects - MMRDA
Experience – Shri U.P.S. Madan, Metropolitan Commissioner, MMRDA

Shri. Madan stated the major issue for implementing metro projects in today's times is the institutional framework to be adopted.

He shared his experience of Mumbai metro, Mumbai has prepared a master plan for metro Corridors in Mumbai (**Figure 1**). All the corridors being implemented in Mumbai are under three different institutional and financial models.

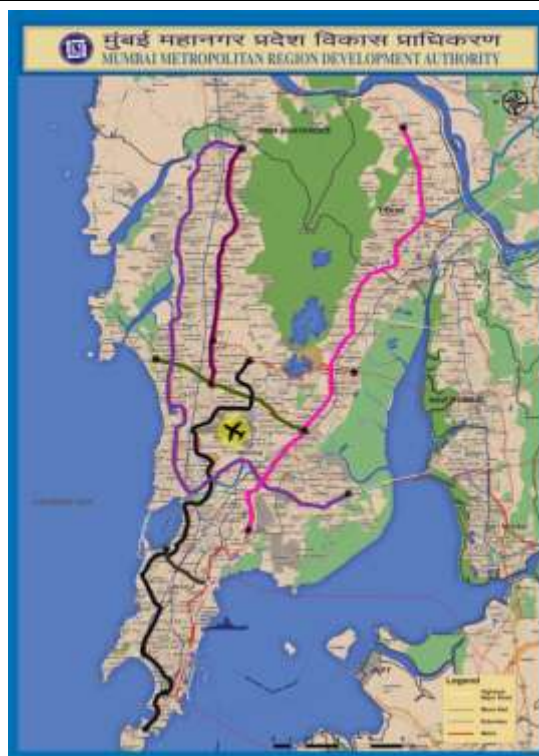


Table 1: Metro Kms planned for Mumbai Metro Master Plan

Line No.	Corridor	Length (km)
1.	Versova-Andheri-Ghatkopar	11.4

2.	Dahisar-Charkop-Bandra-Mankhurd	39.8
3.	Colaba-Bandra-SEEPZ	33.5
4.	Wadala-Ghatkopar-Thane-Kasarvadvali	32
5.	Thane-Bhiwandi-Kalyan.	23.3
6.	SEEPZ- Kanjurmarg	10.5
7.	Andheri (East)- Dahisar (East)	18
8.	Sewri-Prabhadevi	3.5
Total		172

Table 2: Comparison between different models existing for Mumbai Metro

Items	Public Private Participation (BOOT) (Model-1)	Special Purpose Vehicle (Model-2)	Through the Multilateral / International institutions loan assistance & Central, State Govt. sharing. (Model-3)
Metro Corridor	Line 1	Line 3	Line 2, 4 and 7
Length (in kms)	11.4 elevated	33.5 underground	118 elevated
Cost (in Cr) INR	2,356	23,136	over 40,000
Implementing Agency	Mumbai Metro Line One Project Limited (Reliance Infra and Mumbai Metropolitan Regional Development Authority)	Mumbai Metro Rail Corporation Limited, a Special Purpose Vehicle of Government of India and Government of Maharashtra <i>(model followed by most of the cities)</i>	Mumbai Metropolitan Regional Development Authority
Financing Pattern	VGF by Gol Rs. 471 cr., VGF by GoM 179 cr., Equity Rs. 512 cr. Debt Rs. 1,194 cr. <u>Shareholding pattern:</u> 74% R Infra and Veolia, 26% MMRDA	JV Model with equity (10.4%) and sub debt (4.4%) from Gol, equity (10.4%) and sub debt (7%) from GoM, loan from JICA (57%), balance property development, MIAL and MMRDA	State Government to provide sub debt for central taxes (50%), state taxes (100%) and land cost Loan assistance for systems up to 80% from funding agencies and 20% from MMRDA
Pros	<ul style="list-style-type: none"> • Least cost for the Govt./implementing agency (only VGF) • Most of the contribution (VGF) comes from Gol • Faster completion and lower cost – due to administrative and financial efficiency of the private sector 	<ul style="list-style-type: none"> • Upto 15% funding from Gol; lower counterpart funding • Extensive appraisal helps in refining the project report • Benefit of expertise of Gol in the Board 	<ul style="list-style-type: none"> • Civil works can commence immediately after State and Centre approvals (short period) • Simultaneous loan negotiations saves time • Disbursement can commence after 2 years • Faster completion means lower risk for

Items	Public Private Participation (BOOT) (Model-1)	Special Purpose Vehicle (Model-2)	Through the Multilateral / International institutions loan assistance & Central, State Govt. sharing. (Model-3)
	<ul style="list-style-type: none"> Most risks transferred to the private partner 		<ul style="list-style-type: none"> project cost escalation and less hedging cost More autonomy and flexibility
Cons	<ul style="list-style-type: none"> Least control on implementation or operation The current Metro Act does not provide for the PPP model Constant bickering between partners if things do not go according to the plan Inadequate dispute resolution mechanism 	<ul style="list-style-type: none"> Lengthy appraisal process, takes upto 2 years Project cost escalates during appraisal period Procurement of GC and works can commence only after loan negotiations With less than 15% contribution, 50% control by GoI Even with equal power, all responsibilities on State – increase in cost, Forex risk Practical difficulties of Board meetings 	<ul style="list-style-type: none"> No contribution from GoI Much higher counterpart funding by implementing agency Risk if the funding process fails for some reason
	<ul style="list-style-type: none"> Project completed in 6 years as against 42 months announced Project cost increased from Rs. 2,356 cr to Rs. 4,321 cr with both parties disagreeing about the reasons Metro Act made applicable while under construction Powers of MRA given to Concessionaire being the 'owner' of the project Using the MRA's powers, Concessionaire fixed the 'initial fare' 		

Items	Public Private Participation (BOOT) (Model-1)	Special Purpose Vehicle (Model-2)	Through the Multilateral / International institutions loan assistance & Central, State Govt. sharing. (Model-3)
	<p>ignoring the fare structure agreed in the Concession Agreement (CA).</p> <ul style="list-style-type: none"> • CA terms ignored in other matters also • Litigation and arbitrations – huge loss of time and money for both • CAG audit requested but couldn't materialise 		

Conclusion:

- There is no 'best' model – all depends on the requirements of the project proponent
- Metro Act must have adequate provision for PPP with a fair distribution of powers and responsibilities
- Adequate dispute resolution mechanism for all PPP projects is necessary
- More autonomy and equal responsibility for states under Model 2
- GoI should consider giving assistance of 20% of the cost for Model 3

Presentation 2: Institutional and Financial Framework for Implementing Metro Projects by Shri S.D. Sharma, Director (BD), DMRC.

Shri. Sharma started his presentation on a positive note, stating the existence of different institutional and financial frameworks available in today's time, the only need was to strengthen them.

In his presentation he highlighted about the Regulations, Acts and the Institutions which facilitates the implementation of infrastructure project within well defined legal framework.

He mentioned the need for strengthening the institutional and financial frameworks. The city level urban transport is controlled by multiple institutions. There is no single accountability for performance and maintenance of transportation infrastructure and system operations. The institution has to be a unified body which would coordinate with all the concerned organizations and regulate its functions. There is a need to regulate and integrate the operations of different modes of urban transport. Formation



of Unified Metropolitan Transport Authority (UMTA) is still in process. Though, some states have formulated the UMTA, but its effective working needs to be reviewed.

He discussed about the various acts related to regulation of metros and other urban transport systems. However, some other modes of mass rapid transit systems, namely, bus rapid and other light rail transit, the mono rail etc. have hardly having any institutional framework.

He mentioned the need for a single institution for all the guided transport system in the city.

Today there is a need for standardization of metros, the procedure for safety certification and technical clearance of metro system. The procedure issued by RDSO is cumbersome and if you follow this, there would be an additional delay of at least 2-3 years. There is a need to have an independent metro safety certification agency & metro research and standardization organization for timely completion of projects in light of approximately 700 kms. Coming up metro in the country by 2026.

He then discussed about the financial framework percentage of fund contributions from each stakeholder and other norms for different models of metro project implementation in India. He mentioned that the real beneficiary of metro rail project is the city/State and it is for them to initiate conducive framework for generating funds through other innovative methods for financing metro rail projects.



Conclusion:

Summing up, there is need to strengthen the institution of urban rail and making this sector self sustainable. There is need to have a Metro Research & Standardization Organization for indigenizing the components of urban rail. There is need for independent metro safety certification Organization. Innovative financing needs to be implemented by the State Government so that funds are released for financing of metro projects.

Presentation 3: Best Practices Followed by Chennai Metro by Shri P.K. Bansal, MD, CMRL.



Shri. P K Bansal started his presentation with the issue of equitable sharing of cost by the Central Government.

He shared the multi-modal integration being done by Chennai Metro. He mentioned that it was taken up at the design stage itself and all stakeholders have been duly consulted. Multi-modal integration have covered the two main railways stations i.e. Chennai Central and Egmore. Mofussil bus stand and Coimbatore Bus Stand are also covered in Phase 1 itself.



S no.	Issue	Proposal	Way forward/benefit
1	General Consultancy services	Avoid "Front loading" of foreign experts by GC	Hire Independent Consultants directly if needed
2	Civil – elevated construction	Use balancing girder - Cast-in-situ and Balanced Cantilever	Busy traffic need not be diverted
3	Civil – underground construction	Concreting of permanent lining in single pour and self -compacting concrete	Savings in time resource mobilization Good quality finish
4	Environment	Compensatory planting	Double the norms fixed
5	Handling cash	Use Cash Deposit Machines	Savings in payments to bank
6	Signaling	Signal room merged with telecom room	Saving in space and cost
7	Power supply	Single source of power supply for signal, telecom, PSD and AFC	Derived from main UPS

S no.	Issue	Proposal	Way forward/benefit
8	Telecom	Integrated operation of various systems	Saving in cost and space
9	Platform screen doors	Air Conditioning load reduced Passengers protected from falling on track and piston effect	Saving in energy 60%
10	Automatic fare collection	Containers to collect tokens interchangeable	Ease of operation
11	Tunnel ventilation	Changing orientation of fan alignment	Around 30% space saving
12	Environment control	Secondary chilled water system eliminated. Primary pumps to cater to varying loads	Saving in space and energy
13	Lifts & escalators	RDSO standard specifications to be adopted	To indigenize equipment & components
14	Power Supply & OHE	Adoption of GIS Aluminium OHE fittings BTRC eliminated	Saves space Light design Saving in capex and opex
15	Human resources	Pay scales of Jr. Engineers and Technicians reduced	Cost control in salary & wages
16	Phase I – extension	Reduction in u/g station box size from 220m to 140m. Cantilever stations in elevated stretch	Reduction in land acquisition by about 30 to 50%

Session 2: Innovative Financing of Urban Rail

Moderator: Shri. Durga Shanker Mishra, Additional Secretary (Urban Development), GoI



Presenters:

S. No.	Presenter	Designation	Organisation
1	Shri. Pradeep Singh Kharola	Managing Director	Bangalore Metro Rail Corporation Limited (BMRCL)
2	Shri. Sharat Sharma	Director (Operations)	Delhi Metro Rail Corporation Ltd.

Presentation 1: Innovative Financing Techniques by Shri P.K. Kharola, MD, BMRCL

Primary sources of innovative financing are; Land Value, Dedicated Levies/ Taxes and Bonds/ Foreign borrowing. Metro bonds offer Minimum rate of interest of 8.79% for 10 years period (Bengaluru) against 10%+ bank rates and should be preferred. While soliciting foreign loans, it should be remembered that there is a big risk in the exchange rate fluctuation – which can be highly volatile and upset all repayment calculations. Though the Rupee loan may be costlier than the Euro denominated loan, yet the liability to pay interest and principal is fully ascertained. Other innovative financing techniques are:

- Levy of Cess and Surcharge at 5% of the market value of land or/ and building in future developments, to be credited to Metro Infrastructure Fund.
- To extend the benefit of 4 FAR for all properties lying within a distance of 150 m from the Metro Station and To levy a cess of 10% in respect of residential buildings and 20% in respect of commercial buildings on the additional FAR granted,
- To allow issue of TDRs in lieu of compensation for acquisition of land for the Project.



The estimated yield from Premium FAR and Royalty for Access to major commercial hubs is considered for three possibilities; 100% sale, Base case as 70% sale and Worst case as 50% as follows:

Table 3: Yield from Premium FAR and Access (Benagaluru)

Projected Revenue Potential from FAR sale	Best CaseSale of (All figures in Rs crores)		
	15 m s ft.	10.5 m s ft.	7.5 m s ft.
Assuming sale of a maximum limit of 1.0 additional FAR	1,143	802	573
Royalty for Access to major commercial hubs	285	200	143
Total	1,428	1,002	716

Other non-fare-box sources and their yield is estimated as follows:

Table 4: Non-Fare Box Revenue - (Bengaluru)

Projected Revenue from other non-fare-box sources	Estimated yield (All figures in Rs crores)
Air Space Commercialization	281 (year 4) 219 (year 5) 51 (year 7)
Betterment Levy	500
Location & Naming Rights; corporates will be allowed to add their name	360
Additional Cesswould be levied within the entire area of the jurisdiction of the Bangalore Development Authority	50
Total	Rs960cr

Outer Ring Road (ORR) project in Bengaluru costing Rs 3600 cr is proposed to be financed through above listed innovative Financing Techniques (Rs 2131 cr - Conservative) and Balance Through Term Lending Agencies/ Viability Gap Funding (VGF): Rs 1469 cr.



Presentation 2:

In Delhi, the Non-Fare and fare box revenue is 12% and 88% respectively. The non- fare box earnings in FY 2015-2016 from 8 sources were as follows:

Table 5: Share of Earning-FY 2015-2016 in Crores

S/N	Head	Amount	% age
1	Advertisement	102.05	47.70
2	Telecom Business	35.19	16.45
3	ATM Business	29.78	13.92
4	Shops	12.81	5.99
5	Kiosks /AVM's	7.81	3.65
6	Misc. (OMC of IT Park & forfeiture of EMD/SD).	26.30	12.29
	Total	213.94	100.00
1	IT Park	62.09	
2	PD Area (Station Box)	62.71	
	Total	124.80	
	Grand Total	338.74	

48% of revenue among total revenue generated is by advertisements business. Various modes of display of advertisements its segment-wise percentage share is as under:

S/N	Heads	%
1	Outdoor Advertisements on Civil Structures	45%
2	Inside Stations Advertisement	28%
3	Inside Train advertisements	26%
4	Advertisements through innovative/Digital means	2%

As per Outdoor Advertisement Policy (OAP) 2008 when land belongs to other organizations and the structure has been built/installed such that it faces vehicular traffic, the concerned organization or the advertiser will have to share the revenue with local body. DMRC shared 35% revenue with South Delhi Municipal Corporation. Other local bodies are likely to follow. Issue of Revenue sharing with MCD's needs to be settled as 35% is too high. This is rendering most paying advertisement contracts unattractive.

New Initiatives of DMRC are, Promoted goodwill: disputed cases monitored, resolved amicably or through conciliation and arbitrations, Consolidation of Tenders – Encourage competition, E-Tendering introduced, Uniform Tender Conditions, New Schedule of Powers – encourage fast decision, Policy for Licensing on walk in basis after failure of two consecutive bids, reserve prices disclosed, Policy for new initiatives/ Start Ups, Realistic reserve price, Providing water electricity etc DMRC's responsibility

New Avenues to boost Non Fare Box Revenue are; Semi-Naming Rights and Branding of stations, Train wrapping, Licensing of 103 future TOMs, Licensing of built-up Shops/Spaces as is where is basis, Advertisement On Smart cards and Tokens and Licensing for BTS Towers, Telecom Equipment, Fibre-Optics and small cells for telecom connectivity. New initiatives in Delhi resulted in providing facilities for Health Monitors, HP products vending Machines, automatic parcel delivery system and short term promotions.

Way Forward

Primary sources for innovative financing are; Land Value, Dedicated Levies/ Taxes, Bonds and Foreign borrowing. This is best achieved in a Joint Value-Creating exercise between Government, Local Planning Bodies and Mass Rapid Transit Agency. For full benefit, all restrictions on commercially exploiting land need to be removed. Integrated development of urban rail and cities including transit-oriented development is essential. Other non-fare-box revenue sources are several. Advertisements in various formats is the main source. In order to realize its full potential, the related policies and enactments need a review.

Session 3: Private Participation in Urban Rail

Moderator: Shri. UPS Madan, Metropolitan Commissioner, Mumbai Metropolitan Regional Development Authority (MMRDA)

Presenters:

S. No.	Presenter	Designation	Organisation
1	Shri. AK Saini	Head Railway Systems	L&T Hyderabad Metro
2	Shri. Rajiv Banga, Managing	Managing Director	Rapid Metro Rail, Gurgaon
3	Shri. Praveen Goyal	Director Systems	Kochi Metro Rail, Kochi
4	Shri. Ramakrishna Reddy	Managing Director	Amaravati Metro Rail Corporation Limited

Presentation 1: Innovative Financing Techniques – Shri A.K. Saini, Head Railway Systems, L&T Hyderabad Metro

Hyderabad metro is one of the biggest PPP initiative in the country.

It is 72 Kms., sixty-six stations and 18.5 million sq. ft. Transit oriented development

Government of Telangana, that is the PPP partner, are paying for all the land acquisition, right of way and utility and the SPV company is implementing the project.



The financial closure is done for Rs.16,375 crore, wherein Rs. 1,458 is coming from Government of India as VGF. So, VGF is less than 20%, as mandated in NUTP 2006. The term loans have been raised from National Banks Consortium of Banks led by SBI.

The Current Status of the Project:

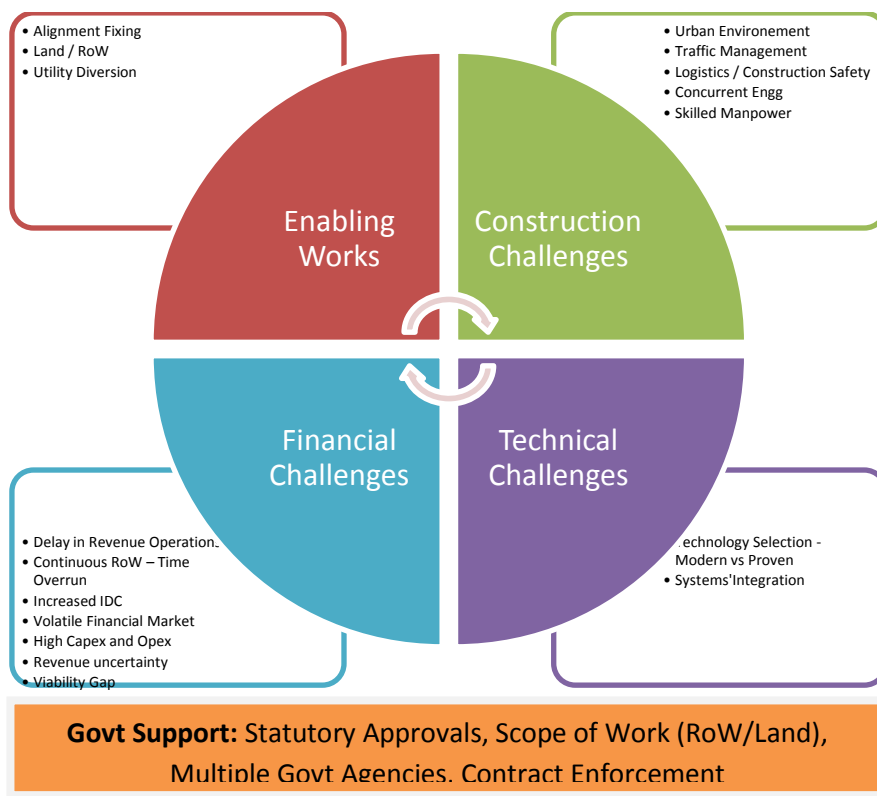
- Viaduct civil works
- Foundations: 57 Km
- Piers: 55 Km
- Span Erection: 45 Km
- 35 Rkm track Completed
- 25 Rkm OHE commissioned
- 17 Stations completed and work in progress@40 stations
- 2 Depot commissioned
- Stage 1 CMRS approval received (8 Kms)



- Stage 2 CMRS inspection in June'16 (12 Kms)
- 2 RoB completed out of 8

Key Challenges:

The key challenges are as follows:



Learnings from Hyderabad Metro

- Technical Specifications & Standards
 - ✓ Modern technology
 - ✓ Redundancy
 - ✓ Life cycle cost (LCC)
- Statutory Approval
 - ✓ Simplification of Process - online
 - ✓ Timelines
- O&M
 - ✓ Resource & spares sharing
 - ✓ Indigenous vendor development
 - ✓ Energy cost optimization – solar
 - ✓ Benchmarking group – Indian metros

Summary

Hyderabad metro, is an example of innovative project management. The project operations will start for 20 kms. very shortly.

On PPP, probably it is high time, if country is going to involve in PPP model, we have to see how the Concession Agreement can be worked and taken with an equitable risk of allocation. It is important as the private partner needs return on equity over a long time period. This probably could be the

learning and there should be some clause in the contract. It should not a fixed term contract for a product or for a supply. There could be some framework such as re-negotiating in the major events. Probably, we have to look into how we re-negotiate the terms and come to a conclusion for the success of the project.

Presentation 2: Private initiative in Urban Rail – Shri Rajiv Banga, MD, Rapit Metro Gurgaon

Rapid Metro was developed as a “**last mile connectivity**” solution from Delhi Metros and Gurgaon line had the interchange station, called Sikanderpur.

Phase 1: In Service	Phase 2: Under Construction
<ul style="list-style-type: none"> • Route Length : 5.1 Km • Project Cost : 1229 Cr • Concession Agreement : Dec’09 • Financial Closure : Jun’10 • Start of Construction : Nov’10 • GoI Approval : Dec’11 • Commercial Operation : Nov’13 	<ul style="list-style-type: none"> • Route Length : 6.6 Km • Project Cost : 2143 Cr • Concession Agreement : Jan’13 • Financial Closure : Jul’13 • Start of Construction : Sep’13 • GoI Approval : Nov’14 • Commercial Operation : 2016 (planned)

Figure 1: Rapid Metro - Key Project Parameters

It is an elevated network and the interchange station is Sikanderpur. The services are aligned to enter to Delhi metro coinciding with the first service of theirs culminating with the last one, just past midnight. During peak hours the frequency is about four minutes which gets close to eight minutes during the non-peak hours. It is a three coach train and a flat fare system. It is probably a unique example of two independent metro systems working in very close tandem as far as the ticketing platform is concerned from a commuter perspective. It would not be any better, you don’t have to do anything except from one system, getting into the other one standing in queues and so on and so forth.

Many of the Achievements is the punctuality of the system, it is 99.85% since its inception. Its regeneration Efficiency on an average is 29.7%.

Challenges encountered:

- **Commercial development in the Cyber City area has been <45%:** directly impacts ridership potential
- **Lack of integration with urban mobility plan** – no feeder/evacuation service from the mass transit nodes, car parks etc.
- **Absence of appropriate regulatory/ policy framework** – anomaly of hugely capital intensive metro (at commercial rates of interest) & “regulated” framework on fares, competing with alternate forms of transport on an unregulated, asset light “aggregator” model.

Enabling framework for making PPP a sustainable proposition – alternate measures

- Metros will favourably impact real estate values around their alignment - ***any strategy to render viability needs to capture such externalities***
- On a concept of **user/ beneficiary to pay**,
 - Adopt a “corridor” approach to monetise such values
 - Consider higher FAR for all properties within a prescribed distance from the metro alignment: levy a cess on the additional FAR granted
 - Enhancement of **property tax** in the influence zone
- Consider other measures viz. **Cess on fuel, parking taxes, congestion charges, auction based motor vehicle registration quota system etc.**
- **All revenues collected into a “Dedicated Urban transport fund”**

“Dedicated Urban Transport fund” created to meet the difference between the public fare paid by commuters and the technical fare (required by the private operator) to sustain the operations.

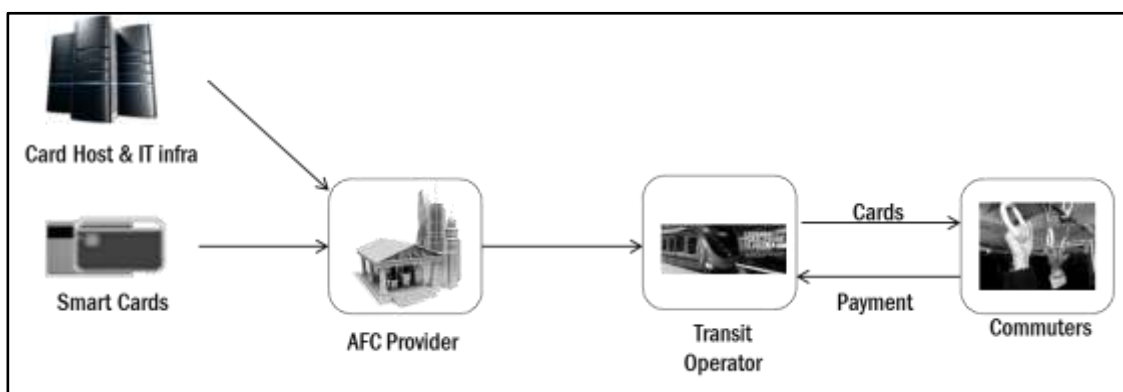
Suggestions for future:

- Viability gap funding is a **must**.
- Enhancing non- fare box revenues is **a necessity**.
- Alternate measures for augmenting non- fare box revenues:
 - **Property development rights** packaged into the concession or accorded as per TOD policy
 - Operationalisation of TOD policy:
 - Creation of Infrastructure Development Fund (IDF) corpus
 - Evolve mechanism for IDF disbursement to private sector projects – infusion as equity/ grants that stay with the project till eventual transfer to Authority
 - While some cross subsidisation is inevitable, IDF benefits need to be administered corridor-wise for the metro network, to the extent possible
 - **Unconditional advertisement rights**, without encumbrances or levies by local bodies
- Integration with urban mobility plan, city bus service, car parking etc. – *well beyond the remit of the private enterprise*
- Enable access to lower cost of funding/ multi-lateral agencies - *State Govt./ Authority may need to facilitate*
- Minimise/ eliminate taxes, levies & custom duties to reduce loading into initial investment
- Principles of equity in **risk allocation**

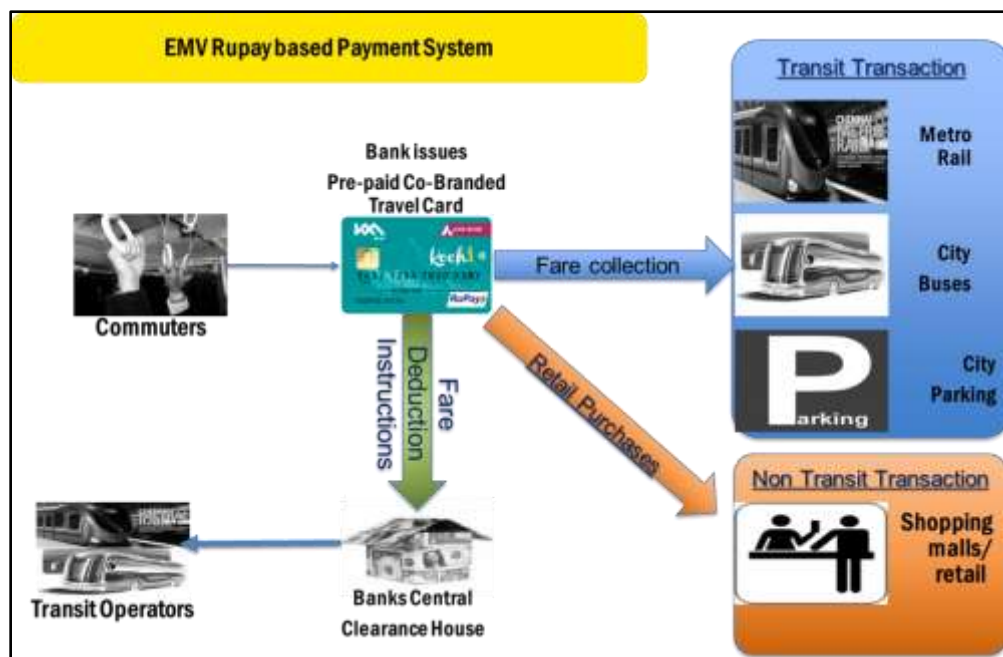
- Risk mitigation measures to be built into the concession framework till specified benchmarks are achieved.
- IDF support to bridge the anomaly between back ended revenues due to traffic ramp-up considerations vs. front ended repayments
- Appropriate mechanism for renegotiation in line with recommendations of Kelkar Committee

Presentation 3: Unbundling for PPP – Shri Praveen Goyal, Director (Systems), Kochi Metro

The vision of Kochi Metro was to create a unified and inter operable multi modal transport system for Greater Kochi as well as to provide interchange hubs to achieve integrated time table, ticketing.



One of the areas where it started with out of the three was ticketing, and as far as the ticketing was concerned, basically the DPR, it was a conventional case leap AFC system with so much cost of Rs. 70 crore.



The major which is required to able to use the metro card just like a debit or credit card. The Kochi metro now is working on to integrate other modes of transport, just not in Kochi but can be used in

other cities like Delhi or Nagpur. Turkey is one such example where it has integrated its transport system ticketing with the banks.

Presentation 4: How Metro Projects can be made Successful under PPP – Shri R. Reddy, MD, Amravati Metro

Shri. Reddy compared Shamshabad International Airport and Hyderabad Metro Rail, which are both PPP projects. The three stakeholders, concessionaire, GOIP and GOI are required to work the plan out for everyone's benefit.

HiAL a concessionaire and Government of A.P. or Government of Telangana now, Government of India has taken 13% stake each. GMR has 63% and Airport Authority has 11% stake. It is a success story there, but when it comes to HML, Hyderabad Metro, the entire responsibility is only to L&T. GOI is participating in PPP by giving 1400 crores as VGF, but if it would have been different if it was IFL, interest free loan. Shareholding of SPV by both Govt's is most important for Mega Projects to make it successful under PPP.

	Existing Govt. Funding Model	Proposed PPP Model
SPV	Two shareholders (GOI & State Govt.)	3 Shareholders
Government of India funding	16% (4 Directors)	20% VGF (2 Directors)
Government of State funding	35% (4 Directors)	30% (2 Directors)
Third Party funding	JICA – 49% or other Agency	Concessionaire – 50% (5 Directors)
Pros & Cons	It would take about 30 to 40 years for repayment of the loans to funding agencies.	<ul style="list-style-type: none"> • Concession period 50 years (or mutually agreed) • Ticket rate fixation should rest with the SPV, which will be notified by the Govt. • 3 share holders. • BOUND to be SUCCESSFUL

Way forward:

- A more elaborate policy on Implementation of Metros under PPP model is required.
- The present policy of MoUD for Govt. funding models on 50:50 equity in the jointly owned SPV be reviewed.
- GOI, State Govt and Concessionaire should be the shareholders in the PPP-SPV
- If both Central and State Govt's. contribution is 45-55% of the project cost in the form of interest free loan/ sub-ordinate debt/ Grant, the concessionaire can easily contribute the remaining 50% in the form of debt and equity

Session 4: Standardization & Indigenization and Reducing Cost of Construction, Operation & Maintenance

Moderator: Shri. I. P. Gautam, Managing Director, Metro link Express for Gandhinagar & Ahmedabad (MEGA)

Presenters:

S. No.	Presenter	Designation	Organisation
1	Shri. HS Anand	Director (Rolling Stock)	Delhi Metro Rail Corporation Ltd.
2	Shri. Brijesh Dixit	Managing Director	Nagpur Metro Rail Corporation Ltd. (NMRCL)

Presentation 1: Innovative Financing Techniques – Shri H.S. Anand, Director (RS), DMRC.

For achieving a standardisation MoUD had set up separate committees in May 2012 which are Fare Collection System, Metro Operations & Maintenance, Rolling Stock, Signalling Systems, Traction and Power Supply System, Track Structure.

The other step in cost cutting is indigenization of urban rail components. Delhi Metro rail has been asking for this in their tender documents. Latest tender conditions mandate that the Contractor must manufacture more than 75% cars within India as well as other specified items, required for maintenance either by setting up their own plant or by associating with suitable Indian companies. Specified items include rolling stock components, S&T items and Track Components. DMRC has achieved Indigenization in manufacture of rolling stock as follows:

- Phase-I: 220 cars out of 280 cars
- Phase-II: 914 cars out of 954 cars
- Phase-III: 786 cars out of 906 cars

In value terms the target is progressively increased indigenization: 90% in components and 100% for repeat order of Rolling Stock. For Jaipur, Kochi & Lucknow, 100% RS is to be Manufactured within India.

Presentation 2: Strategy for Cost Effective Design, Construction, Operation & Maintenance–Shri Brijesh Dixit, MD, NMRCL

Cost control, cost cutting, cost effectiveness and optimization have to be adopted as a philosophy so that the project is completed within the stipulated time & cost and with highest standards of quality and safety. Some of the steps taken by Nagpur metro rail corporation in cost cutting, cost effectiveness and optimization are listed in the table 6.



Table 6: Strategy for Cost Effective Design, Construction, Operation & Maintenance

S No	Parameter	Step taken	Estimated Saving (Rs crores)
Design steps			
1	Viaduct width	Reduced to 8.5m from 10.3m	90
2	Viaduct casting	Parapet included	30
3	Reduction in Right of way	From 20m to 18m	Cost of land
4	Platform length for 3 coach trains	Reduced from 140m to 75m	108
5	Maintenance shed	Size reduced to half	100
6	S&T	Cost effective Design	25
7	E&M	Cost effective Design	4/year
8	Receiving Sub-Stations reduced	From 4 to 2	180
9	Rolling stock eligibility criteria	liberalized wide participation	Will save
10	General Consultant	Cost reduced by 40%	100
Construction Steps			
1	Construction of Stations	Independent of Via-duct	Will Save time
2	To handle entire cash management process incl. AFC	Single banking entity	savings: ~Rs.260crs
3	Use of Pre-Engineered Building components,	Space Frame Trusses, and Precast RCC/PSC Members	50
Operation and Maintenance			
1	Energy saving	Solar Power generation right from the inception	8 Cr per annum
2	Manpower	Reduction to 20 men /km compared to 35 men /km	Rs.25 cr/year
3	Feeder Service	Will enhance ridership	More revenue
4	Improving ridership	Transit Oriented Development	Rs200 crs per year

These are based on the application of 'value engineering' techniques to each and every component of the project by asking questions such as; is it needed?: is there a better way of doing it? And so on.

Way forward

To reduce construction, operation and Maintenance costs, 'Value engineering' techniques should be applied to each component of the project. Indigenization should be given further push. Standardization of urban rail components (civil, rolling stock and signalling) is the first step to benefit from the size of the Indian market.

Session 5: International Learnings

World Bank is conducting a technical study for international perspective on institutional setup, innovative financing and private participation in Urban Rail. Study has been conducted in the cities of London, Sao Paolo, Toronto, Washington D C, Hongkong, Taipai, and Barcelona.

The Progress up-to-date and selected lessons are as follows:

Urban rail is a capital investment project that never stops. There is a need to deliver projects in immediate succession and continuation to benefit from the experience gained. Development is a long term game. Decisions need to be taken with a 100 year view. Asset management should be planned from “day 1” since assets will be there for more than 100 years.



As Metro rail will change land use; we should plan to make it beneficial to the metro rail and its customers. It's never too late to integrate land use and transport. TOD is one way. It is good for financial stability, it is good for social policy and it is good for environmental sustainability. Its implementation is a challenge because the metro rail agency has no authority on urban planning. It is necessary to change the strategy and convert the stations into a gathering hub. Ridership revenue alone won't make the urban rail sustainable.

“Infrastructure is long-term and strategic; politicians are short-term and tactical”. Politics is there in every country. Rather than wait for someone to win election and trying to convince them to do good things for transport, urban rail authority should be pro-active and influence politicians before election. Mega cities need metros with capacity to support their growth; it is difficult to shut down and expand a metro service once it is operating. Getting the service right takes the right people + the right environment to enable them.

New metro lines cost more money than can be recouped from fares, but the operational expenditure (including renewal) can be self-sustaining if fares are sufficient and there is a good level of non-fare revenue. This is done either by upfront subsidy in cash/ non-cash or by ongoing subsidy of debt obligations. In Europe, taxation regimes tend to have very high taxes. So the revenue shortfalls are made up by annual government grant. It is in no one's interest for a metro company to be insolvent on the day one.

Urban rail projects should integrate not just the central government grant, but also businesses and the local government to contribute to the project. It will make the project politically impossible to kill. Revision of fare all over the world is political. Fares fixation formula is public and it is transparent. There are two key variables in those formulas; one is inflation and the other is to wage level.

On O&M cost, Barcelona trained generalists, who could both drive the train, if they needed and maintain the ticket machines and talk to the clients. It increased the job satisfaction from four ways, they had more autonomy, they were empowered to take decisions to improve the service and automatically they were able to give client oriented services and for the organization, that provided a lot of flexibility, more of resilience.

The mode selection criteria for any city going for urban rail in many countries is highly political. Correctly speaking looking for viability in project is the first and foremost criteria. There should be high existing public transport demand. Alignment should be reasonable in cost and technically feasible. The economic case for developing the city should be there.

PPP is a question of moving forward with the lessons you have. One of the things we can see in finance heavy PPPs for modalities is a very high capital grant of the order of 80-85 per cent. PPPs do not create new money. They are a financing modality, they are a delivery modality but they are not a funding modality. Risks should be allocated to the party best suited to manage them or mitigate them. That is fundamental in PPP. When it comes to revenue risk, the factors that are outside concessionaire's control typically outweigh by a large number of factors that are within the concessionaire's control. In general, avoid allocating all revenue risk to the concessionaire. Internationally, the tendency is either to allocate very little revenue risk; may be 5% to the concessionaire or to have no revenue risk at all.



One-day workshop on “Learnings in Urban Rail and Way Forward” on 11th June, 2016 at Delhi Metro Rail Corporation, Metro Bhawan Auditorium, Brigade lane, Barakhamba Road, New Delhi - 110001

Time	Event	Speakers
09:00 – 09:30	Registration	To be facilitated by DMRC
09:30 – 09:40	Welcome Address and Initiation	Additional Secretary (Urban Development), MoUD, GoI
09:40 – 10:00	Keynote Address	Secretary (Urban Development), MoUD, GoI
10:00 – 11:30	Session – 1 Institutional and Financial Framework for Implementation of Urban Rail Moderator: MD, DMRC	i. By Metropolitan Commissioner, MMRDA ii. Director (BD), DMRC iii. Best Practices followed by MD, CMRL (10 minutes for each presentation followed by Q&A and brain storming)
11:30 – 13:00	Session – 2 Innovative Financing of Urban rail Moderator: AS (UD)	i. Innovative Financing by BD-BMRCL ii. Enhancing Non-Fare Box Revenue by Director (Operations) – DMRC (10 minutes for each presentation followed by Q&A and brain storming)
13:00 – 13:45	LUNCH	
13:45 – 15:00	Session – 3 Private Participation in Urban rail Moderator: Commissioner, MMRDA	i. PPP Initiative by L&T Hyderabad Metro ii. Private Initiative by MD, Rapid Metro Gurgaon iii. Unbundling for PPP by Director Systems, Kochi metro iv. PPP Initiative by MD, AMRCL (10 minutes for each presentation followed by Q&A and brain storming)
15:00 – 16:00	Session – 4 Standardization & Indigenization and Reducing Cost of Construction, Operation & Maintenance Moderator: MD, MEGA	i. Standardisation & Indigenisation by Director (RS), DMRC ii. Cost Effective Design, Construction, Operation & Maintenance by MD, Nagpur Metro (10 minutes for each presentation followed by Q&A and brain storming)
16:00 – 17:30	Session – 5 International Learnings Moderator: AS(UD) / OSD (UT)	Presentation by Mr. Dominic Patella, Sr. Transport Specialist, World Bank (45 minutes) followed by Q&A
17:30 – 17:35	Vote of Thanks	Director (MRTS- I)
17:35 – 18:00	TEA AND NETWORKING	

List of Participants

Ministry of Urban Development

S/Shri

1. Rajiv Gauba, Secretary
2. D.S. Mishra, Additional Secretary
3. M.K. Sinha, OSD (UT) & EO JS
4. Ms. S K Ram, JS& FA
5. R.K. Singh, Director
6. Prakash Singh, Director
7. Janardan Prasad, Director
8. V. S. Pandey, Deputy Secretary
9. Ambuj Bajpai, Under Secretary
10. Deen Dayal, Under Secretary
11. Ms.S. V. R. Ramana, Under Secretary
12. Lohrii Kapani, Under Secretary

Ministry of Railways

S/Shri

1. Pankaj Tyagi, Dir. CE (Plg.)
2. Mohit Lila, Director / Works-I)
3. Ch. P. Sarathi Reddy, Director /Project (Elect.)
4. S B Bhavin, ED/Sig (Dev.)
5. Vinay Kr. Singh, CGM, PP&D
6. Raj Kumar, Dy. CMM/Con-II(ER)

Ministry of Finance

1. Shri Sitangshu Chakraborty, Deputy Secretary, Deptt. of Expenditure

NITI Ayog

S/Shri

1. M Vijayakumar, Joint Advisor
2. Amit Bhardwaj, Sr Research Officer
3. Ms. Molishree, Research Officer
4. Ms. Shikha Juyal, Economic Officer
5. Shri Shashvant singh, Young Professional
6. Shri Manish Kumar, Intern
7. Ms. Suchi Mathur, Intern

Ministry of Road Transport and Highways

1. Shri B.K. Sinha, Chief Engineer
2. Shri O.P. Srivastava, Superintending Engg.

MMRDA

S/Shri

1. U.P.S. Madan, Metropolitan Commissioner,
2. Siddarth Gondhale, Transport Planner
3. Shantanu Wagh, Transport Planner
4. Rahul Wasnik, Transport Planner

Govt. of Bihar

1. Shri Neeraj Sexena, Executive Engg. Cum Nodal Officer, UD & Housing

Govt. of Jharkhand

1. Shri Harsh Mangla, Director /DMA
2. Shri Nishikan, DIMTS

Guwahati Metropolitan Development Authority

1. Shri Anurag Singh, CEO
2. Shri Anant Lal Gyani, Joint Secretary

World Bank

1. Shri Atul Agarwal, Sr. Transport Specialist
2. Ms. Nupul Gupta, Sr. Transport Scientist

Delhi Metro Rail Corporation Limited

S/Shri

1. Mangu Singh, Managing Director
2. H.S. Anand, Director /RS
3. Jitendra Tyagi, Director/ Works
4. S.D. Sharma, Director/ BD
5. D.K. Saini, Director/ Project
6. Sharat Sharma, Director/ Operation
7. K.K. Saberwal, Director / Finance
8. A.K. Gupta, Director/Electrical
9. Pramit Kumar Garg, Project Director/ N-GN
10. D.R. Padmanabham, CRFO/N-GN
11. Vikas Kumar, ED/Operation
12. Ashwani Kumar, CE/Trg.I
13. Navneet Kothari, CE/Trg.II
14. Pankaj Gupta, CE/E&M/AP
15. S.M. Saha, Dy. CE/P-II
16. Sumit Bhatnagar, CEE/RS-IV
17. S.N. Agarwal, CEE/PS-2
18. Anil Kapur, GM/Fin.
19. S.S. Joshi, ED/RS
20. Surya Prakash, ED/PD
21. S. Singh, ED
22. Yatender Kumar, CEE/UG
23. S. Sivamathan, GM/Finance
24. T.B. Ramesh, GM/Finance
25. R.K. Yadav, GM/PB

26. S.K. Sinha, GM/HR
27. D.K. Sinha, GM/S&I
28. S. Kubba, CEE/RS
29. Mahavir Singh, GM/CS
30. Sudhir Mitra, Sr.DGM
31. A.K. Tripathi, DGM
32. Himanshu DGM
33. Manish Yadav, DGM/PB/I
34. Gautam Kumar, DGM
35. Sandeep, DGM
36. A.V.Patil, Dy.CA/contracts
37. Arun Kr. Singh, CE/PD
38. Sanjeev Maheshwari, Sr. AGM/IT
39. Pramod Kumar, Advisor/CS
40. I P singh, DGM/Civil
41. Papiya Sarkar, CA
42. Sumeet Singh, DGM
43. Dhananjay Sharma, DGM
44. Suyash Trivedi, Dy. CE/Cont.
45. S K Roy, DGM
46. Kamal Ram Meena, Dy. CEE/Plg
47. A Godgil, CPM
48. Rajesh Agarawal, Sr. DGM/env.
49. Dipankar Nath, Dy.CA-V
50. S P Dhasmanu, Dy. CEE/RS-1
51. Ramakant, DGM/System
52. M M Sharma, Trg. Coord
53. R S Mann, AM/Admin
54. Sidharth Kumar, Sr. CRA
55. Rohit Prakash, Sr. CRA
56. R L Dogra, Sr. AGM (F)
57. Ritesh Garg, PM-SQ
58. Chandrakant Shrivats, DGM/E
59. Mriunjay Kumar, DGM/RS/MB
60. Suresh Sharma, DGM /IT
61. Vikas Kumar, AM/Arch.
62. Tanu Singh, AM/RS
63. Subodh Pandey, AGM/IT
64. Mahinder Yadav, Dy. CPRO
65. R.G. Sharma, AM/CS
66. Niti Kothari, AGM/F
67. Bharat Bhushan, ASE/Tele
68. Gaurav Garg, AM/RS
69. Vinay Kumar, HM/Tele

Chennai Metro

1. Shri Pankaj Kumar Bansal, IAS, Managing Director
2. Shri L. Narasim Prasad, Director /Systems & Operations
3. Shri J. Hari Prasad, JGM /TVS

Bangalore Metro Rail Corporation Ltd.

1. Shri P.S. Kharola, Managing Director

Kochi Metro

S/Shri

1. Praveen Goyal, Director/Systems
2. Rajendran AR, GM/RS&E
3. Jayananda, Manager/AFC
4. Mohammed Baheer, Sr DGM/Civil
5. Hari S Pillai, JGM/Civil

Mumbai Metro

S/Shri

1. S K Gupta, Director/ Project
2. Indranil Sarkar, CFO
3. R K Sharma, ED/Elect
4. R Ramanna, ED/Planning
5. Rajiv, GM/RS
6. N M Bhatiya, Coordination Officer

MEGA

1. Shri I.P. Gautam, Managing Director
2. Shri Ramesh Kumar, DGM
3. Shri Navin Verma, AGM (F&A)
4. Shri Aditya Bhardwaj, AGM (PED)

Nagpur Metro

1. Shri Brijesh Dixit, Managing Director
2. Ramnath S, Executive Director
3. Shri Sunil Mathur, Director
4. Shri Mahesh Kumar, Director
5. Shri Ramesh Agarwal, PRO

Lucknow Metro

1. Shri Naveen Babu, Chief Engineer /Contract
2. Shri S.K. Mitta, GM (F)

Kolkata Metro

1. Shri Parashuram Singh, Director (P&P)
2. Dr. S.K. Panday, Director (Finance)

L&T Hyderabad

1. Shri Anil K Saini, Head Rly. System

Amravati Metro (Vijaywada)

1. Shri N. P. Rama Krishana Reddy, Managing Director
2. Shri U. J. M. Rao, General Manager

NCRPB

1. Shri Satyabir Singh, AD (T)

MMOPL

S/Shri

1. Abhay Kumar Mishra, CEO
2. Vikas Verma, DGM/BD
3. Prashant Kumar, Sr Manager
4. Sanjay Rathi, Manger

NMRC Noida

S/Shri

1. Santosh Kumar Yadav, Managing Director
2. Saumya Shrivastava, Executive Director
3. Shailendra Kumar Bhatia, OSD
4. Sandeep Raizada, OSD (CBS)
5. P D Upadhyay, GM/Finance
6. V K Jain, DGM/Finance
7. Jai Prakash, DGM/HR

MPMRCL

S/Shri

1. Jitendra Kumar Dubey, E-in Chief/Director (Tech)
2. Manju Sharma, Add. Commissioner, UAD
3. Vijendra Nanavati, Technical Advisor
4. Kamal Nagar, OSD(Transport)
5. Sanjay Shrivastava, CFO
6. Chetan Bakshi, Advisor
7. V. Nanavati, Advisor (Tech)
8. Anoop Vijay, Chartered Accountant
9. Sandeep Jain, Company Secretary

Rapid Metro Rail Gurgaon

1. Shri_Rajiv Banga, Managing Director
2. Shri Dilip Jadeja, Vice President

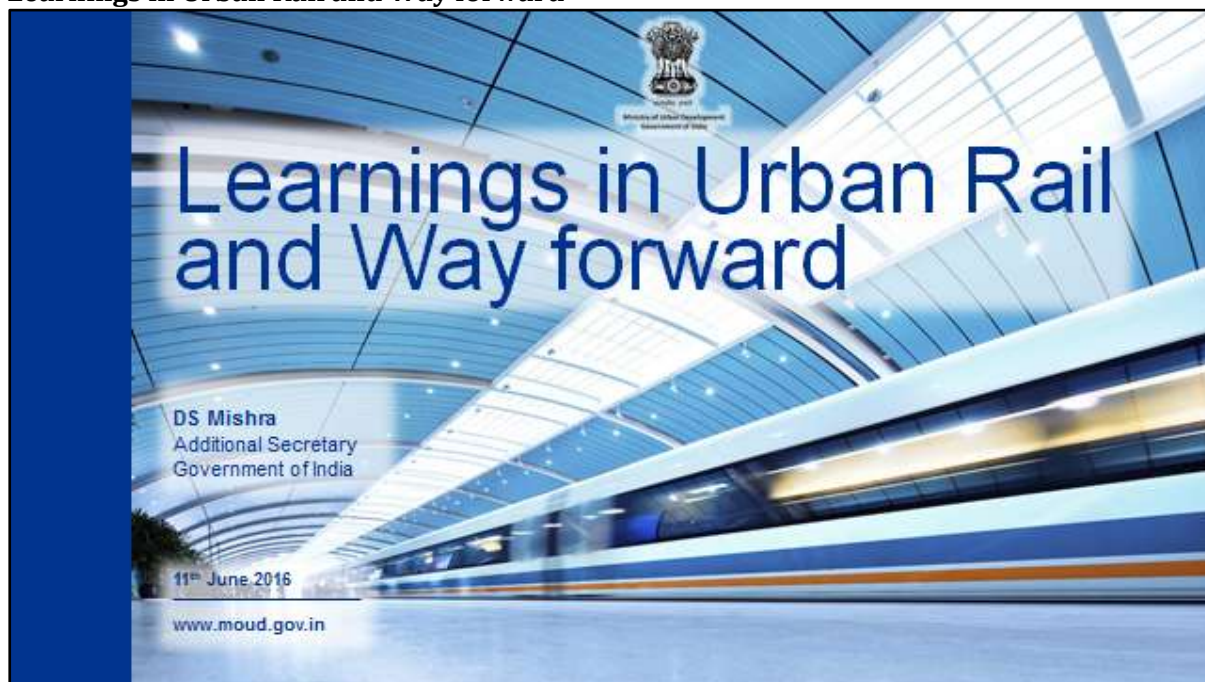
UMTC

1. Shri Ajai Mathur, MD & CEO
2. Shri Kishore Nathani, Sr Vice President
3. Shri Ankush Malhotra, Vice President

List of Presentations

No.	City	Presenter	Title
		Shri. Durga Shanker Mishra, Additional Secretary, Urban Development, GoI	Learnings in Urban Rail and Way forward
1	Mumbai	Shri. UPS Madan, Metropolitan Commissioner, MMRDA	Institutional and Financial Framework for implementing Metro Projects – MMRDA Experience
2	Delhi	Shri. SD Sharma, Director (BD), Delhi Metro Rail Corporation Ltd.	Institutional and Financial Framework
3	Gurgaon	Shri. Rajiv Banga, Managing Director, Rapid Metro Rail, Gurgaon	Private initiative in Urban Rail
4	Vijayawada	Shri. Ramakrishna Reddy, Managing Director, Amaravati Metro Rail Corporation Limited	How Metro Projects can be made Successful under PPP
5	Bengaluru	Shri. Pradeep Singh Kharola, Managing Director, Bangalore Metro Rail Corporation Limited (BMRCL)	Innovative Financing Techniques
6	Delhi	Shri. Sharat Sharma, Director (Operations), Delhi Metro Rail Corporation Ltd.	Enhancing Non-Fare Box Revenue
7		Mr. Dominic patella, Sr. Transport Specialist, World bank	International Experiences with Urban Rail Funding, Institutional Frameworks & PPP – Progress update and selected lessons
8	Delhi	Shri. HS Anand, Director (Rolling Stock), Delhi Metro Rail Corporation Ltd.	Standardisation & Indigenisation
9	Nagpur	Shri. Brijesh Dixit, Managing Director, Nagpur Metro Rail Corporation Ltd. (NMRCL)	Strategy for Cost Effective Design, Construction Operation & Maintenance
10	Chennai	Shri. PK Bansal, Managing Director, Chennai Metro Rail Ltd. (CMRL)	Best Practices Followed
11	Hyderabad	Shri. AK Saini, Head Railway Systems, L&T Hyderabad Metro	PPP Initiative
12	Kochi	Shri. Praveen Goyal, Director Systems, Kochi Metro Rail, Kochi	Unbundling for PPP

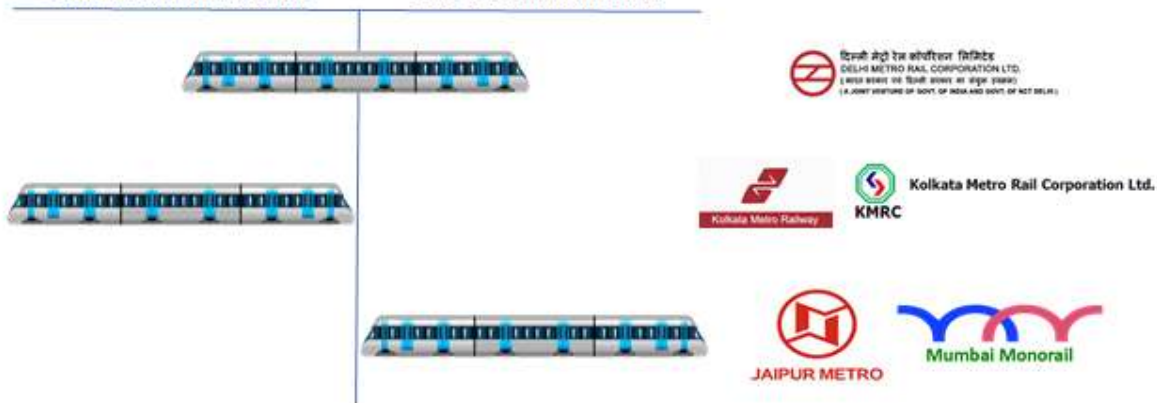
Learnings in Urban Rail and Way forward



Financing Metro Rail – Fully Government

Central Government Share

State Government Share



Financing Metro Rail –PPP

20%

Viability Gap Funding from Government of India



100%

Fully Privately Financed Initiative



3

Metro Rail Projects – 12 Cities



316

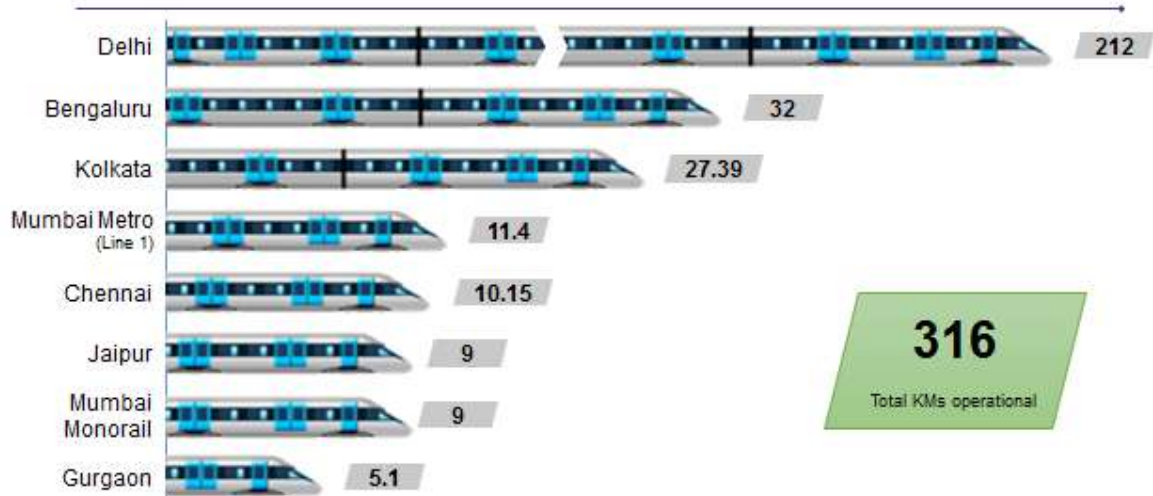
Operational Kilometers

509

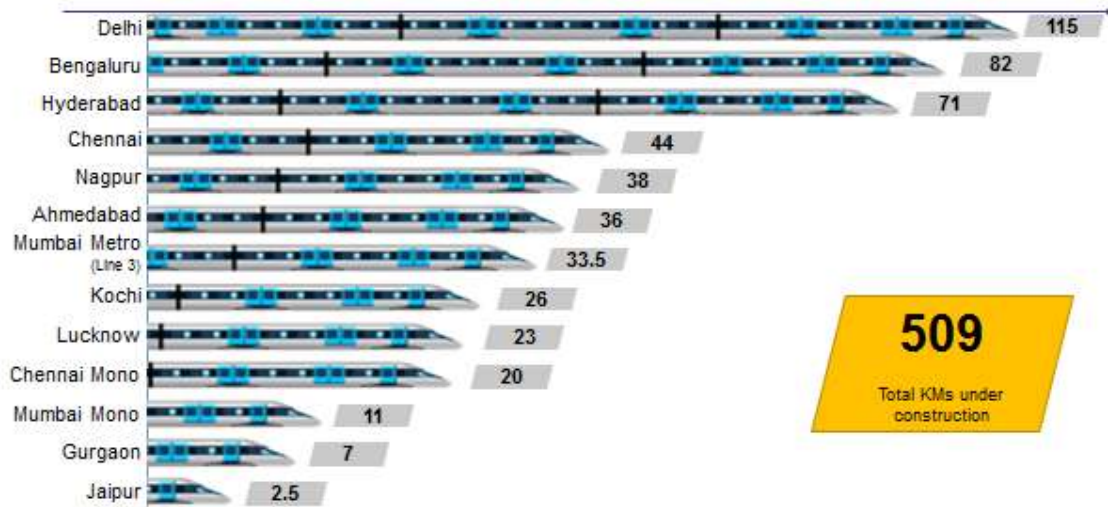
Under Construction Kilometers

4

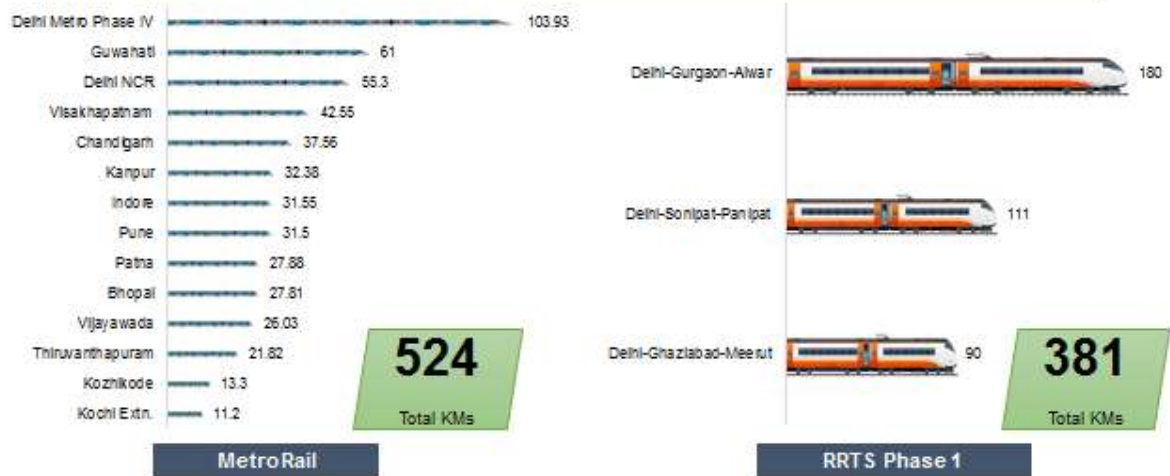
Metro Rail Projects – Operational KM



Metro Rail Projects – Under Construction KM



Metro Rail Projects – Under Consideration KM



World Bank Study









World Bank is conducting a technical study for international perspective on institutional setup, innovative financing and private participation in Urban Rail



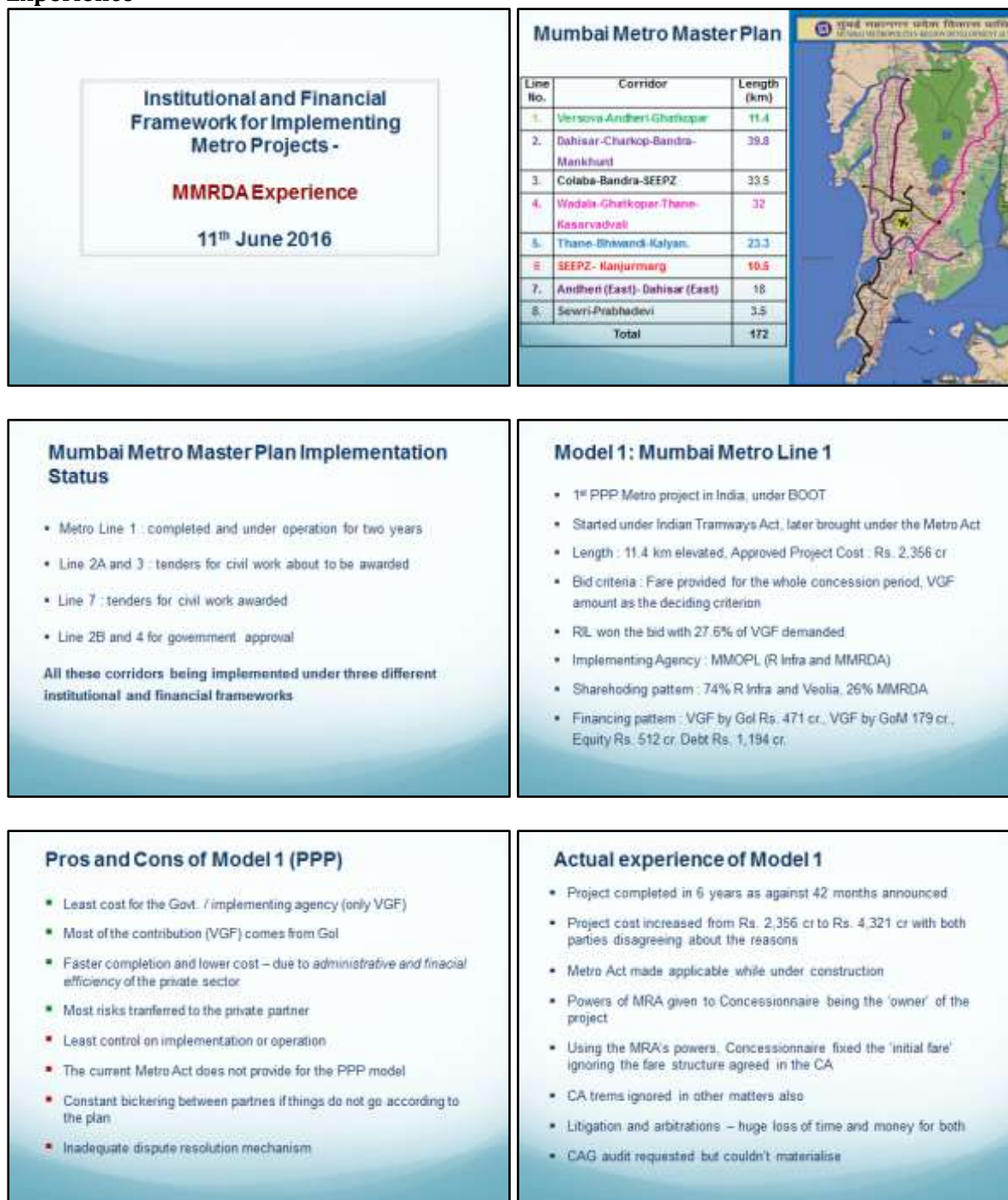
Study has been conducted in the cities of London, Sao Paulo, Toronto, Washington D C , Hongkong, Taipei, and Barcelona

Challenges Anticipated – Deliberation Required

	<ul style="list-style-type: none">• Institutional and Financial Framework for Implementation of upcoming Metro Projects
	<ul style="list-style-type: none">• Innovative Financing of Metro Rail Projects
	<ul style="list-style-type: none">• Innovative Design to reduce construction, operation and maintenance costs
	<ul style="list-style-type: none">• Methods for increasing Non-fare Box Revenue
	<ul style="list-style-type: none">• Models for successful Private Participation in Metro Rail Projects
	<ul style="list-style-type: none">• Standardisation and Indigenisation of metro components (civil, rolling stock and signalling) – Make in India

Thank you

Institutional and Financial Framework for implementing Metro Projects –MMRDA Experience



Model 2: Mumbai Metro Line 3 (SPV)

- Length : 33.5 km, fully underground,
- Completion cost : Rs. 23,136 cr.
- Implementation : 2014 – 2020
- JV Model with equity (10.4%) and sub debt (4.4%) from Gol, equity (10.4%) and sub debt (7%) from GoM, loan from JICA (57%), balance property development, MIAL and MMRDA
- Implementation through MMRC an SPV of Gol and GoM – Chairman Secretary MoUD, MD an IAS officer from GoM (model followed by most of the cities)

Pros and Cons of Model 2

- Upto 15% funding from Gol, lower counterpart funding
- Extensive appraisal helps in refining the project report
- Benefit of expertise of Gol in the Board
- Lengthy appraisal process, takes upto 2 years
- Project cost escalates during appraisal period
- Procurement of GC and works can commence only after loan negotiations
- With less than 15% contribution, 50% control by Gol
- Even with equal power, all responsibilities on State – increase in cost, Forex risk
- Practical difficulties of Board meetings

Model 3: Metro Line 2, 4 and 7 (MMRDA)

- 118 kms. of fully elevated corridors, total cost over Rs 40,000 cr
- MMRDA will be the implementing agency
- Some works to be done directly by MMRDA by inviting bids, some through DMRC as deposit work
- Civil works funded by MMRDA, loan for systems from bilateral /multilateral agencies
- State Government to provide sub debt for central taxes (50%), state taxes (100%) and land cost
- Loan assistance for systems up to 80% from funding agencies and 20% from MMRDA

Pros and Cons of Model 3

- Civil works can commence immediately after State and Centre approvals – much shorter period for approvals
- Simultaneous loan negotiations saves time
- Disbursement can commence after 2 years
- Faster completion means lower risk for project cost escalation and less hedging cost
- More autonomy and flexibility
- No contribution from Gol
- Much higher counterpart funding by implementing agency
- Risk if the funding process fails for some reason

Conclusion

- **No 'best' model** ~ all depends on the requirements of the project proponent
- Metro Act must have **adequate provision for PPP** with a fair distribution of powers and responsibilities
- Adequate **dispute resolution mechanism** for all PPP projects necessary
- **More autonomy and equal responsibility** for states under Model 2
- Gol should consider giving **assistance of 20% of the cost** for Model 3

Thank You

Institutional and Financial Framework



Presentation Profile

- What is an Urban Rail?
- What is the Institutional framework?
- Existing Institutional Frame Work in Urban Transport
- Numerous Framework of Institutions
- Present Framework of Institutions for Metro Rail and few of its salient points including deficiencies
- Financial Framework:

What is an Urban Rail?

- Sub-urban Rail
- Metro Rail(Heavy, Medium, Light)
- Tram Way
- Rail Guided LRT

What is the Institutional Framework?

- Regulations/Acts
Institutions are broadly defined as systems of rules which define the boundaries of any institution. These facilitate the implementation of a particular infrastructure project within well defined legal and functional norms. In case of Urban Rail this is the responsibility of Central Government
- Organization
Institutions are also likely to be organizations, a set of the people who carry out a particular set of activities. In case of Urban Rail, this is the responsibility of State Government

Urban Transport-Existing Institutional Frame work

- Under the Constitution of India, responsibility for urban development, urban transport, rests with the state government.
- City level - At the city level, several agencies are involved in the management of various components of urban transport.
- Urban local bodies, under the Ministry of Urban Development, are responsible for a range of functions

Existing Institutional Framework inadequate

- Urban Transport is controlled by multiple institutions. This multiplicity of institutions has resulted in no unity of command and hence fragmented functional responsibilities.
- There is also no accountability in ownership, performance, and maintenance of transportation infrastructure and system operations.
- Urban transport affects almost all and each agency reports to a separate ministry at the state and center level.
- There is no single apex agency for regulation & coordination between institutions.
- There is also no co-ordinating agency for integrating operations of different modes.
Formation of UMTA is still in progress

Numerous Institutions

- 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 intercity and sub-urban Rail
- Metro Railways(amendment) Act-2009 deals with the specific issues related to metro rail,
- Tramways Act deals with tramways
- Other modes of mass rapid transit namely bus rapid transit, the light rail transit the mono rail and several other guided modes of transport hardly have any institutional Framework

Institutional Framework for Metro Rail

- **Metro Railways (Amendment) Act 2009**
 - It comprises the following
 - Railway's Act 1989
 - Railway's Construction of Works Act 1978
 - Delhi Metro (Operation and Maintenance Act)-2002
- **Allocation of Business Rule**
 - Planning and coordination of urban transport systems with technical planning of rail based systems being subject to the items of work allocated to the Ministry of Railways, Railway Board
 - Non-Government Railways - Matters in so far as provision for control by the Ministry of Railways, Railway Board as provided in the Railways Act, 1989 (24 of 1989) or in the contracts between the Government and Railways, or in any other statutory enactments, namely, regulations in respect of safety

Institutional Framework for Metro Rail

- Procedure for Safety Certification and Technical Clearance of Metro Systems ,December 2005 issued by RDSO
- However , there is need to have an independent Metro Safety certification, Metro Research and Standard Organization for timely completion of Metro Projects likely to come up in the country(approximately 700 Kms. by 2026).

INSTITUTIONAL FRAME WORK FOR ORGANISATION

Special Purpose vehicle(SPV)

- Formation of SPV with 50:50 participation by Central and State Government for implementation of an urban Infrastructure Projects is now time tested and has produced the desired results.
- A Special Purpose Vehicle (SPV) be formed for implementation of the project.
 - The SPV should be registered under the Companies Act, 2013 as a joint venture of GOI and concerned state government.
 - The SPV should have full time MD, Director (RS), Director (Works) and Director (Finance).
 - The SPV will also have equal number of nominee directors of GOI & state government.
 - Organisation down below should also be made up by selecting the men power through competitive examination.

State Government to abide by the GOI's Guidelines

- State government to abide by the GOI guidelines on:
 - Uniformity,
 - Standardisation,
 - Safety certification,
 - Security related issue and
 - Service level benchmarks
- Integration of various modes of transport which would act as feeder system to the proposed metro.
- State government to provide multimodal integration, including sub-urban railways (involving Indian railways) to provide a well connected network in the region.
- State government to ensure that the metro rail project provides for:
 - First and last mile connectivity,
 - Accessibility and
 - Appropriate security arrangements

State Government to abide by the GOI's Guidelines(contd.)

- Enter into a Memorandum of Understanding (MOU) with the GOI to effect the various terms and conditions of the approval of the project.
- State Government to provide common mobility card across all modes and all operators in the city for:
 - Integrated ticketing and
 - Seamless travel

FINANCIAL FRAME WORK

Items involved

- Percentage of Fund Contributions from each Stake holder and other norms**
- Pattern for the implementation**
 - Completely Government Funded
 - Build, Operate and Transfer(BOT)
 - Public Private Partnership(PPP)
 - Completely Private Funded
- Raising of Funds**
 - Particularly by City Authorities by the help Institutions to be set by State Government

Complete Funded by Government-Percentage Fund Contributions and other norms-

- GOI contributes not more than 20% of the cost of the project excluding the cost of land and state taxes.
- 20% ceiling includes cost of central taxes to be shared between GOI & concerned state government in equal ratio.
- State Government shall also contribute funding to the extent of 20%.
- Cost of land to be fully borne by the state government.
- ODA/Multilateral loan is arranged by GOI and on lent to metro rail company (SPVs) on back to back basis.
- GOI provides ODA Loan amount as Pass Through Assistance(PTA) to the metro rail companies (SPVs) to meet the contractual commitments.

Percentage Fund Contributions and other norms(contd.)

- Exchange rate variation is shared either equally between GOI & state government or by the state government.
- State Taxes are either reimbursed or exempted by the state government.
- The cost of the metro rail projects sanctioned so far have not included the impact of service tax.
- Service Tax being a central levy, GOI may consider to bear the impact of the service tax on the lines of sharing of other central taxes.

Examples: Chennai, Bangalore, Kochi, Delhi Metro, Nagpur, Lucknow Metros, Mumbai Metro Line 3

BOT-Percentage Fund Contributions and other norms-

- GOI contributes not more than 20% of the cost of the project excluding the cost of land and state taxes.
- 20% ceiling includes cost of central taxes to be shared between GOI & concerned state government in equal ratio.
- State Government shall also contribute funding to the extent of 20%.
- Cost of land to be fully borne by the state government.
- Private Party(Concessionaire) to bring balance of the Project Cost.
- Any Additional Viability Gap Funding to be met from State Government Funds.
- Concessionaire to operate and transfer back the project after 30 years to SPV Government Company.

Example: Hyderabad metro, Mumbai Metro Line 1

PPP-Percentage Fund Contributions and other norms-

- Cost of the Civil Structures and construction thereof is done by the SPV and all other systems including Track, Traction Signalling and rolling Stock is procured and implemented by the Concessionaire at his cost.
- Concession is normally for 30 years
- GOI contributes not more than 20% of the cost of the project excluding the cost of land and state taxes.
- 20% ceiling includes cost of central taxes to be shared between GOI & concerned state government in equal ratio.
- State Government shall also contribute funding to the extent of 20%.
- Cost of land to be fully borne by the state government.
- There may be any subsidy or premium, both will be to the State Government Accounts.
- Concessionaire to operate and transfer back the project after 30 years to SPV Government Company.

Example: Delhi Airport Line

Completely Private Funded

- Entire cost(equity + loan) of the project is brought by the concessionaire and project implemented, operated and handed over back to the SPV/ State Authorities after the concession period is over.
- Concession is normally for 30 years
- In lieu of the above, State Government extends the various concession to the concessionaire including sweetener like land for property Development, Tax exemptions etc. etc.
- Land is provided by the State Government free of cost.
- There may be any premium, it will be to the State Government Accounts.
- Concessionaire to operate and transfer back the project to SPV Government Company/City Authorities once the tenure of the project is over.

Example: GGN Rapid metro

Summing Up

- There is need to strengthen the institutions for Urban Rail including making this sector independent of Railway Ministry
- There is need to have a Metro Research and Standard Organization for indigenizing the remaining components of Urban Rail and also for Safety certification
- There is need to have independent Metro Safety certification organization
- There is need to resort to innovative financing on the ground which is otherwise only on papers.



Private initiative in Urban Rail

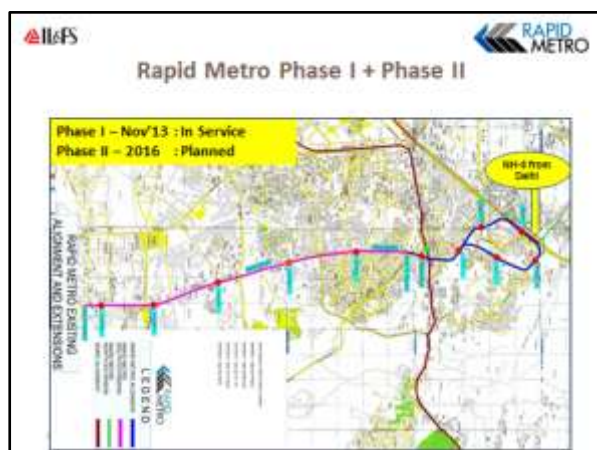


Rapid Metro Gurgaon

- Developed as a "last mile connectivity" solution from Delhi Metro's Gurgaon line at Sikanderpur interchange station to NH-8 thru' Cyber City
- Phase I - 5.1 km thru' SPV (RMGL)
 - India's first fully privately funded metro facility in PPP format
 - Construction & commissioning in 36 months
 - Operations commenced since 14th Nov'13
- Phase II - 6.6 km thru' SPV (RMGSL)
 - Currently under construction
 - Targeted to be in service by end 2016
- Promoters:
 - IL&FS Transport Networks Limited
 - IL&FS Rail Limited

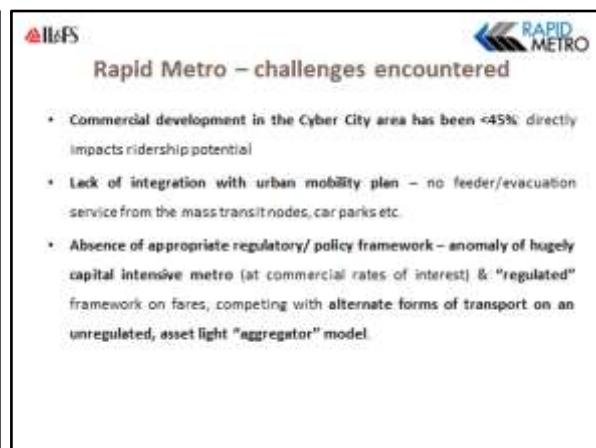
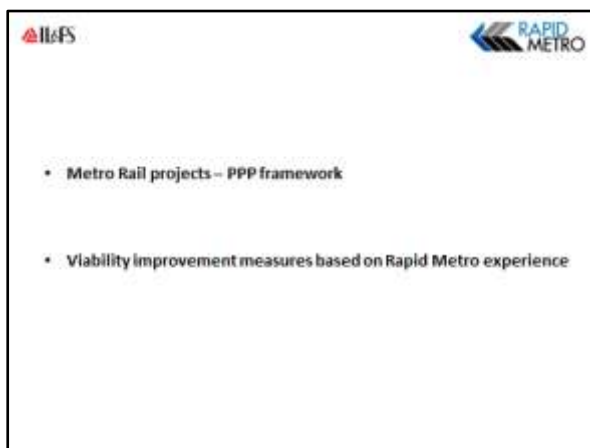
Rapid Metro – Key Project Parameters


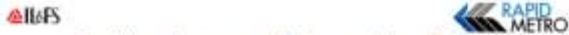




Phase I: In Service	Phase II: Under Construction
Route Length : 5.1 Km	Route Length : 6.6 Km
Project Cost : 1229 Cr	Project Cost : 2143 Cr
Concession Agreement : Dec'09	Concession Agreement : Jan'13
Financial Closure : Jun'10	Financial Closure : Jul'13
Start of Construction : Nov'10	Start of Construction : Sep'13
Goi Approval : Dec'11	Goi Approval : Nov'14
Commercial Operation : Nov'13	Commercial Operation : 2016 (planned)



Salient Features – Snapshot

Project	Network	Train
Elevated Network	Interchange station: Sikanderpur	Number of Trains: 5
Delhi Metro Smart Cards and Tokens applicable	Length: 5.1 km	3 Coaches per Train
Launch: 14th November 2013	Number of Stn: 6	Average speed: 30 km/hr
Fare: Flat @Rs 20/-	Timing: 0605 - 0036 hrs (midnight)	Train frequency: 4-5 minutes



 <h3>Metro Rail Projects – PPP Model</h3> <ul style="list-style-type: none"> • Connectivity solutions are central to urban mobility - Mass transit solutions like metro rail have significant positive impact on the city and the society at large • Development of Metro rail projects are hugely capital intensive although viability of such projects is always a challenge • Private sector brings in efficiency & leveraging potential in addition to enterprise, innovation, technology etc. • Need for an enabling framework by Gov/State Govt. <ul style="list-style-type: none"> • Government to extend support with an enabling framework supplemented with appropriate grants, concessions, opportunities, land rights, rebates and risk cover etc. • Authority to monetise benefits and channelise back into such projects. 	 <h3>Enabling framework for making PPP a sustainable proposition - alternate measures</h3> <ul style="list-style-type: none"> • Metros will favourably impact real estate values around their alignment – any strategy to render viability needs to capture such externalities • On a concept of user/beneficiary to pay, <ul style="list-style-type: none"> • Adopt a “corridor” approach to monetise such values <ul style="list-style-type: none"> • Consider higher FAR for all properties within a prescribed distance from the metro alignment: levy a cess on the additional FAR granted • Enhancement of property tax in the influence zone • Consider other measures viz. Cess on fuel, parking taxes, congestion charges, auction based motor vehicle registration quota system etc. • All revenues collected into a “Dedicated Urban transport fund” <p>“Dedicated Urban Transport fund” created to meet the difference between the public fare paid by commuters and the technical fare (required by the private operator) to sustain the operations.</p>
 <h3>Enabling framework for making PPP a sustainable proposition – building blocks</h3> <ul style="list-style-type: none"> • Developing a sustainable proposition <ul style="list-style-type: none"> • “Fare box” revenue cannot sustain such projects • Recognise that cost of funds to a concessionaire without sovereign guarantee are at commercial rates of interest • Building in alternate revenue opportunities are a necessity • Risk sharing between Project Sponsor (Authority) and Project developer (Concessionaire) needs to be equitable <ul style="list-style-type: none"> • Practice is to shift entire ridership risk to the Concessionaire • Risk mitigation to be adequately built into the concession framework • Integration with Urban Mobility Plan for the city (Corporation’s remit) <ul style="list-style-type: none"> • multi-modal integration for feeder/evacuation, car parks etc • Structural issues related with commercial borrowing for infra projects in India – lack of alignment in moratorium/tenor/rates vs. back ended revenues (gestation period for traffic ramp up) 	 <h3>PPP Metro projects – suggestions for future</h3> <ul style="list-style-type: none"> • Viability gap funding is a must. • Enhancing non- fare box revenues is a necessity. • Alternate measures for augmenting non- fare box revenues: <ul style="list-style-type: none"> • Property development rights packaged into the concession or accorded as per TOD policy • Operationalisation of TOD policy: <ul style="list-style-type: none"> • Creation of Infrastructure Development Fund (IDF) corpus • Evolve mechanism for IDF disbursement to private sector projects – infusion as equity/ grants that stay with the project till eventual transfer to Authority • While some cross subsidisation is inevitable, IDF benefits need to be administered corridor-wise for the metro network, to the extent possible • Unconditional advertisement rights, without encumbrances or levies by local bodies
 <h3>PPP Metro projects – suggestions for future</h3> <ul style="list-style-type: none"> • Integration with urban mobility plan, city bus service, car parking etc. – <i>well beyond the remit of the private enterprise</i> • Enable access to lower cost of funding/ multi-lateral agencies - State Govt./ Authority may need to facilitate • Minimise/ eliminate taxes, levies & custom duties to reduce loading into initial investment • Principles of equity in risk allocation <ul style="list-style-type: none"> • Risk mitigation measures to be built into the concession framework till specified benchmarks are achieved. • IDF support to bridge the anomaly between back ended revenues due to traffic ramp-up considerations vs. frontended repayments • Appropriate mechanism for renegotiation in line with recommendations of Kelkar Committee 	 <p style="text-align: center;">Thanks</p>

How Metro Projects can be made Successful under PPP

How Metro Projects can be made Successful under PPP

By,
Ramakrishna Reddy,
MD,
Amaravati Metro Rail Corporation Limited
Vijayawada, AP.

What is PPP???

- Public Private Partnership (PPP)
- It is not Public(GOI) Public(State Govt) Partnership (PPP) ?

Following Metro projects in India are Privatised

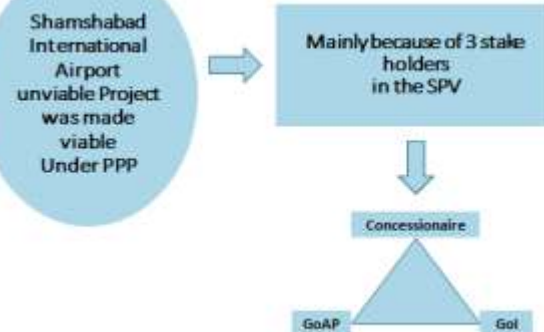
- 1) Delhi Airport Metro Express Line (DAMEL)
- 2) Rapid Metro Gurgaon Phase-I
- 3) Mumbai Mono Rail
- 4) Mumbai Metro Line-1... **This is only PPP project**
- 5) Hyderabad Metro Rail Project

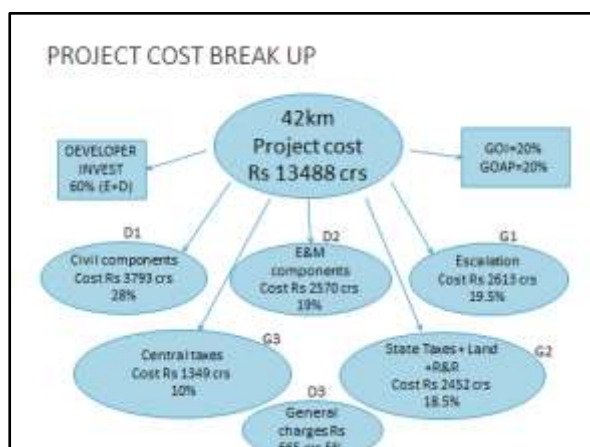
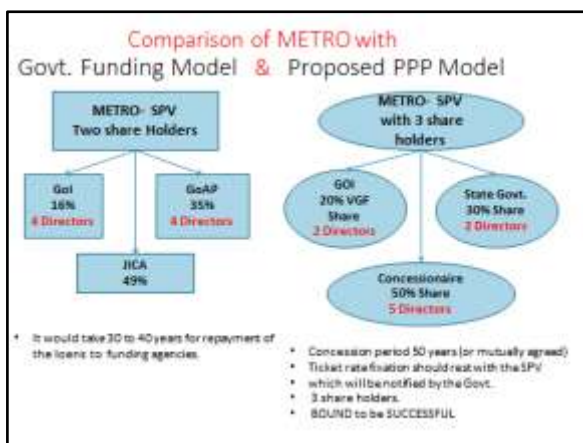
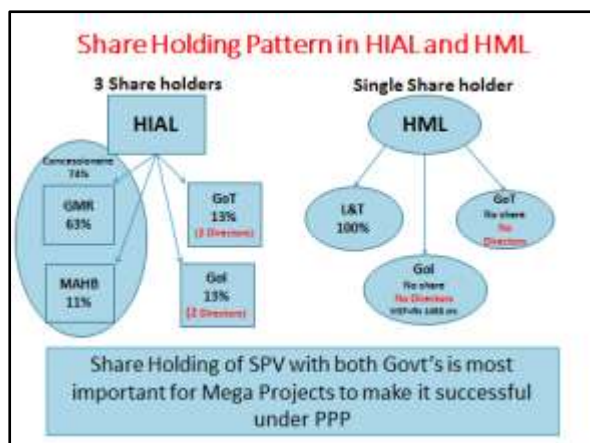
In reality there is no Public (Govt.) partnership (shareholding) in projects 1,2,3 & 5. Hence these metro projects are privatised projects by respective State Govts. Mumbai Metro Line-1 can be called as PPP project as there is MMRDA share of 26%

Cont.....

- In a Public Private Partnership project, there has to be a share holding of GoI, State Govt. and Developer in the SPV
- There has to be Directors representing from both Govt's. in the SPV
- Shareholding of GoI/State Govt. can be to any extent which can be decided in the policy

My previous Experience





TYPICAL EXAMPLE OF FUNDING PATTERN

Sr.No	Organization	Type of Funding	Amount (Rs/ Crore)	% of contribution excluding State Taxes and Acquisition Cost
1	GoI	Equity	829.50	14.26%
2	GoAP	Equity	829.50	14.26%
3	GoI	SD for Central Taxes	333.50	5.74%
4	GoAP	SD for Central Taxes	333.50	5.74%
5	JICA / Bilateral/ Multilateral /Market	Loan	3485.00	60.00%
6		Total Project Completion Cost excluding Land and State Taxes	5815.00	100%
7	GoAP	Land including R&R cost	954.00	
8		Total Project Completion Cost including Land acquisition, R&R but excluding State Taxes	6769.00	GOI = Rs 1125 crs (16%)
9	IDC (PTA)		54	GOAP= 1163+954+389 =Rs 2506 crs (36%)
10	GoAP	State Taxes	389.00	
11		Total Project Completion Cost including Land acquisition, R&R and State Taxes	7212.00	JICA= Rs 3543 crs (49%)

- ### Way Forward
- No specific Policy on Implementation of Metros under PPP model is available, except for contributing maximum 20% VGF
 - The present policy of MoUD for Govt. funding models is, on 50:50 equity in the jointly owned SPV.
 - Same recommendation is available in MoUD Policy for PPP model, but GOI is not implementing such share holding system...?
 - GOI, State Govt and Concessionaire should be the share holders in the PPP-SPV
 - If both Central and State Govt's. contribution is 45-55% of the project cost in the form of interest free loan/ sub-ordinate debt/ Grant, the concessionaire can easily contribute the remaining 50% in the form of debt and equity
 - IFL/SD can be paid back after main debt is cleared or after 25 years from COD.. Which ever is later

Thus, Metro Projects can be made Success under PPP



Innovative Financing Techniques



INNOVATIVE FINANCING TECHNIQUES
By Pradeep Singh Kharola
June 11, 2016

OVERVIEW

- FINANCING INFRASTRUCTURE
Current Challenges
- INNOVATIVE FINANCING TECHNIQUES
Classification
- METRO BONDS
Market Appetite
- RUPEE DENOMINATED FOREIGN LOAN
Rupee Loan
- CASE STUDY
Bangalore Metro - Phase 1 & Phase 2
Proposed ORR Metro
- WAY FORWARD

**FINANCING INFRASTRUCTURE
CURRENT CHALLENGES**

- Capital Intensive Projects
- High Reliability on the Budgetary Support from Central & State Government
- Loans from Multilateral Financial Institutions
- Inadequate availability of Long-Term debt from Domestic Financial Institutions
- Long Gestation Periods



Securing Adequate and Stable Funding by combining Revenue Streams through Innovative Financing Techniques is necessary to deliver ambitious Integrated Infrastructure Strategies

**INNOVATIVE FINANCING TECHNIQUES
CLASSIFICATION**

Innovative Finance Instruments vary widely and have been applied by local governments and related agencies in different parts of the world for financing Transit and Transit Oriented Development (TOD) related investments.

Primary Catalyst

- Capture Land Value
- Other Dedicated Levies/Taxes
- Bonds/Foreign Avenues

TAX OR FEE BASED	NON-TAX OR NON-FEE BASED	OTHERS
Property Taxes	Land Based Value Premium (P&R Plaza, etc.)	Misc. Bonds
Development Charges	Additional TOD Transfers/Deeds Development Rights (TDR)	Foreign Avenues
Other Special Assessments	Location Based Advertising Rights	
	Rights to Access	
	Development Rights and/or Commercial Rights	

**METRO BONDS
WHY BONDS**

- If term loans are taken then the borrower has to adjust to the repayment schedules etc.
- Even term loan lending institutions raise money through bonds, add a spread and pass it on to the borrower
- Minimum rate of interest
- The rating of the State Government & Central Government helps in mobilizing funds at reasonable rates.

**METRO BONDS
MARKET APPETITE**

- BMRC published the first Metro Bond Issue and the Media picked up the Success Story of BMRC and helped in increasing the Investors Appetite for the Bond Issue.
- There were 12 investors and the Bond was fully subscribed at 8.75% for 10 year period.
- The then Prevailing Bank base lending rate was above 10% spread. This demonstrates investor's Confidence in the Company and Metro Project.

**RUPEE DENOMINATED FOREIGN LOAN
WHY RUPEE**

- Metro have to borrow from foreign source as the funds required is large with long repayment period.
- Borrowing from multilateral and bilateral agencies helps in better scrutiny of documents and also provides sufficient comfort for domestic borrowing as well as bond investors.
- A big risk in foreign borrowing is the exchange rate fluctuation – which can be highly volatile and it can upset all repayment calculation.

**RUPEE DENOMINATED FOREIGN LOAN
RUPEE LOAN**

- In order to obviate the uncertainties of hedging due to currency fluctuation, BMRC sought from AFD disbursement of the Euro loan in INR, so that BMRC pays interest and principal to AFD in Rupee terms.
- Though the Rupee loan may be costlier than the Euro denominated loan, yet the liability of the Company to pay interest and principal is fully ascertained.
- This is for the first time such a loan term was negotiated and finalized.
- BMRC has since drawn the Euro loan in Rupee. The current INR interest rate is 9.71%, which is far cheaper than any domestic borrowings.



CASE STUDY BANGALORE METRO - PHASE 1 & PHASE 2

- Levy of Cess and Surcharge under Section 15A of the Karnataka Town and Country Planning Act at 5% of the market value of land on/ and building in future developments, to be credited to Metro Infrastructure Fund and to be shared by BMRCCL (55%), BWSSB (20%) and SDA (10%) respectively.
- To Extend the benefit of 4 FAR for all properties lying within a distance of 150 mtrs from the Metro Station.
- To levy a cess of 10% in respect of residential buildings and 20% in respect of commercial buildings on the additional FAR granted, in respect of Phase 1 and Phase 2 of the Metro Rail Project and share the same among BMRCCL(55%), BWSSB(20%) and SDA(10%) respectively.
- To allow BMRCCL to issue TDRs in lieu of compensation for acquisition of land for Metro Rail Project.

**PHASE 1 & PHASE 2
BMRCCL ESTIMATED YIELD**

TAX ON PREMIUM	NON-TAX ON PREMIUM BASED LAND VALUE INCREASE
INR 556 CR. (3 YEARS)	INR 402 CR. (3 YEARS)

CASE STUDY PROPOSED ORR METRO ALIGNMENT

ORR METRO - STATION LOCATION

Estimated Metro:

- 17 Km Line
- Planned from K.R. Puram - Silk Board
- Estimated No. of Stations - 12 (Excluding Start Point & End Point)
- Estimated Cost of Construction Metro - INR 3500 CR.

CASE STUDY PROPOSED ORR METRO

Cater Ring Road (ORR) in Bangalore being a strategic location for growth and as backed by huge development potential. Development-Based Land Value Capture is a Strategic Apparatus for Financing the Proposed ORR.

Project Cost: INR 3500 CR.

- Through Innovative Financing Techniques INR 2521 CR. (Conservative Model)
- Balance Through Term Lending Agencies/ Viability Gap Funding (VGF) INR 1489 CR.

INNOVATIVE FINANCING TECHNIQUES:

PREMIUM FLOOR AREA RATIO (FAR) INR 96 CR.	BETTERMENT LEVY INR 96 CR.	MAKING RIGHTS/ ADVERTISING INR 96 CR.	PREMIUM ACCESSORY/ PARKING INR 96 CR.	AIRSPACE COMMERCIALIZATION INR 96 CR.	ADDITIONAL CESS ON MARCLOS OF NEW PROJECTS/ BUSINESS INR 96 CR.
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PREMIUM FAR

- The lands falling within 1 Km of the Mass Transit Corridor would be offered Additional FAR over and above the existing FAR.
- Premium FAR is applicable to New Developments
- This increased FAR is called 'Premium FAR' for which prospective developers/land owners would have to pay and buy the additional FAR which would be made available in a transparent manner and would be free from all legal encumbrances.

Floor area ratio (FAR) - Ratio of a building's total floor area to the size of the land on which it is built. The higher the FAR, the higher the density. Also referred to as floor space ratio (FSR) or floor space index (FSI).

PREMIUM FAR PRICE DETERMINATION

- Premium FAR Value will be determined through a Book Building Process.
- To make the Premium FAR attractive (as compared to TDR available in the open market) it is proposed to have a minimum Floor Price of 10% of the prevailing guidance value of land along the ORR.
- Considering the average Guidance Value on ORR, Minimum floor price of Premium FAR is proposed to be fixed at 10% of the Prevailing Guidance Value.
- Bidders would be required to quote the quantum of Premium FAR desired and a price that they would be willing to pay for the same which would be the same as or more than the Minimum floor price (at the discretion of the bidder).
- The bidder willing to pay the highest price (per Sft) for the Premium FAR would get first quantum of additional FAR bid for followed by the next best and so on till the entire quantum of available premium FAR is exhausted.

FAR - Floor Area Ratio. FAR - Formula: Gross built-up area / Plot area.

PREMIUM FAR ESTIMATED YIELD

- Keeping in view the height restrictions (ORR falls under vicinity of HAL Airport) on the corridor, it is estimated that:
- An additional FAR of between 0.75 and 1 can be consumed on ORR within 1 KM from the metro stations considering
- An additional developable potential of 15 Million sq ft of built up space in a 1 KM radius. This is the amount of premium FAR that will be available for sale.
- Best case is considered as 100% sale of Premium FAR, Base case as 70% sale of Premium FAR and Worst case as 50% sale of Premium FAR.

Parameters: Revenue Potential, Best Case	Best Case: Sales of 15 M sq ft	Base Case: Sales of 10.5 M sq ft	Worst Case: Sales of 7.5 M sq ft
Revenue: 100% of 1.2 Additional FAR	1,143 CR.	802 CR.	573 CR.

FAR - Floor Area Ratio

BETTERMENT LEVY

- The concept of Betterment Tax finds its place in the Bangalore Development Act, 1976, Section 20
- In order to capture the appreciation in the value of land, which is a direct result of the Metro implementation, a Betterment Tax Regulation could be amended capturing the below:
 - Propose Betterment Levy (instead of Betterment Tax)
 - Applicable only to non-residential properties located within 1 KM of the metro corridor
 - Applicable to properties, size of which exceeds a minimum threshold which is a built area greater than or equal to 1 Million Sq Ft.
 - Betterment Levy is proposed to be charged @ 1.5% of prevailing guidance value of the commercial built-up area and is a one time upfront payment once the MRTS project is approved for implementation on the corridor.

BETTERMENT LEVY ESTIMATED YIELD

Non-Residential Properties Identified (Developed/Under Construction) with a Cumulative Built Up Area of 50 Million Sq.Ft. as on May 2016

POTENTIAL FROM BETTERMENT LEVY	PROJECTED REVENUE
50 MILLION SFT @ INR. 100/SFT.	INR. 500 CR.

LOCATION & NAMING RIGHTS

- The Stations are normally located at a distance of about 1 Km. from each other. However, there is slight amount of flexibility in the positioning of these stations.
- The positioning of stations could also be used as a source of generation of revenue.
- Under the station naming rights, corporates will be allowed to add their name as a prefix before the name of the station - Corporate Branded Stations
 - BMRCCL to Tender Naming Rights/Advertising of 12 Stations.
 - Minimum Floor Price 10 Cr/Year/ Station.
 - Shortlisted Bidder will be awarded Naming Rights for a period of 10 Years
 - 30% of the Total Estimated Revenue to be Paid Upfront by the Shortlisted Bidder Upon Awarding the Contract.
 - Successful Bidder will have naming rights for the station inclusive of branded route maps, indication signs, promotional and other material released in relation to ORR Metro, etc. all featuring the name of the successful bidder.

LOCATION & NAMING RIGHTS ESTIMATED YIELD

Estimated Upfront Yield from Naming Rights/Advertising for 12 Stations:

POTENTIAL FROM NAMING RIGHTS	PROJECTED REVENUE
30 CR. PER STATION/ 12 STATIONS	INR. 360 CR.

ROYALTY FOR ACCESS - RAMPS/WALKWAYS

- BMRCCL have experienced that there is a substantial demand from commercial units located near the metro line for direct access to the Metro stations through an exclusive bridge.
- This direct access facilitates and helps these properties, as the access to these properties improves significantly. It also leads to time and energy saving for the people who are frequenting these buildings.
- An upfront premium which is equal to two times the construction cost could be charged for providing direct access to the Metro Stations by way of access ways and ramps.

ROYALTY FOR ACCESS – ESTIMATED YIELD

- A minimum premium of INR 15 CR (2 Times construction cost) can be charged from Developers or Occupiers for Dedicated ramps of average length of 300 mts to their properties.
- Considering the major commercial hubs on the corridor and estimated number of ramps/ access ways to these prime locations on a conservative case an upfront yield of INR 200 CR is estimated.

BEST CASE (100%)	Best Case (70%)	WORST CASE (30%)
285 CR.	200 CR.	143 CR.

AIR SPACE COMMERCIALIZATION

- At present the roof-top of the Metro stations are not being used for any commercial activity. There is, however, scope of exploiting the commercial potential of the airspace above the metro stations.
- 12 Stations proposed (not including KR Puram & Silk Board), on the ORR Corridor have Maximum Potential to absorb additional Real Estate Space considering current & future Commercial Developments around the proposed stations and connectivity to Residential Projects.
- Thus Station Monetization Structure includes potential Utilization/Revenue Potential from Real Estate Space on the concourse and above the metro station.
 - 1st Floor (Long Lease of 40,000 Sq Feet of Retail Space due to High Footfall)
 - 2nd Floor Ticketing & Platform (Leasing of Advertising Space)
 - 3rd Floor (Long Lease of 40,000 Sq Feet Commercial Office Space)

NPV - Not Present Value

AIR SPACE COMMERCIALIZATION AWARD PROCESS

- Airspace Commercial Development Rights will be awarded on a competitive bidding process for a period of 60 years. Bids will be floated once the project is approved.
- Upfront Development Premium quoted will constitute the criteria for evaluation of Financial Bid.
- A minimum development premium will be fixed and bidder will quote development premium above the Minimum Development Premium.
- Airspace Commercial Development Rights will be awarded to the bidder who quoted highest quoted development premium.

NPV - Not Present Value


AIR SPACE COMMERCIALIZATION ESTIMATED YIELD

A detailed Net Present Value (NPV) assessment has been done for each of the 12 stations and estimated yield from upfront payment from bidder for air space commercialization rights on present date on a conservative model will be INR 219 CR.

PROJECTED NPV ESTIMATED MARKET VALUE	BEST CASE NPV SPACE AVAILABLE BY YEAR 4	BEST CASE NPV SPACE AVAILABLE BY YEAR 5	WORST CASE NPV SPACE AVAILABLE BY YEAR 7
PROJECTED VALUE	281 CR.	219 CR.	51 CR.

NPV - Not Present Value

ADDITIONAL CESS



- While the Premium FAR as well as the Betterment Levy would be confined to the influence zone i.e. in the areas in the vicinity of the Mass Transit Corridor, the levy of additional cess has no such restriction.
- The cess would be levied within the entire area of the jurisdiction of the Bangalore Development Authority (BDA) on approval of New Projects/Developments.
- The levy of cess and surcharge is governed by Section 18A of the Karnataka Town and Country Planning Act, 1961
- The Cess is levied as at the time of granting approval for development of land or buildings. The BDA had already notified levy of cess for Metro rail purposes which has been questioned in the High Court.
- Estimated Yield as an upfront cess is estimated to be INR 50 CR. on a conservative model.

WAY FORWARD



- Promote Integrated Development of Urban Transit and cities along the line.
- Through adoption of Innovative Finance Techniques, Govt. can raise through PPP Model about 50-60% (on a Conservative model) of the Total Construction Cost Estimated.
- Reduce Transit Investment, Operation and Maintenance Costs through revenues generated via Innovative Financing Techniques.
- In a Joint Value-Creation exercise Government, Local Planning Bodies and Mass Rapid Transit Agencies can contribute significantly to value creation either through zoning changes (FARs and land use) or Transit Oriented Development (TOD).
- Unlock unexploited land values in Urban Cities to finance highly capital intensive projects and promote transit-oriented development for the economic development, wellbeing of people today and for their sustainable future.




Enhancing Non-Fare Box Revenue



DMRC

**Enhancing
Non-Fare box Revenue**

Sarat Sharma
Director (Operations)

<http://www.delhimetrorail.com>

Background

- DMRC got the mandate of earning Revenue from non fare box.
- Non-Fare and fare box revenue is 12% and 88% respectively.
- As per MoUD's directives, DMRC buildings being operational structures are exempted from prior approval from building plan.
- It is necessary to seek completion certificate from local bodies.

PB Earning Vs. Fare-Box Earning (Excl. Airport)

All figure are in Cr of Rs

S/N	FY	PB Revenue	Fare Box Revenue	PB Share of Total Revenue
1	2011-12	118.7	1016.30	10.46%
2	2012-13	131.7	1223.00	9.72%
3	2013-14	142.56	1364.83	9.46%
4	2014-15	158.86	1505.75	9.54%
5	2015-16	213.94	1650.0	11.48%

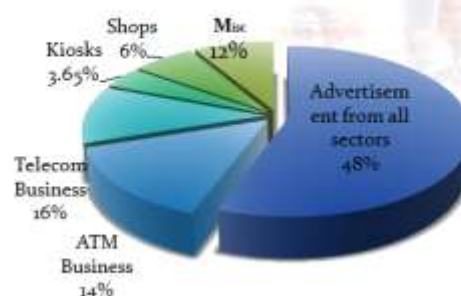
Revenue details(in crores)

S/N	Heads	2011-12	2012-13	2013-14	2014-15	2015-16
1	Advertisement	78	81	75.16	77.07	102.05
2	ATM Business	7.5	12	15.47	21.71	29.78
3	Shops	9.5	10	8.26	8.08	12.81
4	Telecom Business	4	9.1	13.79	20.08	35.19
5	Kiosks /AVM's	5.2	7.6	8.21	8.12	7.81
6	Misc. (OMC of IT Park & forfeiture of EMD/SD)	14.5	12	21.67	23.8	26.30
	Total	118.7	131.7	142.56	158.86	213.94
7	IT Park	35.2	42	51.60	57.94	62.09
8	Big PD Areas	28.4	35	43.86	50.24	62.71
	Total	63.6	77	95.6	108	124.80
	Grand Total	182	209	238	267	338.74

Share of Earning-FY 2015-2016 in Crores.

S/N	Head	Amount	% age
1	Advertisement	102.05	47.70
2	Telecom Business	35.19	16.41
3	ATM Business	29.78	13.92
4	Shops	12.81	5.99
5	Kiosks /AVM's	7.81	3.65
6	Misc. (OMC of IT Park & forfeiture of EMD/SD).	26.30	12.29
	Total	213.94	100.00
1	IT Park	62.09	
2	PD Area (Station Box)	62.71	
	Total	124.80	
	Grand Total	338.74	

% Share of Earning 2015-16



New Initiatives

- Promoted goodwill: disputed cases monitored, resolved amicably or through conciliation and arbitrations.
- Consolidation of Tenders – Encourage competition
- E-Tendering introduced
- Uniform Tender Conditions
- New Schedule of Powers – encourage fast decision
- Policy for Licensing on walk in basis after failure of two consecutive bids, reserve prices disclosed.
- Policy for new initiatives/ Start Ups
- Realistic reserve price
- Providing water electricity etc DMRC's responsibility

New Avenues to boost Non Fare Box Revenue

- Semi-Naming Rights and Branding of stations
- Train wrapping
- Licensing of 103 future TOMS.
- Licensing of built-up Shops/Spaces as is where is basis
- Advertisement On Smart cards and Tokens
- Licensing for BTS Towers, Telecom Equipment, Fibre-Optics and small cells for telecom connectivity etc.

New Avenues to boost Non Fare Box Revenue

- New initiatives policy resulted in providing
 - Health Monitors,
 - HP products vending Machines,
 - automatic parcel delivery system,
 - Short term promotions etc.

Airport Line

- DMRC took over the operation & maintenance of Airport Express Line from M/s. DAMPEL in JULY 2013.
- DMRC called Licensees and confirmed to respect and continue all the agreements signed with M/s Reliance.
- Provided they agree to continue and sign modified and new Contracts with DMRC retaining same terms.
- Strategy adopted to increase the ridership, need be even by reducing the Fares.
- Once the ridership picked up from 10,000 (July' 13) to 36,000 presently, new Contracts for non-Fare box revenue awarded.

Revenue Generation from Airport Line

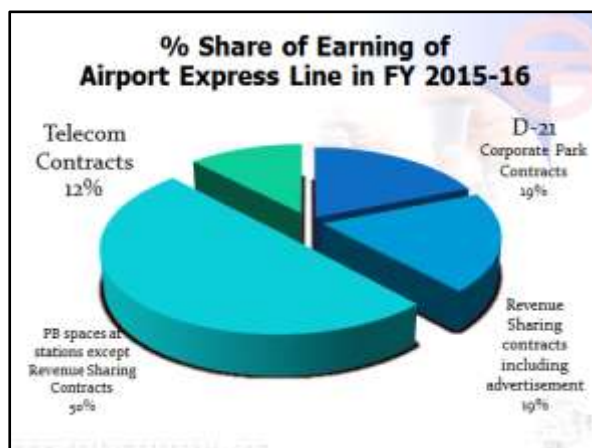


(Airport Line) Proportion of PB Earning Vs. Fare-Box Earning

All Figures are in Cr. of Rs

S/N	Period	Non Fare Box Revenue	Fare Box Revenue	Total Revenue	PB Share of Total Revenue
1	2013-14*	3.31	24.84	39.74	8.33%
2	2014-15	10.27	38.59	48.86	21.02%
3	2015-16	20.94	44.86	65.80	31.82%

* PB Revenue for the period of (Oct'13 to Mar'14) and Fare-Box for revenue for the period of (Jul'13 to Mar'14).



Activities carried out in FY 2015-16 (Airport Line)

- Commercial spaces at Shivaji Stadium (SJSU) has been successfully licensed.
- Office spaces at D-21 Corporate Park licensed out.
- New Delhi Metro Station (NDRU) contract for commercial spaces awarded.
- Due to customer oriented approach, Revenue from revenue sharing contracts (including Advertisement Contract) increased by 297% in FY 2015-16 as compare to FY 2013-14.



Property Development at
Airport Line



Shivaji Stadium



New Delhi



New Delhi



New Delhi



New Delhi



D21 CORPORATE PARK





Impediments

- 48% of revenue among total revenue generated by advertisements business.
- Various mode of display of advertisements its segment-wise percentage share are as under:

SN	Mode	%
1	Outdoor Advertisements on Civil Structures	45%
2	Inside Stations Advertisement	28%
3	Inside Train advertisements	26%
4	Advertisements through innovative/Digital means	2%

Impediments

- As per Outdoor Advertisemet Policy (OAP) 2008: In case land belongs to other organizations, the structure has been built/installed and it faces the vehicular traffic ply on it, the concerned organization or the advertiser with their permission will have to share revenue 25% of the revenue if the device is to installed in non-MCD/NDMC area an 50% if it is MCD/NDMC territory
- Left with no alternative as a way forward, DMRC had to agree Revenue share of 35% recently with south DMC.
- Others are likely to follow the suite soon.

Impediments

- On 27th September' 2006, MOUD defined Metro's "Operational Structures" as:-
 - All Metro Stations and tracks supporting structures at grade, elevated and underground including entry structures, ancillary buildings to house DG sets, chiller plants and electric sub-station, supply exhaust and tunnel ventilation shafts etc.
 - Depots and maintenance workshops.
 - Traction sub-stations, Operational Control Centers.

Impediments

- On 27th September' 2007, MOUD clarified interalia :-
- "..... The issue has since been examined in consultation with the MRTS Division of this Ministry and it has been decided with the approval of Competent Authority that construction of structure above the platform over the footprint of the Metro Station is an integral part of the Metro Station building, and is, therefore, to be treated as part of the operational structure of the Metro Station.

Impediments

- It may be reiterated, Metro Stations have already been included in the list of operational structures as per relevant provisions of MPD 2021."
- MOUD further decided "NOC for property development shall be issued to DMRC and DMRC in turn will issue NOC to developers appointed. This NOC should be honoured by concerned agencies for e.g: MCD, DDA, etc. while sanctioning building plans submitted by the developers."
- MCD's do not follow above guidelines, they are not able to issue Completion plan in want of building plan and at times treat DMRC activities illegal.

Impediments

- On sealing one of the DMRC's property at Inderlok, the Hon'ble Lt. Governor on 16.06.2010 recorded:-
- "Commercial establishments within the footprint of the Metro Station complex is to be considered integral part of the Metro station only and there would be no requirement for any building approval from the MCD.
- Further, it was also clarified that the commercial establishments within the footprint of the Metro Station would be liable to pay the property tax and secure trade license from the MCD as per MCD regulations.

Impediments

- Health Trade License application include
 - Proof of legal occupation
 - Proof of Sewer connection
 - Building sanction plan along with completion certificate
 - Prof of mixed land use
 - Fire clearance
- DMRC pays the property tax and trade license issue is settled by the Licensees.
- Issue of Completion certificate needs to be settled early.
- Issue of Revenue sharing with MCD's also needs to be settled as 35% of top line is too high.
- This is rendering most paying advertisement contracts unattractive

Way forward Airport line.....

- As the fares have bottomed up, we are exploring the other possibilities to increase Non Fare box revenue.
- DIAL, AI, Jet are persuaded to start check in at New Delhi and Shiva G stadium, to increase the foot falls.
- Tender for carrying white goods through empty luggage carrier floated.
- New spaces are being explored for commercial / Offices at Shivaji Stadium, New Delhi Metro Station.
- Tender for commercial spaces at D-21 Corporate Park
- ATM sites at feasible locations of existing stations.
- Identification of possibilities for e-lobby/Digital Banks/Money Shoppe.

Way forward.....

- Full Inventory being taken
- New areas are being explored
- Outdoor advertisements scope to be expanded to event management and short time activities
- Digital media advertisement to be encouraged at stations and TOMs
- Licensing of vacant Token counters
- Advertisement on tokens
- Identification of possibilities for e-lobby/Digital Banks/ Money Shoppe.
- Requesting MOUD for early settlement of disputed issues.

DELHI METRO
मेरा मेट्रो

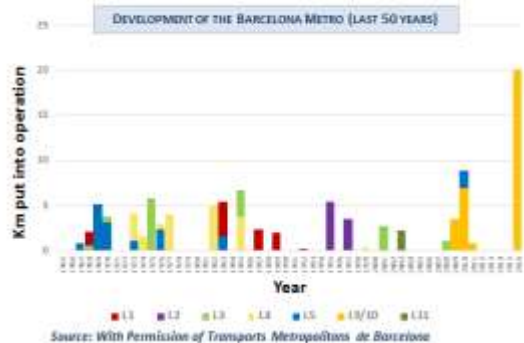
**Thank You
for
Giving me an opportunity
for sharing my views**



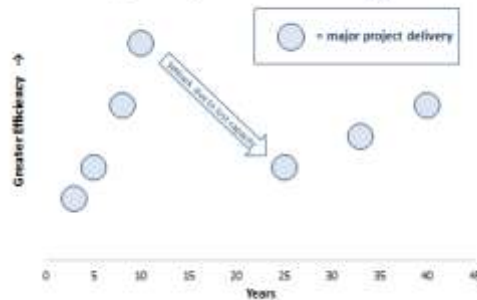
Sharing selected learnings

1.) Metro is a capital investment that never stops...

Development is a long game



Loosing a step when out of practice



Asset management from day 1



What our case study metros have said

Decisions need to be taken with a 100 year view

- "The biggest mistake to make is to just let a load of contracts - and that's the easiest thing to do"
- "Buy whole of life, don't just buy first asset"
- "The intention was purely to do a new line. They never think about paying it back"
- "What's really important is what capability you have to manage obsolescence"

Think of asset management from "day 1"

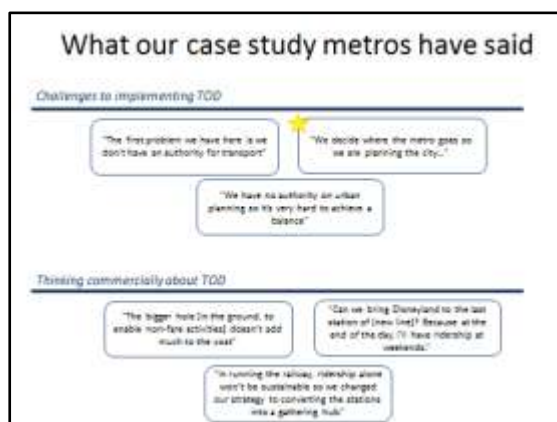
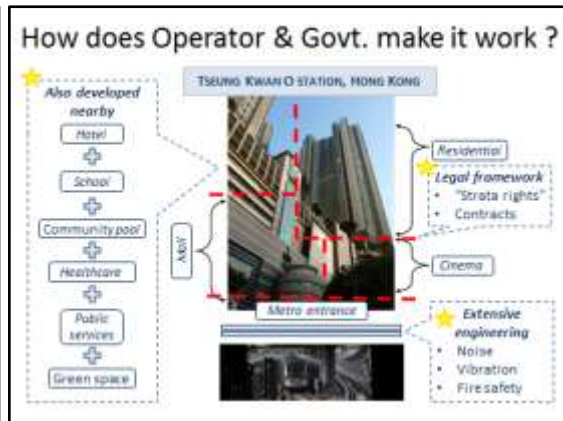
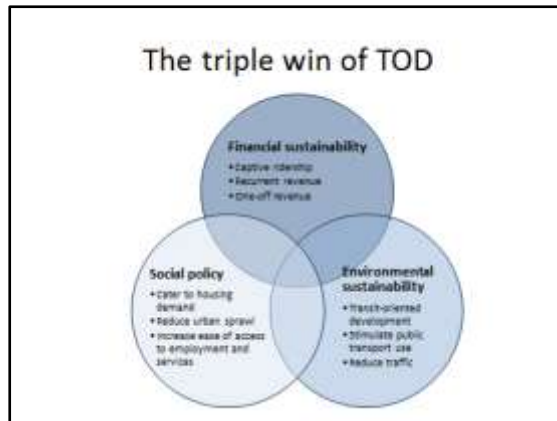
- "If we cannot value our own assets, you can't expect others to see their value"
- "It never crossed their mind that in 20 years time they'd need a big stack of money and they never put it aside"
- "Every night for 4 hours the patient has to go through brain surgery, heart surgery, then get up in the morning, turn a machine, and wait"
- "Government finds it difficult to decide where the money comes from for asset replacement"

2) Your metro will change land use. Plan on changing your metro when it does.

Better yet – plan to make changing land use beneficial to your metro and its customers.

Example: <City Name?>

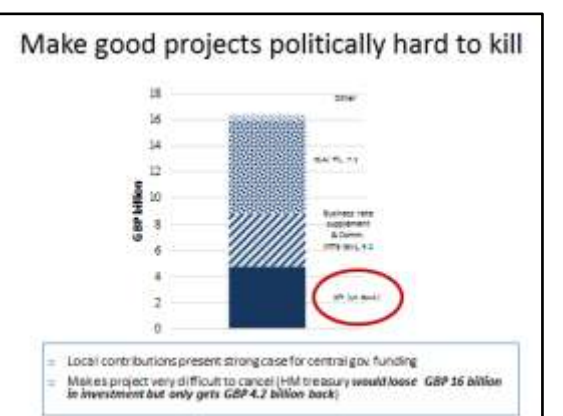




3) Think of the politics and manage upwards (within the rules)

Example – anonymous metro

- During a mayoral campaign, transport was a key election issue.
- The Operator publically posted a list of 8 actions that could be taking to improve services in short / medium term.
- All but 1 candidate adopted the Operator's list as their electoral platform. The Operator is now implementing the improvements with political support.



Critical to engage with elected leaders



What our case study metros have said

Everyone is facing similar challenges

"Infrastructure is long-term and strategic; politicians are short-term and tactical"

"The discount is designed by government, not by us... that is the biggest challenge"

"You need to convert the economic benefits to financial benefits, but you need political will for that"

BUT metros that manage up seem to get what they want

"The Operator cannot sit back... they must be engaged with all the key decisions - including upstream decisions"

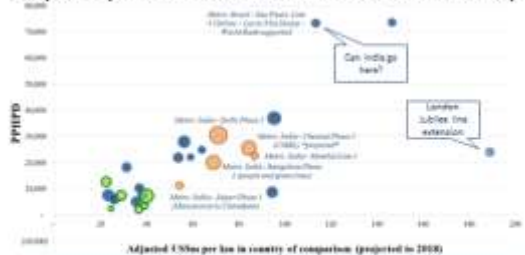
"TfL, as a corporation is much, much bigger than City Hall"

"We try and find ways together with our government to finance projects"

"TfL had to learn from central government about the process of managing electoral change"

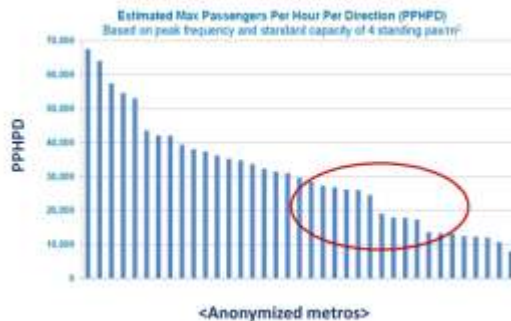
4) You get nothing more than the metro you pay for... but you can also get less

Capacity is the business & it costs money



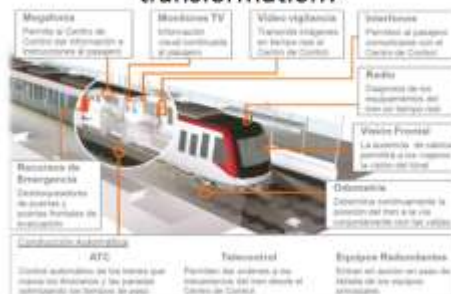
- Capacity costs money - tradeoff between building upfront or adding later
- Cutting upfront CapEx often comes at expense of later OpEx. Decisions get locked in and are difficult to reverse
- Mega cities need metros with capacity to support their growth. REMEMBER - it is difficult to shut down and expand a metro service once it is operating

Heavy metros & not so heavy metros

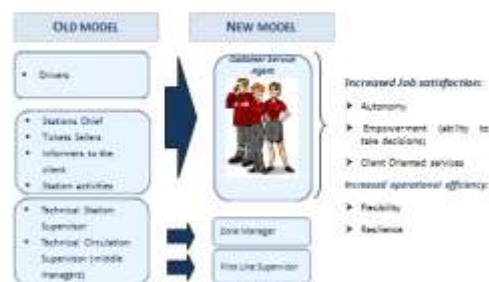


5) Getting the service right takes the right people + the right environment to enable them.

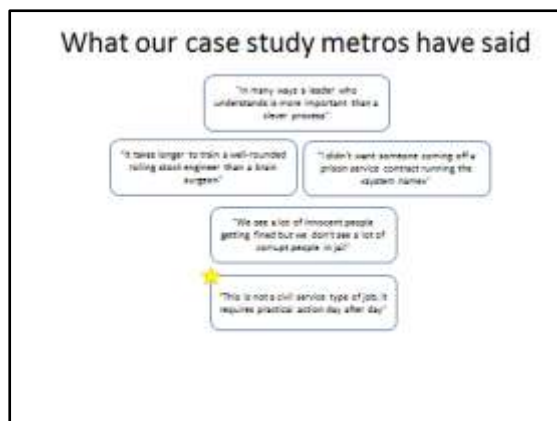
Automation for organizational transformation?



Barcelona's new operating model



Source: With permission from Transports Metropolitans de Barcelona



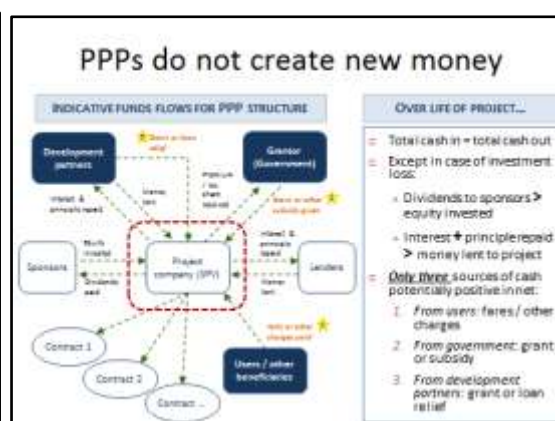
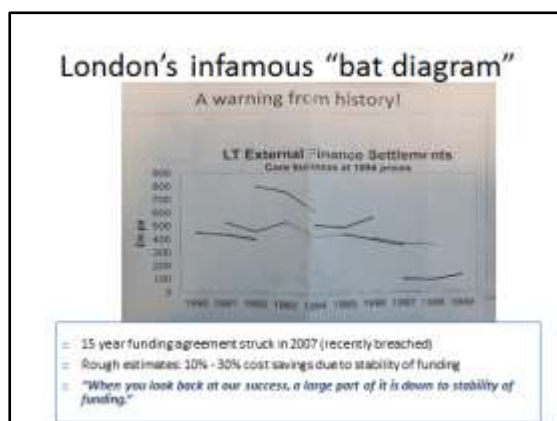
5.) Funding and finance modality may be the most powerful influence on an Operator

Simple and brutal economics of metro

- New metro lines cost more money than can be recouped from fares.
- ...but operational expenditure (including renewal) can be self-sustaining if fares are sufficient and there is a good level of non-fare revenue.
- Sustainable fares policy is crucial as is the approach to managing subsidies

Ways this is managed

- Upfront subsidy in cash
- Ongoing subsidy of debt obligations
- Upfront non-cash subsidy
- Different companies / balance sheets for Opex & Capex



Standardisation & Indigenisation



DMRC

Standardisation & Indigenisation

(11th JUNE 2019)

By
H S Anand
Director/ Rolling Stock
Delhi Metro Rail Corporation.
<http://www.delhimetrorail.com>

Standardisation & Indigenisation

Standardisation:

1. MoUD had set up separate Committees in May'12 for achieving Standardisation:
 - a) Fare Collection System
 - b) Metro Railway Operations & Maintenance
 - c) Rolling Stock
 - d) Signaling systems
 - e) Traction and Power Supply System
 - f) Track Structures

Standardisation & Indigenisation

Strategy for increased Indigenisation:

1. DMRC as a policy encourages **Quality Indigenisation** in procurement of all major value systems.
2. Suitable mandatory clauses are incorporated in the tender specifications for achieving progressively increased manufacturing of cars and sub-systems in India

Standardisation & Indigenisation

Strategy for increased Indigenisation:

1. In the Phase-III Rolling Stock tender (tender 'RS10'), the tender conditions mandates that the Contractor must manufacture more than 75% cars within India by:
 - a) Either setting up their own plant
 - b) Associate with suitable Indian companies
2. Indigenisation of specified items (18), required for maintenance is mandated either by the OEMs directly or through their local partner for minimum 25% of the ordered quantity

Standardisation & Indigenisation

Indigenisation - Manufacturing of RS:

1. Notable achievements in manufacturing of modern state of the art Metro RS:
 - a) Phase-I : 220 cars out of 280 cars ('RS1' type-BG) manufactured in BEML, Bangalore
 - b) Phase-II : M/s Bombardier set up a green field plant at Savli, near Vadodara in Gujarat. 570 cars out of 614 cars ('RS2' type-BG) have been manufactured indigenously
 - c) Phase-II : 192 cars out of 196 cars ('RS3' type-SG) have been manufactured in BEML
 - d) Phase-II : 08 cars ('RS1' type-BG) manufactured in BEML
 - e) Phase-II : 136 cars ('RS1' type-BG) manufactured in BEML

Phase-I: 220 cars out of 280 cars Manufactured in India
Phase-II: 914 cars out of 954 cars Manufactured in India

Standardisation & Indigenisation

Indigenisation - Manufacturing of RS:

Procurement of Phase-III RS:

- a) 162 cars ('RS2' type-BG) manufactured by BT at Savli
- b) 162 cars ('RS3' type-SG) manufactured at BEML
- c) 366 cars out of 486 cars ('RS10' type-SG) contracted for manufacture in BEML
- d) 96 cars ('RS1' type-BG) contracted for manufacture in BEML

Phase-III: 786 cars out of 906 cars Manufactured in India

Standardisation & Indigenisation

Indigenisation - Manufacturing of RS:

1920 Cars out of 2140 Cars

For DMRC Phase-I, II & III projects

Manufactured in India

in the facilities created at:

BEML (brown field) – 1180 Cars

BT (green field at Savli) – 740 Cars

BT exporting 450 Cars for Queensland from Savli
Alstom exporting 132 Cars for Sydney from Sicily

Standardisation & Indigenisation

Indigenisation - Content in value terms:

In the recently placed orders on BEML and BT the indigenisation content in value terms is estimated as:

1. Contract 'RS11' (BT - 162 Cars) : >80%
2. Contract 'RS13' (BEML - 96 Cars) : >80%

TARGET with progressively increased indigenisation : 90%

Standardisation & Indigenisation

Indigenisation – 100% for repeat order of RS:

Type of Stock	Contract	Year of Award	No. of Cars	% Indigenization
RS1	RS1	2001	280	79
RS1	RS4	2008	8	100
RS1	RS6	2011	136	100
RS1	RS13	2015	96	100
RS2	RS2	2007	424	92
RS2	RS5	2010	114	100
RS2	RS7	2011	76	100
RS2	RS11	2015	162	100
RS3	RS3	2007	196	98
RS3	RS8	2013	162	100
RS3	RS8	2011	40	100
RS10	RS10	2013	486	75
KRS1	KRS1	2014	75	100

Standardisation & Indigenisation

Indigenisation - Manufacturing of RS:

- 40 Cars for Jaipur Metro procured directly from BEML
- 75 Cars for Kochi Metro being procured from Alstom shall be manufactured in their green field facility set up at Sricity near Chennai.
- 80 Cars for Lucknow Metro being procured from Alstom shall be manufactured in Sricity.

For Jaipur, Kochi & Lucknow, 100% RS
Manufactured within India

Standardisation & Indigenisation

Indigenisation - Manufacturing of specified items:

- Melco/Japan has set up green field plant in Bidadi for Propulsion Equipment (Traction Transformer, Converter Inverter, Traction Motors & SIV)
- Bombardier at Maneja/Vadodara - CI and SIV
- Faveley at Hosur - Pantograph, HVAC, Brake parts & Saloon doors
- Knorr Bremse @ Palwal - Brake parts
(Setting up Door Manufacturing Facility with IFE/Austria)
- Autometers - Electrical panels & Cab Panels

Standardisation & Indigenisation

Indigenisation - Manufacturing of specified items:

- VOITH & IGW – Gear Drive
- VOITH – Semi Permanent Coupler
- DELLNER – Gangway
- BT, Premier & Metlonics - Bogie Frames
- AMCO SAFT – NiCd Batteries
- RANE – Brake blocks
- SIDWAL & LLOYD – HVAC
- FAG, SKF & TIMKEN – Axle Bearings

Standardisation & Indigenisation

Indigenisation - Manufacturing of specified items:

- Axle Box
- Battery Box
- All types of Glassess
- VCB by Schneider
- Large number of fabricated items
- PA/PIS of RS1 type
- Luminaires and Lamps

Standardisation & Indigenisation

Indigenisation – S&T Items:

- AFC Gates by Thales
- Smart Cards and Tokens
- Track Circuits (Alstom – Mainline; Siemens – DepoT)
- TVM and AVM for Phase-II
- LED based PIDS Boards (100% in Jaipur & Phase-II)
- Digital Clocks
- UPS and Batteries
- FOTS – almost 80%
- Point Machine for Depots
- Junction boxes
- Cables

Standardisation & Indigenisation

Indigenisation – Track Components:

- Fastening System 336:
 - 8 out of 11 items of the Track fastening seat are manufactured locally
 - Only Tension clamps, Elastomeric pad & helical spring imported
 - Localisation in value terms – 70%
- Turnouts and Scissor crossover:
 - Raw switch stock, check rails & specialised fastenings imported
 - Machining/assembly done in local facilities
 - Localisation in value terms – 51%


THANK YOU

Strategy for Cost Effective Design, Construction Operation & Maintenance



**Strategy for Cost Effective Design,
Construction
Operation & Maintenance**


**Nagpur Metro Rail Corporation Ltd.
(NMRCL)**



In NMRCL cost control, cost cutting, cost effectiveness and optimization have been adopted as a philosophy with each team member committed and contributing to it so that the project is completed within the stipulated time & cost and with highest standards of quality and safety.




**COST EFFECTIVENESS
IN DESIGN**



VIADUCT

Via duct segment width reduced to 8.5m as compared to conventional 10.3m due to:


- adoption of train - end evacuation.
- elimination of side walkways.
- elimination of RCC cable troughs.
- elimination of pre-cast parapets.
- adoption of 40 KE for 120m curve.



Reduction in weight by 60 t per span (15%).

Optimization of the viaduct design parameters
Reduction in time and cost of completion of Via-duct

Estimated savings: Rs. 90 Cr



VIADUCT

Parapet Casting along with segments

↓

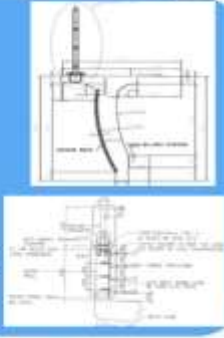
Casting of 70 cm Parapet Integrated with Segment

↓

doesn't need separate casting, transportation, launching and stitch concrete

↓

Saves Time & Cost



Estimated savings: Rs. 30 Cr



**COST EFFECTIVENESS IN DESIGN
Land- Right of Way**

➤ Reduction in "Right of way" from 20m to 18m due to:

- Reduction in width of segment from 10.3m to 8.5m.

Estimated savings: 10% area & cost of Land Acquisition

COST EFFECTIVENESS IN DESIGN

STATIONS

Station Platform length: Reduced to 75m from 140m as:

Train composition of NMRCL consists of 3 coaches (length 66m)

Stations have been designed for extension of Platform in future, if the need arises.

Estimated savings: Rs. 100cr (@ Rs. 3 cr * 36= Rs.108cr)

COST EFFECTIVENESS IN DESIGN

DEPOTS

- > Maintenance shed in depots: Size reduced to half compared to DPR due to:
 - * 3 coach composition of NMRCL Trains.
- > Stabling lines: Reduced to one third due to:
 - * Trains are to be maintained in depot once in three days.
 - * Only trains requiring maintenance (one third) to be stabled at Depot and remaining trains (two third) to be stabled at Terminal Stations.
- > No roof covering for stabling lines.
- > Overall track length of depots reduced to 8km from 10 km.
- > Reduction in length of inspection bay lines to 80m from 166m
- > Reduction in length of repair bay lines to 80m from 166m
- > Elimination of procurement of jigs & fixtures for repairs of electronics equip included in AMC of OEM

Estimated savings: Rs. 100 Crs

COST EFFECTIVENESS IN DESIGN

Signalling & Telecom

- > Separate tenders for signalling & telecom for more competitive bids.
- > Elimination of sub master clocks and servers thereof at stations.
- > Virtualization of Telecom subsystem servers in OCC leading to hardware optimization.
- > Elimination of 48 Volts DC supply in the Telecom system design.
- > Signalling rooms eliminated from stations not having interlocking

Estimated savings: Rs 25 cr

COST EFFECTIVENESS IN DESIGN

E & M

- > Only LED Lighting on universal basis over entire metro system.
- > Regenerative VVVF Drive for lift and Escalators also saving 20% energy.

Estimated savings: Rs. 4 Cr/ year

COST EFFECTIVENESS IN DESIGN

TRACTION

Reduction in number of Receiving Sub-Stations from four to two by feeding traction power at Interchange Station to both the corridors

↓

- > Reduction in transformer ratings
- > optimization of cable sizes
- > Elimination of neutral sections

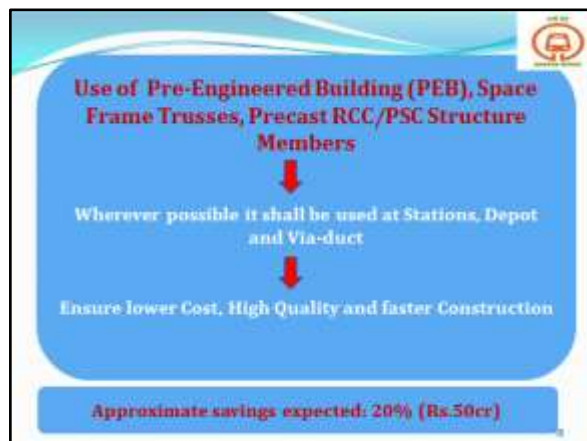
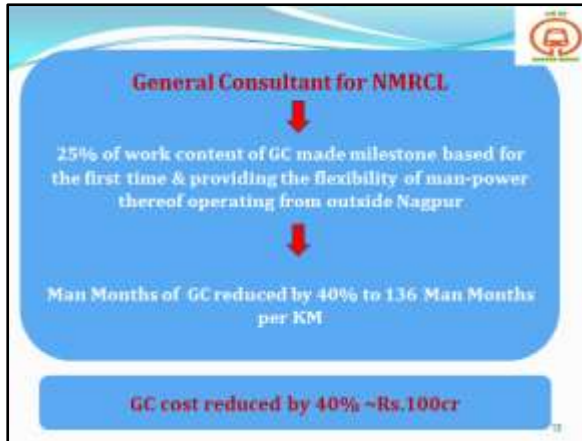
Estimated savings: Rs. 180 Cr

COST EFFECTIVENESS IN DESIGN

Rolling Stock

Pioneered the complete liberalization of eligibility criteria of bidders to achieve widest possible participation from across the world

Will lead to competitive bidding



Light Weight Tubular OHE Portals

To improve aesthetics

to be used for fixing CCTV surveillance and lights for Track, OHE, Signalling, Maintenance

Will also detect presence of unwanted persons on Viaduct with alarm



Reduction in Cement content of RCC & PSC Structure

Conventional system : More Cement for stronger Concrete.

Recent studies show: More cement produces more heat of hydration leading to surface cracks reducing durability of Structure.

Addition of fly ash & Silica fumes reduces Cement content without impacting Concrete Strength.

Increased durability and better finishes.

COST EFFECTIVENESS IN O & M

COST EFFECTIVENESS IN O&M Solar Power Initiative

> Solar Power generation right from the inception.

- A 14MWp Solar Roof Top project is planned to be set up on RESCO Model by 2017 in Phase - I under the net metering scheme of Maharashtra. Finally capacity rising to 25 MWp
- Solar PV panels will be mounted on the roof of all platforms & buildings. Also on boundary walls and vacant grounds.
- Solar power likely to meet - 65% of NMRCL's energy requirement.
- Solar energy generation will be 20 Mtu finally rising to 34 Mtu per annum.



NMRCL will be able to save in excess of - INR 8 Cr per annum

COST EFFECTIVENESS IN O & M

- > Manpower: Anticipate reduction of manpower requirement to 20 men /km compare to current Average of 25 men /km.
- OHE: Night vision cameras for direct maintenance.
- Avoid keymen and Hot weather-Patrolling
- Avoid movement of dummy train in the morning
- Use of Predictive Maintenance in place of Time based maintenance.
- AMC of Electronic equipment for 10 years after DLP for Rolling Stock.
- Outsourcing of simulator avoiding procurement of simulator.

Estimated savings: Rs.25 cr/year

COST EFFECTIVENESS IN O&M FEEDER SERVICE

- > To connect Metro commuters to all other modes of transport through a common mobility IT platform
- > A common city mobility plan with route rationalisation is planned for providing first and last mile connectivity

Will enhance ridership & revenue

COST EFFECTIVENESS IN O&M TRANSIT ORIENTED DEVELOPMENT (TOD)

- > In addition to fare box revenues, NMRCL project is unique in terms of financial viability due to additional revenues from :
 - Transit Oriented development - COM notification issued
 - Increase in stamp duty by 1% - notification under issue
- > Half of TOD premium & 1% Increase in Stamp duty to accrue to NMRCL as non-fare box revenue

Accrual of revenue to NMRCL - Rs200 crs per year

COST EFFECTIVENESS IN O & M Property Development Initiatives under TOD Right From Inception

International Architects M/s Ensa from France (contract includes engaging a Property Development Expert) appointed as Main Architect for inter-change Station at Sitabuli and Iconic Station building at Zero Mile

Selected through International Architectural Design Competition wherein 23 International/National Architects participated

Construction cost of station portion to be borne by NMRCL and rest of the development to be on PP basis by the developer selected by bidding

	STATION	ZERO MILE	TOTAL
NO. OF FLOORS	5-7	5-7	-
STATION AREA	9,17,000 sq. feet	70,000 sq. feet	1,07,000 sq. feet
PPP AREA	4,30,000 sq. feet	2,33,000 sq. feet	6,63,000 sq. feet
METRO AREA	4,30,000 sq. feet	23,000 sq. feet	4,53,000 sq. feet

Average anticipated sales per year from FY17-18 would be 150,000 Sq. feet



COST EFFECTIVENESS IN O & M

Non fare box revenue through Property Development Metro Cities on Depot Land

Property development by efficient use of depot land to ensure captive ridership as per the best practices followed in MTR Hongkong and other advanced Metro systems

- 25 hectare land each already available at the sites of two car depots at South and West end of the Metro corridor (Mihan and Hingna)
- Conceptual proposal and architectural plan received from renowned architect from Mumbai M/s Hafeez Contractor (contract includes engaging a Property Development Expert)

- Development of two Metro Cities on the concept of Smart and fully green city having solar power supply
- To be developed on FPP model through bidding process
- Accessibility of all residential and commercial areas within 500m of Metro stations to be developed within the depot area
- Will ensure extra capture ridership of 50,000 per day on full development

	Mihan Depot	Hingna Depot	TOTM
Residential Development Proposed	30 lakh sq feet	30 lakh sq feet	60 lakh sq feet




Anticipated sales per year from FY 17-18 would be 12 lakh sq feet



Other Innovations being developed in NMRCL

- > Adoption of Flat void Slab for concourse level which is aesthetically good, which will be used for art work.
- > Elimination in leakage of rain water from station roof due to "fixity arrangement of solar panels" by adoption of "Standing Seam" arrangement at Station roof
- > Adoption of "Sleeper pad" for PSC Sleepers for At-grade section which will reduce attrition of ballast and absorb vibration of running train.

Best Practices Followed

 <p>ONE DAY WORKSHOP ON "LEARNINGS IN URBAN RAIL & WAY FORWARD" 11TH JUNE 2016 DMRC - NEW DELHI</p> <p>BEST PRACTICES FOLLOWED Narasim Prasad, Director (Systems & Operations)</p>	<p>PLANNING – UNIQUE FEATURES</p> <ul style="list-style-type: none"> ➤ About 55% of the corridors in Phase-I are UG and the remaining Elevated. This is the highest UG tunnelling for any start up Metro. ➤ Multi Modal Integration Strategy has been built in to the Project Design stage itself. ➤ Covers the major arterial roads and connects important transport hubs such as Airport, Chennai Central station, Egmore station, Chennai Mofusill Bus Terminus (CMBT), etc. ➤ Airport link is given as part of the Phase-I Project itself.
<p>GENERAL CONSULTANCY SERVICES</p> <ul style="list-style-type: none"> ➤ "Front loading" of foreign experts by GC – Needs to be cautioned. ➤ Hidden costs (Travel, accommodation, communication costs, office supplies etc) to be closely monitored. ➤ Review of CV's and interview proposed GC candidates prior to deployment to ensure value for money. ➤ Developing in-house competencies to avoid full dependency on the external Consultants. ◉ Way Forward: ➤ To hire Independent Consultants directly only where in-house competencies are not available. 	<p>CIVIL – ELEVATED CONSTRUCTION</p>  <p>KATHIPARA CROSS OVER</p>
<p>BALANCING GIRDER</p> <ul style="list-style-type: none"> ➤ Cast-in-situ Concrete segment casting. ➤ This was necessitated due to busy road fly-over. ➤ It is unavoidable to divert busy traffic. ➤ Main Span = 75 m ; ➤ Adjacent Spans = 53m+46m 	<p>BALANCED CANTILEVER DURING & AFTER CONSTRUCTION</p> 

ELEVATED CONSTRUCTION – GUINDY ROB

- Viaduct is crossing over Railway tracks (skew) at an angle of 79deg.
- Total Length of 105m, Span – 35m, 70m.
- It is a open web girder composite girder. Total weight -770 Tons (540+230).

GUINDY RAIL OVER BRIDGE



CIVIL - UG

- Specially designed lintel beam for supporting the tunnel rings during excavation for cross passage.
 - Replaces heavily designed steel C-beam used earlier
 - Easy to install and dismantle – saving time
 - Minimization of resources
- Concreting of permanent lining in single pour by using specially designed single piece one-of-a-kind formwork and self compacting concrete.
 - Savings in time
 - Improved resource mobilization planning
 - Good quality finish



ENVIRONMENT

- Compensatory planting works in the ratio of 1:12. For 2,405 trees felled and planted 61,400 saplings in and around Chennai city.
- Compensatory planting double the norms fixed.
- Toyota-Miyawaki method of afforestation being attempted for first time.



The Rare, endangered, red listed or sentimental valued trees were transplanted by CMRL. Till date 75 trees are transplanted successfully in Chennai city.

BUSINESS DEVELOPMENT

◦Cash Deposit Machines:

- First of its kind in Metros of INDIA.
- Revenue generator, Bankers paying CMRL for the space licensed, to put up the CDMs, also CMRL can deposit the collections immediately, as against the prevailing T+1 day system.
- Savings in service payments to bank for station cash collections.
- Safe and secure.

ROLLING STOCK



SIGNALING

- › Single source of power supply for signal, telecom, PSD and AFC derived from main UPS
- › Signal room dispensed with Non-interlocked stations duly shifting cabinets to Telecom room – saving in AC capital and running cost plus releasing space for PD
- › Hot stand-by feature of On-Board ATP.
- › Seamless changeover from main to standby system without stopping the train.
- › Introduction of stud weld avoiding hole in the web of the rail for S-Bond connection-ease of maintenance and replacement. Avoid weakening of rail strength.

TELECOM

- › Fence intrusion detection system in Depot Perimeter: by detecting the vibrations on barbed wire fence.
- › Passenger Information display and PA announcements for single line operation of trains
- › Integrated Operator Works Station for Telecom Systems of PA/VA, PIDS, CCTV & ACID, instead of individual works stations, saving on Equipment Cost and Room Space.

PLATFORM SCREEN DOORS

- › Reduction in Air Conditioning load by reducing loss of cool air into tunnels.
- › Protecting passengers from track side piston effect.
- › Reduction in platform width thereby reducing station box size



AUTOMATIC FARE COLLECTION

- › First metro in India to start operations with 30 full complement Ticket Vending Machines (TVM's)
- › 95% ticket sales through TVM's - a trend started by CMRL
- › First TVM's in India to dispense "Bank notes as Change" as of today.
- › Token containers used to vend and collect tokens are interchangeable among the equipment's resulting in ease of operations.

TUNNEL VENTILATION SYSTEM

- › Smoke free evacuation route in the event of train on fire due to PSD
- › SIL 3 SCADA control system for TVS system developed from scratch
- › Train Motion Sensors : Used to operate Tunnel Extract Fans only when required (no continuous operations)
- › Minimizing bends in duct thereby reduced energy consumption
- Way Forward:
 - › Phase 1 Ext & Phase 2: Around 30% space saving by changing orientation of fan alignment.
 - › Multi-Duty Fans to minimize the numbers of fans.

VAC(ECS)

- › Chiller Sizing - Peak load 400 TR (Without PSD 1050 TR) 60% energy savings
- › VFD in water cooled chillers - Ensures energy saving during part load.
- › Variable Refrigerant Unit - VRF AC units - Twin compressors with inverters has increased Co-efficient of performance & efficiency at part load conditions.
- › Primary chilled water system with VFD - Secondary chilled water system was eliminated, savings in space/energy. Primary pumps with VFD to cater varying loads.
- › Air curtains - Located at entrance of the concourse level to minimize leakage of conditioned air from concourse level to entrances thereby energy saving.
- Way Forward:
 - › Space optimization in Phase 1 ext for Chiller plant & Fans rooms.
 - › AHU/ Fans at Concourse level to feed concourse & Platform by eliminating AHU/Fans room in platform level.

LIFTS & ESCALATORS

- › Frequent tripping of Lifts and Escalators was faced due to problem in input power quality. The distorted power fed to Lifts and Escalators was identified due to Harmonics and delays were introduced in the sensing devices.
- › For first time users of escalators, signages have been especially placed to enhance the eye catching potential.
- Way Forward:
 - › RDSO standard specifications can be adopted to indigenize escalator equipment & components.

POWER SUPPLY & OHE

- Adoption of GIS , reduces the space requirement
- Aluminum OHE fittings is adopted. Lighter design.
- BTRC was eliminated, cost saving in investment as well as maintenance.



110kV GIS at Koyambeda RSS



Aluminum OHE fittings

MEP

- › LED Lighting and VRV air-conditioning and Hydro pneumatic system was provided in Stations for Electrical Energy savings around 30%
- › Room flooding system is avoided in Low voltage and Medium voltage Power rooms. Panel flooding system has been provided there by Saving of Rs.20 Lakh per station.
- › BMS system is dispensed in Elevated stations thereby saving 1 Crore/station
- › Normal Detector provided inline of VESDA (Very Early Smoke Detection Apparatus) thereby savings of Rs.30Lakh per station.
- › O&M-MEP services man power Outsourced.
- › Planned Solar panel as a Roof for Upcoming Elevated stations.

OPERATIONS – 10KM(7 STN)

- › Customer care operations at stations is outsourced
- › Staff made redundant have been re-trained and redeployed as Stations Controllers & Train Operators.
- › Dwell time reduced at Stations to save AC energy
- Twin Single Line working :
 - › Owing to contractual issues the Terminal Station could not be commissioned in time for Revenue Operations.
 - › Main Lines of CMRL are provisioned for Bi-directional working.
 - › Using the above feature, single line working has been introduced on both the lines for a distance of 5 Kms.
- Transformation of customer access to Ticketing Services.
 - › Closing down Ticket Offices & sales thro TVMs
 - › Personalized services at TVMs by redeploying staff from Ticket Offices.
 - › Enhanced services to passengers as these staff also function as facilitation agents.

HUMAN RESOURCES

- › Introduced PG Diploma in Metro Rail Technology Course at IIT, Madras
- › Conducted Online test All Over Tamil Nadu even for ITI and Diploma holders to ensure timely recruitment of O&M staff.
- Introduced E-Office in CMRL: Paperless Office, easy tracking and effective monitoring of files & Digital storage.
- › Conducted learning classes / screening of Tamil movies for non-Tamil speaking officials / staff
- › Conducted Food & games carnivals at Metro Stations to increase ridership and publicity.

COST CONTROL IN SALARY & WAGES OF JR. ENGINEERS AND TECHNICIANS BY REDUCING PAY SCALES

Details	Diploma Holders		ITI Holders	
	Existing	Proposed	Existing	Proposed
Designation	JE	JE, Gr II	Technician	Technician Gr II
Pay Scale	13500-25520	9570-11470	8000-14140	5590-8500
Basic Pay	13,500	8,570	8,000	5,590
DA (112.4% of Basic)	15,174	7,457	8,962	6,245
HRA (10% of Basic)	4,350	2,001	2,400	1,827
Cafeteria Allowances (10% of Basic)	4,725	2,335	2,800	2,132
Gross Pay	37449	18,503	22,162	15,594

PHASE I - EXTENSION

- » Reduction in station box size of UG STN from 220m to 140m
- » Leading to reduction in construction & operation cost
- » Optimized systems room sizes/location without compromising on redundancy
- » Platform Screen doors to reduce platform width and AC load
- » Cantilever stations in elevated stretch leading to reduction in land acquisition
- » Land acquisition reduced by around 30 to 50%
- » Station over central pier system with only landing area in ground level

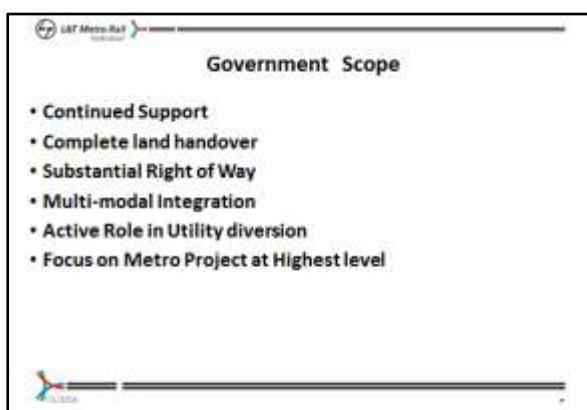
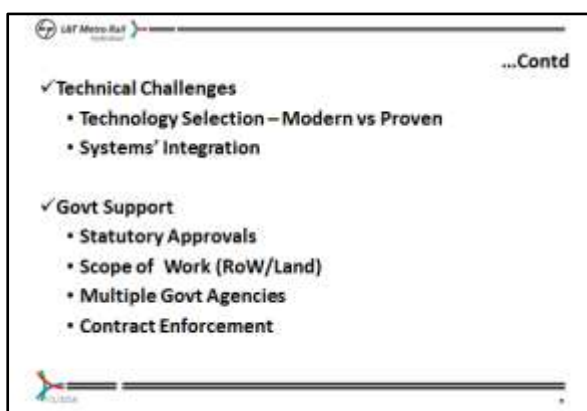
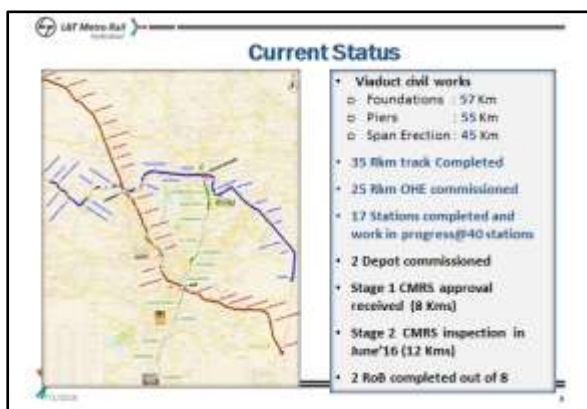
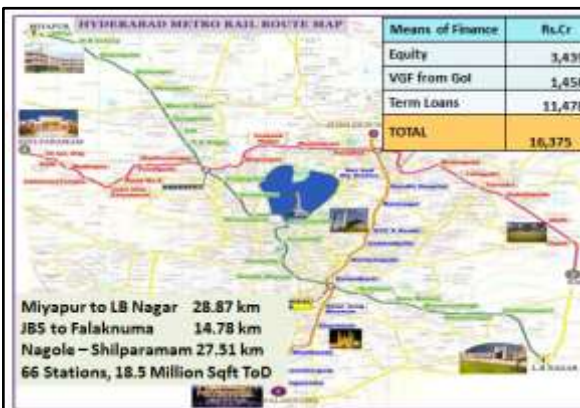
THANK YOU



Chennai
Metro Rail
Limited

ANY QUESTIONS?

PPP Initiative



...Contd

- **O&M structure – Operator model**
 - ✓ Outsourced model
 - ✓ IT based Maintenance Management Tools
- **Statutory Approvals on time – early engagement**
- **Sustainability Initiatives**
 - ✓ Zero discharge
 - ✓ Solar Energy

Project

PROGRESS PHOTOS





Uppal Depot



Station Progress – Exterior

OCC Theatre*



*Architectural view

Learnings & Take-aways

- **Technical Specifications & Standards**
 - ✓ Modern technology
 - ✓ Redundancy
 - ✓ Life cycle cost (LCC)
- **Statutory Approval**
 - ✓ Simplification of Process - online
 - ✓ Timelines
- **O&M**
 - ✓ Resource & spares sharing
 - ✓ Indigenous vendor development
 - ✓ Energy cost optimization – solar
 - ✓ Benchmarking group – Indian metros

Summary

- **Hyderabad Metro**
 - ✓ an example of innovative project management
 - ✓ L&T Group & GoTS committed for the Project
 - ✓ Revenue operations to start soon
- **PPP Initiatives for future Projects**
 - ✓ Tweaking the Model CA with existing experience
 - ✓ Equitable risk allocation
 - ✓ Renegotiation in case of major events




Unbundling for PPP



UNBUNDLING FOR PPP

Automatic Fare Collection System for KMRL

Presenter: PRAVEEN GOYAL, Director (Systems)
Date: 12.06.2015




KOCHI UMTA

Kochi-UMTA Vision

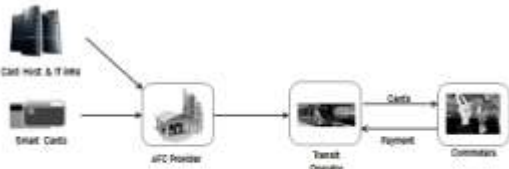
- To create a unified and inter-operable multi-modal transport system for Greater Kochi area.
- Provision of Integrated time table, ticketing and interchange hubs to achieve this.

© KMRL 2015 Automatic Fare Collection System for KMRL



The Background

- Approved DPR envisaged conventional AFC system for KMRL.
- Estimated cost was INR 70.82 Crores.




© KMRL 2015 Automatic Fare Collection System for KMRL



The Background

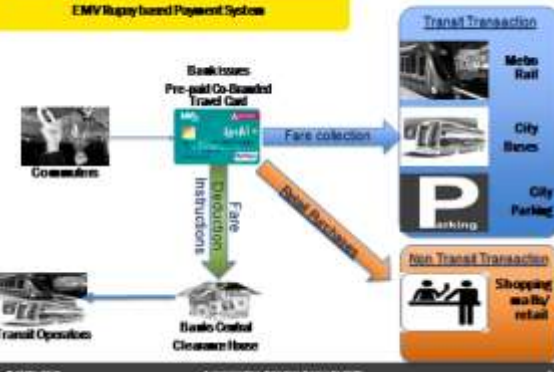
- KMRL appointed consultant for "Common Smartcard Ticketing Solution" (CSTS) for Kochi region.
- A number of brainstorming sessions were held with the consultant for enhancing the ticketing system.
- An idea was generated for integrated ticketing system for Kochi region as part of preparation for UMTA.
- Financial institutions found to be better equipped to adopt fare collection system objectives.

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The solution

EMV Based Payment System



© KMRL 2015 Automatic Fare Collection System for KMRL



Case study

- ESKİŞEHİR, Turkey
- Izmir, Turkey



© KMRL 2015 Presentation Title

AFC Model

PPP Structure

- **KMRL with 3 member consortium**
 - Lead Member – AXIS BANK LTD
 - Member – ASIS Technologies Ltd
 - Member – AGS India Technologies

AFC Model

Salient features

- CAPEX to be borne by the Consortium
- Royalty over a period of 10 years
- Maintenance and Software support for 10 years
- Revenue from both fare box and non-fare box transactions
- Web / Mobile / IVRS based customer interface and support
- Central Clearing House System is replaced by Bank host
- Expected overall financial gain for KMRL over 10 years is 236 Crores.

AFC Model

Fare Media

- **QR Code (Mobile based / Print based)**
 - Target – Mainly for occasional user
- **RPT (RFID Paper Ticket)**
 - Target – For Tourists, trippers, etc
- **EMV Cards (Prepaid)**
 - Target – Regular users
- **NFC (Mobile / Sticker based)**
 - Target – Regular users



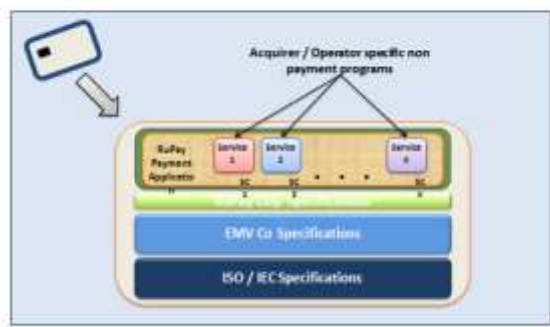
Projects under Implementation

- **BMTC smart card**
- **Ahmedabad Bus**
- **Electronic Toll Plaza**

The Way Forward

- MOUD and NPCI have prepared open source NCMC specification
- The business rule reside in the card itself, not at the backend
- The card can be used in any transit system which uses NCMC standards

NCMC Concept



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Current Status of Urban Rail Projects across the Country

S. No.	City	Length (km)		
Operational and expanding				
		Operational	Under construction	Under consideration
1	Delhi	212	115	104
2	Bengaluru	32	82	
3	Kolkata	27.39		
4	Mumbai Metro	11.4 (Line 1)	33.5 (Line 3)	
5	Mumbai Monorail	11	11	
6	Chennai	10.15		
7	Jaipur	9	2.5	
8	Gurgaon	5.1		
Under construction				
9	Hyderabad	71		
10	Chennai	44		
11	Nagpur	38		
12	Ahmedabad	36		
13	Kochi	26		
14	Lucknow	23		
15	Chennai Mono	11		
Under Consideration (Metro Rail)				
16	Guwahati	61		
17	Delhi NCR	55.3		
18	Visakhapatnam	42.55		
19	Chandigarh	37.56		
20	Kanpur	32.38		
21	Indore	31.55		
22	Pune	31.5		
23	Patna	27.88		
24	Bhopal	27.81		
25	Vijayawada	26.03		
26	Thiruvanthapuram	21.82		
27	Kozhikode	13.3		
28	Kochi Extn.	11.2		
Under Consideration (RRTS Phase 1)				
1	Delhi-Gurgaon-Alwar	180		
2	Delhi-Sonipat-Panipat	111		
3	Delhi-Ghaziabad-Meerut	90		