Digital India
Power To Empower

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF HOUSING AND URBAN AFFAIRS

स्वच्छ भारत
एक कदम स्वच्छता की ओर

BUSES, MORE BUSES, BETTER BUSES, BUS PRIORITY, BRTS, INTEGRATED TRANSPORT – A PATH TOWARDS SUSTAINABLE MOBILITY

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AHMEDABAD

13th Urban Mobility India Conference 2020

CONTENT

1. **Introduction**
   - Urbanisation Trends
   - Inadequate Bus based PT – What happens?
2. **What to do?**
   - Buses – Adequacy
   - Buses – Quality
   - Buses – On-street Priority
   - Public Transport Integration
3. **Conclusion**

INDIA IS URBANISING..

- Urbanization is an inevitable outcome of development process
- Urban India with 377 million people account for 31% of the total population
- By 2031, 600 million people about **40% population** will live in India
- Second Largest Urban System - **8000 towns and cities**
- Most cities are likely to double their population and more than double their area before they reach stable growth
- About 50% of urban population to live in **53 no. of Mill+** population Cities
- **Another 70 no of 5 lakh**+ Popn. Cities will also face severe transport pers
- Urbanization is accompanied by income growth & Rapid motorization

WHERE ARE THE BUSES ?

Estimated 2lakh+ buses are required to support urban bus transport in India.

In 10 years ONLY <25000 buses are partially funded by Centre under NURM & FAME scheme

Cost of PT Operations discourages authorities for increasing bus services.

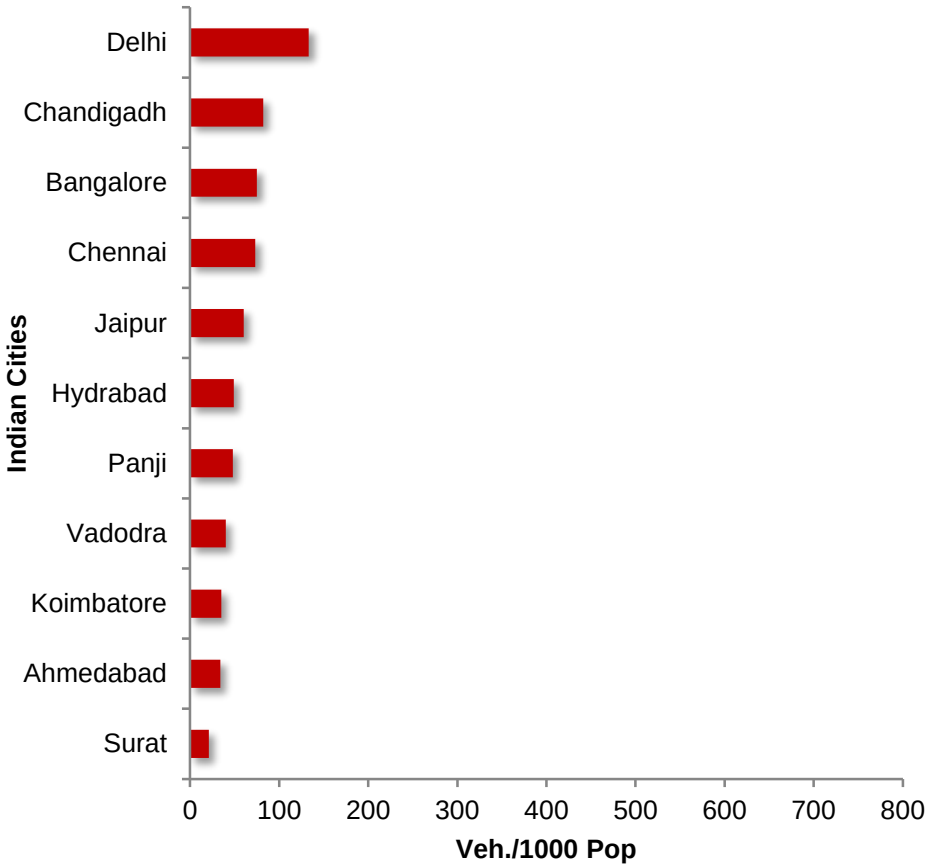
Indirect benefits such as travel time savings, road safety, environment, urban economic growth, etc. are overseen.

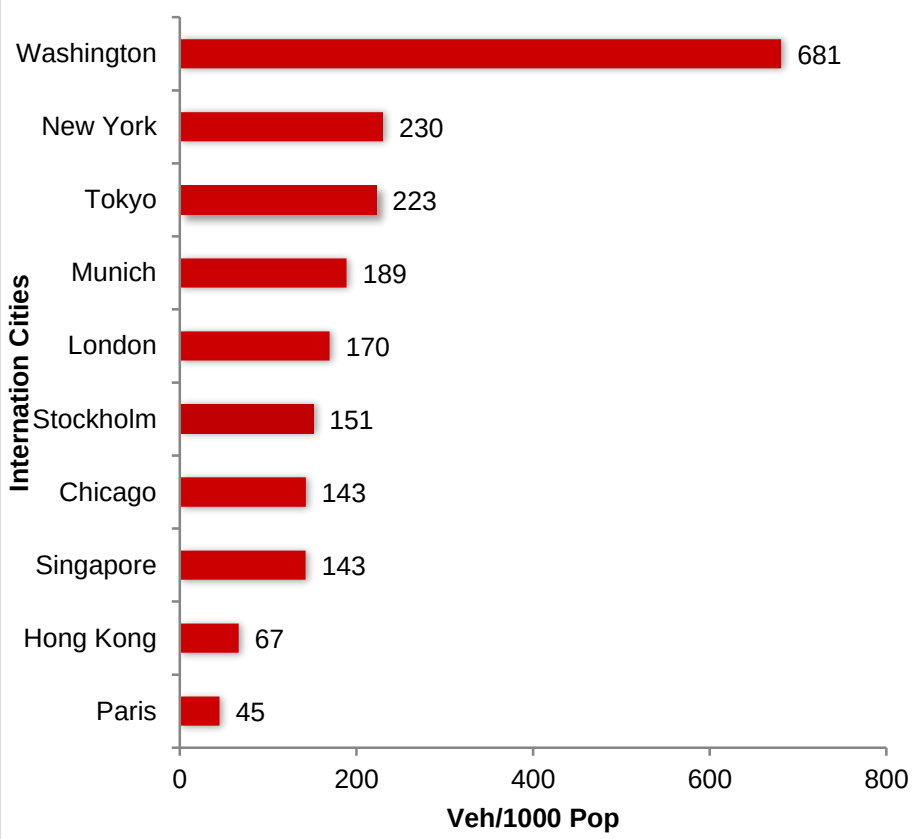
Dedicated & periodic capex & opex funding is required to support urban bus.

Innovative funding models for bus operations are needed to be created.

VEHICLE OWNERSHIP LEVELS

Vehicle Ownership per 1000 Population





Indian Cities

International Cities

INADEQUATE BUS BASED TRANSPORT?.

IPT to perform the role of public transport!!

Cars cause congestion!!

Congestion increasing travel times: 8-10kmph?

INADEQUATE BUS BASED TRANSPORT? WILL METRO'S WORK?.

Metro Systems	Study	Ridership v/s Forecast
Three federally funded US Transit Systems	Wachs (1986)	47% to 68% below forecast
% metros in developing cities worldwide	Halcrow Fox (1990)	50% to 90% below forecast
10 federally-funded US transit systems	Pickrell (1990)	28% to 85% below forecast
6 Asia rail concessions	Halcrow (2004)	25% to 50% of forecast
Bangkok Sky Train: (24 kms)	UNESCAP (2014)	Actual 1.8 lakh v/s forecast of 6.5 lakh -72% below forecast

INADEQUATE BUS BASED TRANSPORT? WILL METRO'S WORK?.

City	Commencement Year	Proposed Network Length (2016) - km	Operational Network length (2016) - km	Estimated Daily Ridership (2016)	Actual Daily Ridership (2016) Lakh	Actual Daily Ridership (2017)	% Ridership Achieved
Delhi	2002	193	213.00	22.00	26.61	24.20	118%
Mumbai	2014	11.4	11.40	6.00	2.77	3.80	46%
Jaipur	2015	12.06	9.63	2.10	0.25	0.18	**12%**
Chennai	2015	43.80	20.00	7.56	0.12	0.30	**2%**
Bengaluru	2011	72.09	30.30	14.80	1.75	3.20	**12%**
Chennai*	2015	173.01	45.10	8.89	1.15		**13%**
Lucknow*	2016	107.98	22.90	6.44	0.67		**10%**
Kochi*	2017	39.07	24.80	4.68	0.6		**13%**
Hyderabad*	2017	188.00	69.21	10.89	4.9		45%

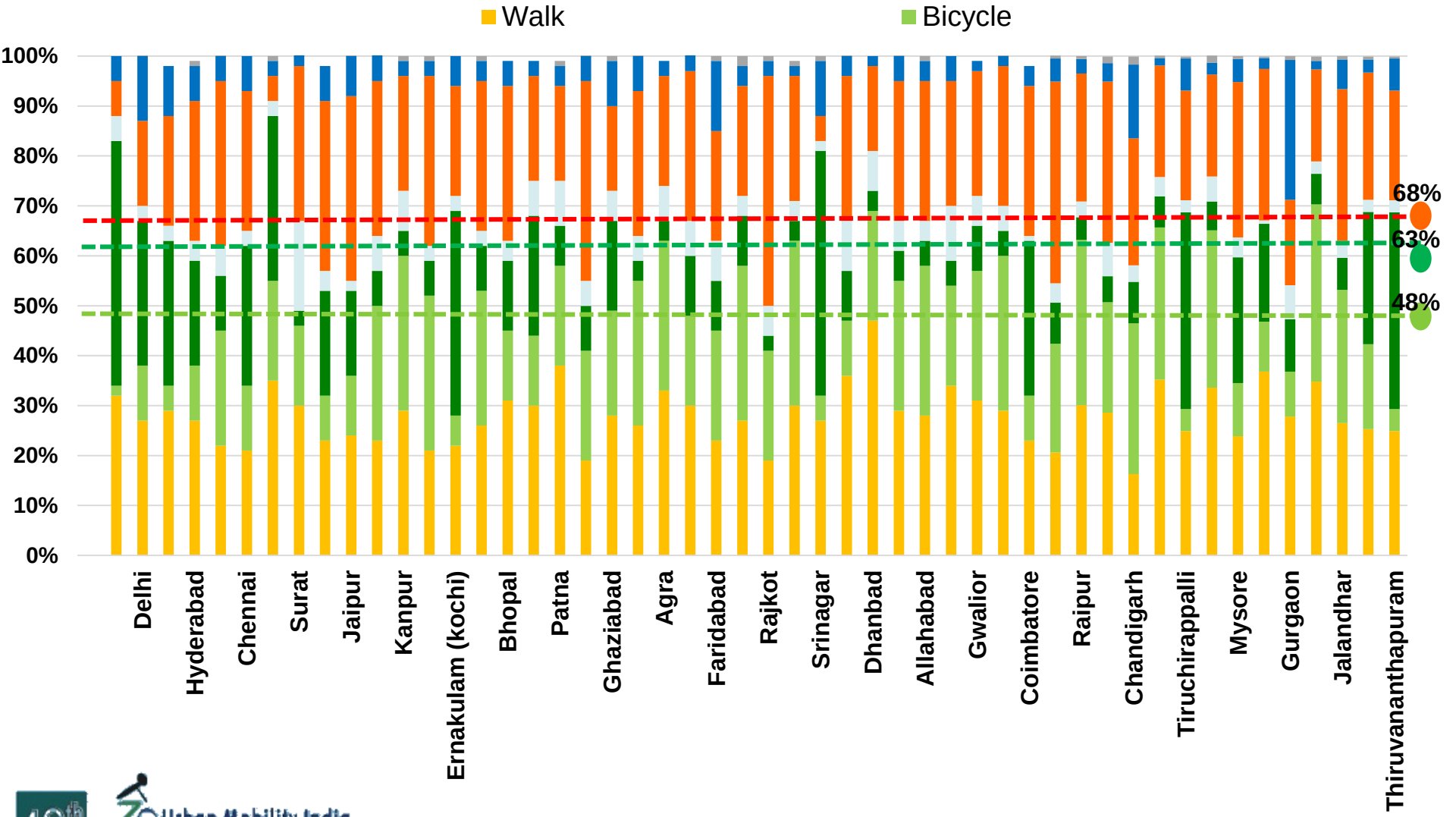
1. More Buses, Quality Buses…..

MORE BUSES, FREQUENT BUSES....

Bus Type	Length	Width	Typical capacity	Peak hour peak direction passengers carried for headways (minutes)				
			Capacity/Frequency	1	2	3	5	10
Mini buses	6m-8m	2.2m	13-30	1200	600	400	240	120
Midi buses	9m	2.5m	40-50	2700	1350	900	540	270
Standard buses	12m	2.6m	60-80	4200	2100	1400	840	420
Articulated buses	18m	2.6m	140-170	9900	4950	3300	1980	990
Bi articulated buses	24m	2.6m	210-270	14400	7200	4800	2880	1440

2. On-Street Priority

MODE SHARE (%) (COMMUTE TRIPS) – TOP 50 CITES



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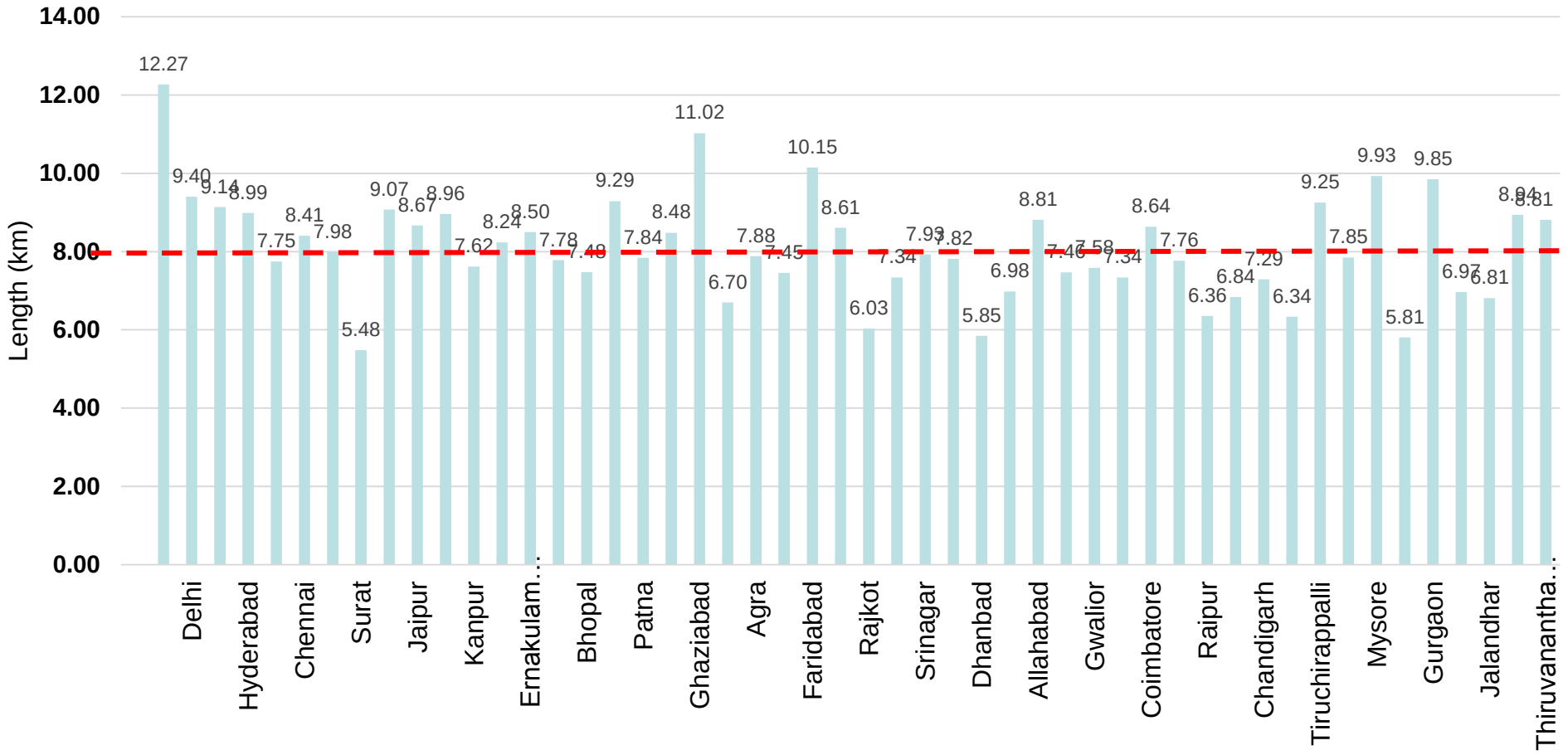
AVERAGE TRIP LENGTH – TOP 50 CITIES



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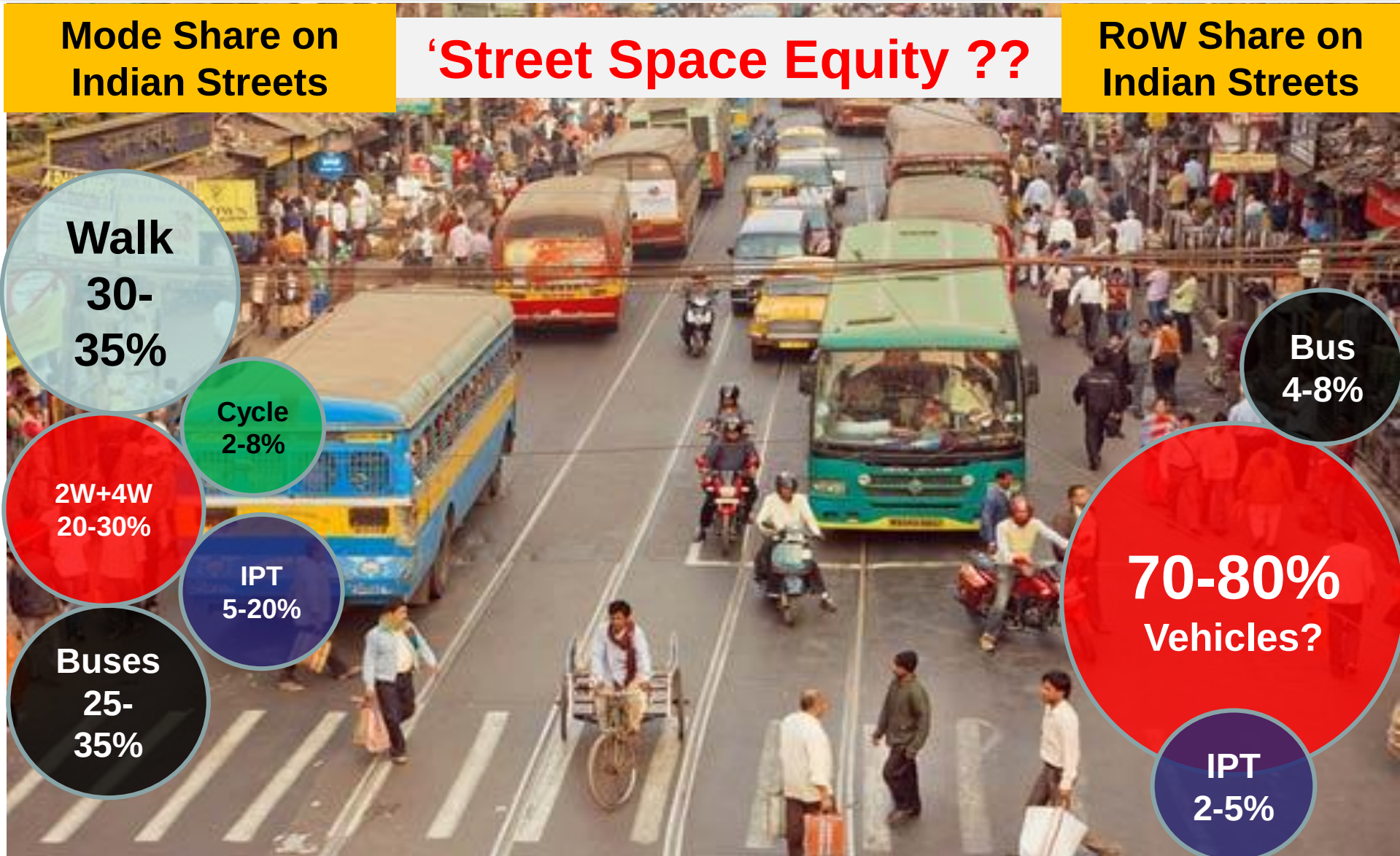
ARE WE DESIGNING OUR STREETS RIGHT ?

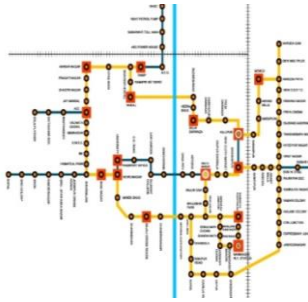
Mode Share on Indian Streets

'Street Space Equity ??

RoW Share on Indian Streets



FRAMEWORK OF BUS PRIORITY COMPONE



Running ways

- Segregated bus ways

Bus Stations

- Accessible, Comfortable stations – Level boarding, External Ticketing

Vehicles

- Clean buses & modern technologies
- Trained Driver

ITS & Fare Payment

- Public Information System (Next bus/Next stop)
- External Ticketing, Smart Cards, AVL
- Area Traffic Management for Bus Priority & Minimise wastage of GREEN TIME

Operating Plan

- Frequent, Reliable service
- Closed System
- Operations under Single Management Control

Institutional Structure

Outreach & Communication Strategy

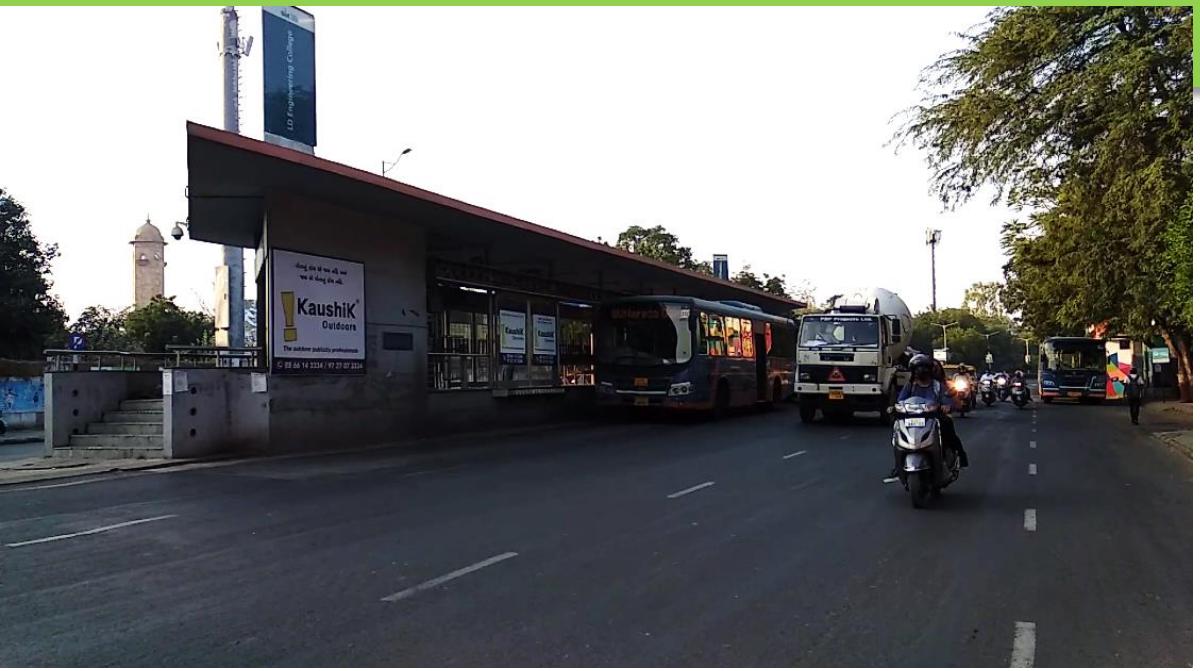
BENGALURU – NOWAY TO BUSWAY

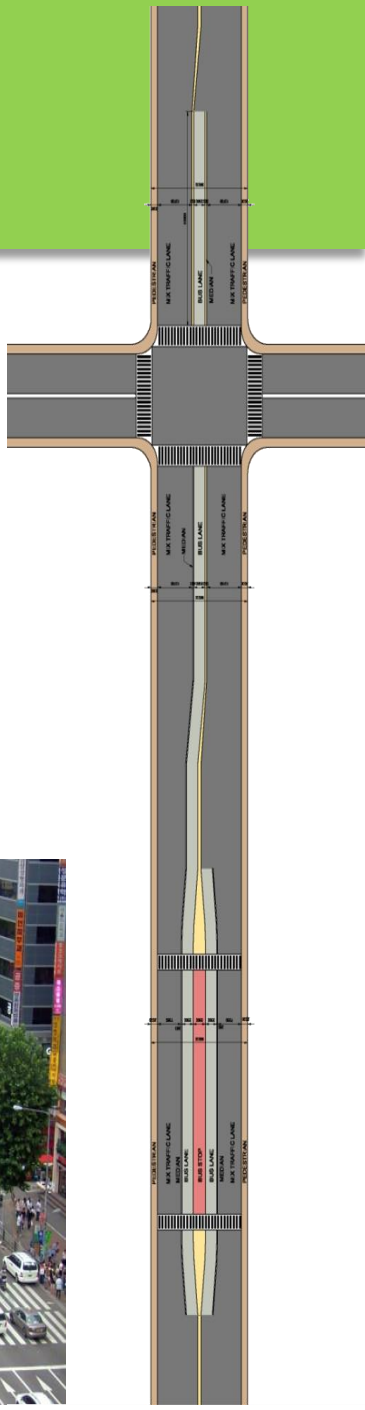
Traffic congestion costs Bengaluru Rs 38,000 Crore annually – Indian Express

Bus Priority to save 18% of BMTC Costs, 15% increase in vehicle utilisation. CEPT Study

Increased speed & reliability would bring more passengers on board and more revenue to fare box!!

BUS PRIORITY





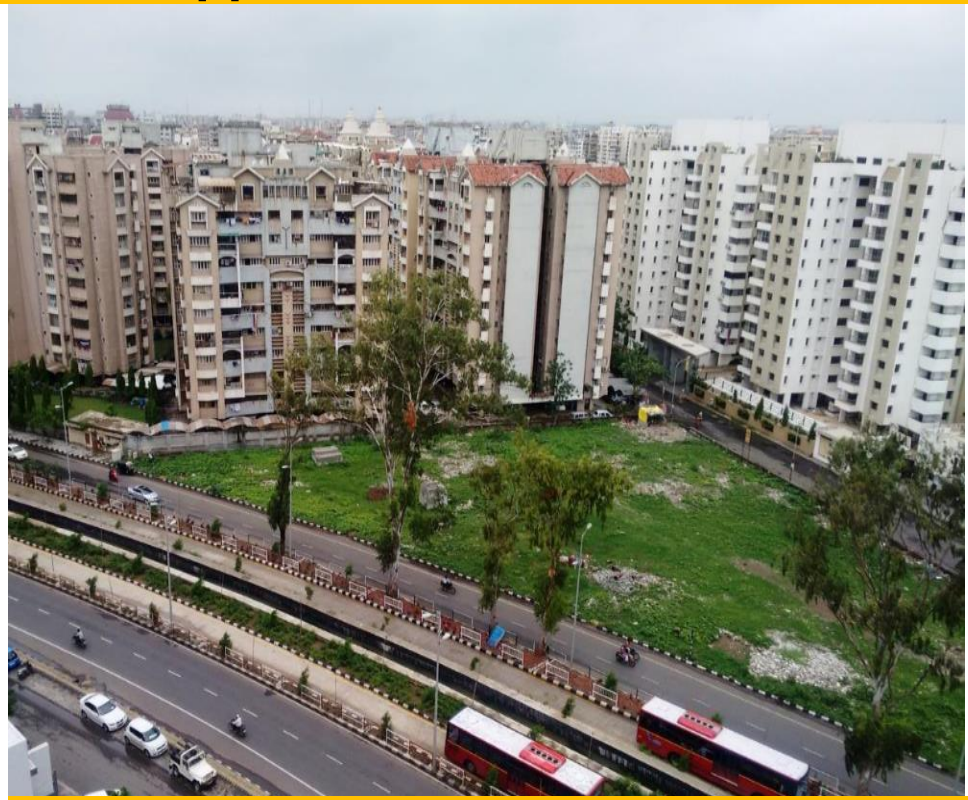
CELEBRATING BUS SERVICE: SUSTAINABLE PUBLIC TRANSPORT SERVICES

From two lane undivided SH to India's highest capacity BRT between twin city

INVESTING ON RIGHT PATH : SUSTAINABLE PUBLIC TRANSPORT SOLUTIONS

Converted Limitations to Opportunities

Under maintained Canal diving the City

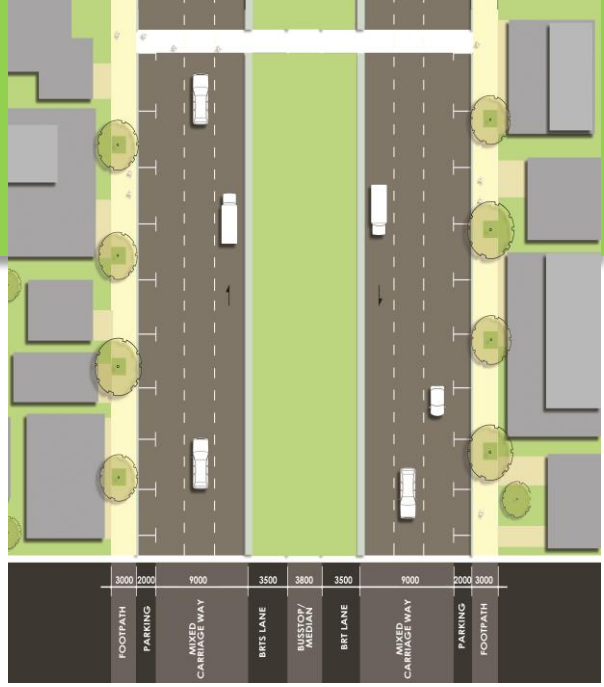


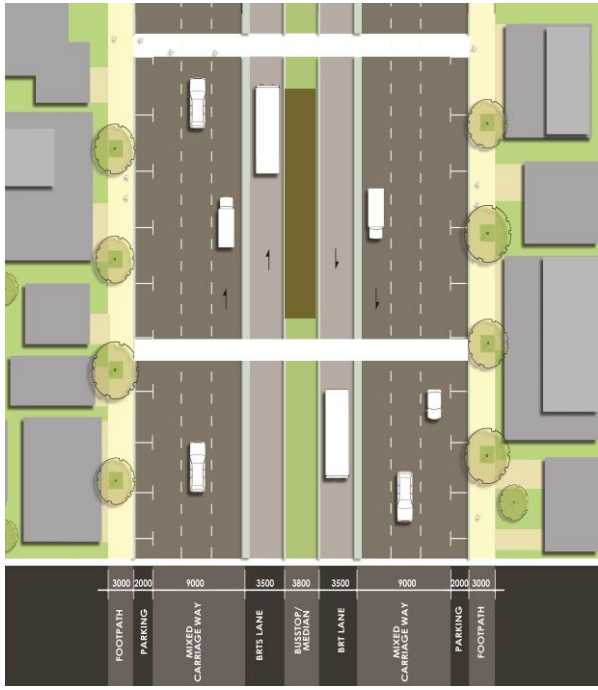
12 km water front BRT with TOD opportunities

TRANSIT READY STREET

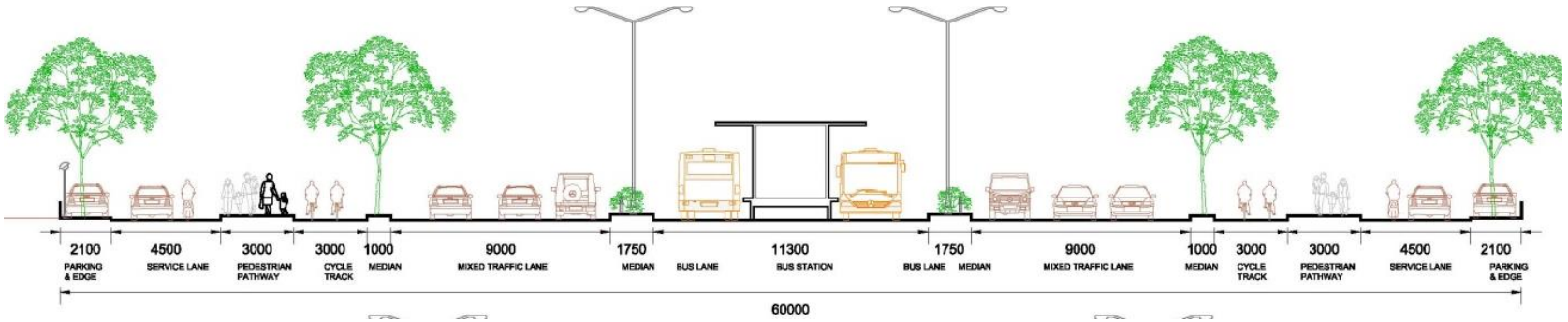
'STREET SPACE EQUITY'

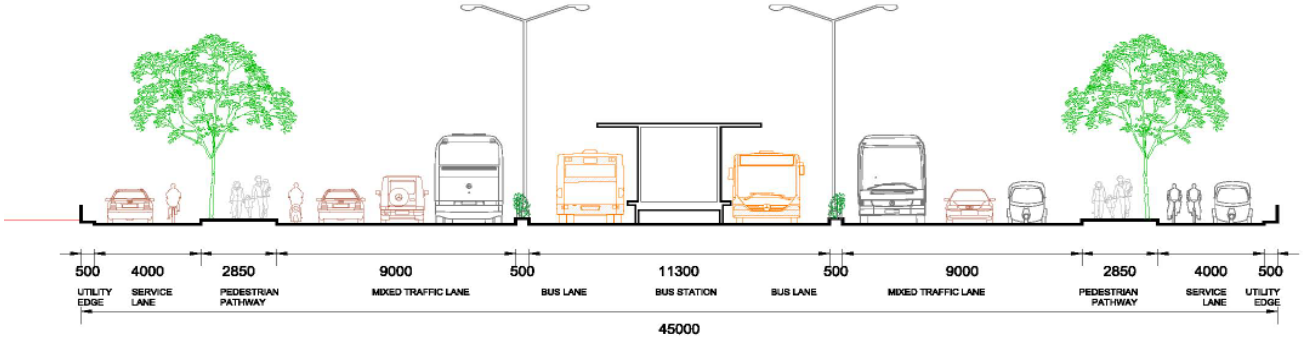
'**Transit Ready Streets**' maybe designed allocating extra space in the road way, which can accommodate any kind of mass transit in future. The roadway design is such that it has reserve space in the center or at sides, designed as a strip of green space along the length of the road at the time of construction and is flexible enough to be used for laying mass transit infrastructure when time demands.



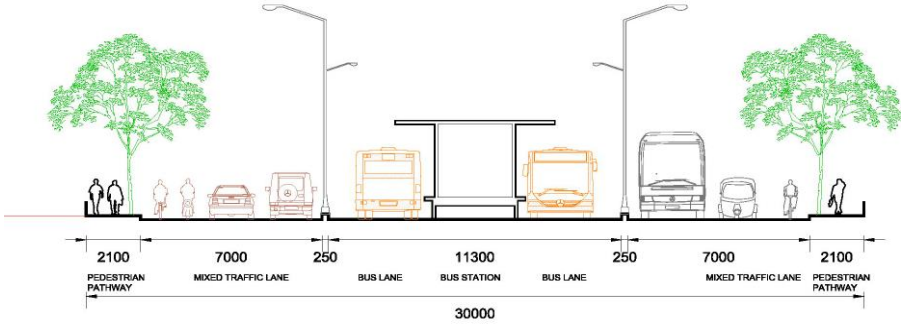


TRANSIT READY STREETS





Arterials



Sub Arterial

3. INTEGRATION

PHYSICAL & FARE INTEGRATION

BRTS

CITY BUS

HMC

The entire PT network is planned in a way that BRTS stations acts as an interchange which helps in providing easy and convenient transfers to commuters across different services.

BRTS, City Bus and HMC buses are designed with 2 side gates which can be used for at level boarding and alighting at BRTS stations and City bus stops

Advantage

- Network Optimization
- Optimization in Schedules
- Last mile connectivity in the form of city bus services acting as a feeder

COMPREHENSIVE PLANNING

Planning for Seamless Transit Infrastructure (Intracity + Intercity + Sub-Urban + Regional Services)

Hosur Interchange

Dharwad BRT Depot

Hubli BRT Depot

Foot Over Bridges for BRT Station

Multilevel Dharwad BRTS Terminal

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5. Incentivizing

Pricing

Institution Building

PROMOTE ELECTRIC

	Diesel High Quality (12 m)	E – Bus (12 m)
Capital Cost of Bus (Rs lakh)	75	190
Charging Infra Per Bus (Rs lakh)	-	8-12
Total Average Bus Cost (Rs lakh)	70	200
Depreciation + Interest Cost pa over 10 years* (Rs lakh)	11.5	32.5
Capital Cost /Km@72000 km pa	Rs 16/ km	Rs 45/km
Energy Cost Per Km **	Rs 36/km	Rs. 9/ km
Other Costs per km #	Rs 23/km	Rs 21/km
Total Cost per Km	**Rs 75/km**	**Rs. 75/ km**

** Interest @10% pa, equated annual instalments for 100% cost*

*** Diesel price of Rs 79/litre and FE of 2.2 km/litre for Diesel Bus and Electricity at Rs 8 / unit and FE of 1.1 unit / km for the 12 m E bus. While electricity is available at concessional rate in many states at around Rs 4 per unit for EV Charging, taxes and fuel adjustment charges bring it up to level of Rs. 8 per unit.*

The two key costs of capital and energy costs in Diesel and Electric buses almost cancel each other out. Cost differences in other costs such as manpower, insurance, maintenance are negligible. **This shows that the case for need for subsidies in E Buses is not strong.**

KOCHI BUS SYSTEM - RIDERSHIP AND FARE SCENARIO

Type of Bus	Fleet	Ridership (Passengers)
Private City Permit Buses	1,137	12,10,710
Moffusil Private Buses		
KSRTC	139	48,635
KURTC	46	28,224
Total	**1,322**	**12,87,569**

- Average passenger per bus per day
  (Private Buses) is 1000 pax
  (KSRTC/ KURTC) is 400-600 pax
- Average bus kilometres run is 270 kms/bus/day

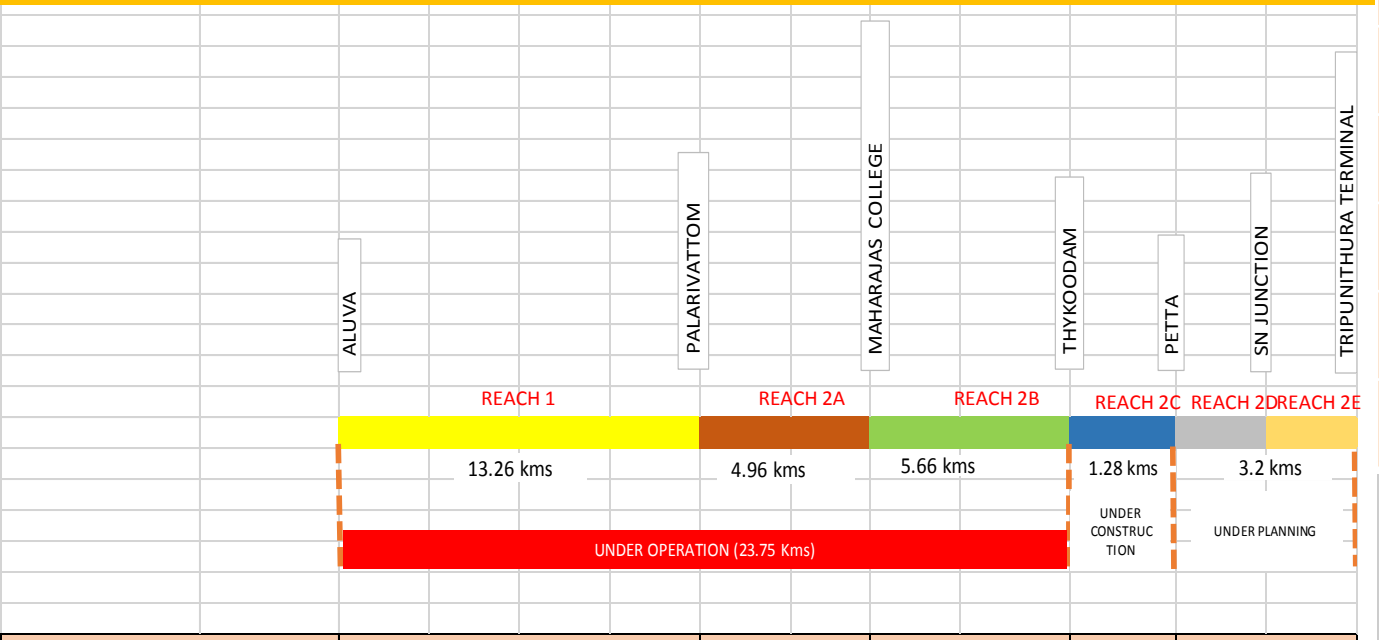
Fares are in effect from 26-02-2018

Source: (i) GO No. 4/2018/Tran.; dated 26-02-2018
(ii) Integrated Transit System: A Case of Kochi; Dennis Jose and H.M Shivanand Swamy

Distance (Km)	Fare(Rs) – Private Buses	Fare(Rs) Non AC Jnnurn Buses	Fare(Rs) AC Jnnurm KURTC
2.5	8	10	20
5	8	10	20
7.5	10	12	23
10	12	14	26
12.5	13	16	29
15	15	19	32
17.5	17	21	35
20	19	23	38
22.5	20	25	41
25	22	27	44
27.5	24	29	47
30	26	31	50
32.5	27	33	53
35	29	36	56
37.5	31	38	59
40	33	40	62
42.5	34	42	65
45	36	44	68
47.5	38	46	71
50	40	48	74
52.5	41	50	77
55	43	53	80
57.5	45	55	83
60	47	57	86

KOCHI METRO RIDERSHIP AND FARE SCENARIO

Currently 23.75 kms is operational and another 4.5 kms is under construction to complete Phase I



Date of Opening	June 2017	Oct-17	Sep-19		Feb-20	Jul-22	
			Sep	Oct			
Average Ridership (Actual)	31,144	36,083	71,098	60,676			
Average Fare Box Revenue/day (Actual) in lakhs	₹10.46	₹11.63	₹13.65	₹20.09			
Average Non Fare Box Revenue/day (Actual) in lakhs	₹3.49						

Fare Basis	Peak	Remarks
F1	Rs. 10	Upto 2 KM
F2	Rs. 20	Between 2 KM and 5 KM
F3	Rs. 30	Between 5 KM and 10 KM
F4	Rs. 40	Between 10 KM and 15 KM
F5	Rs. 55	Between 15 KM and 20 KM
F6	Rs. 65	Between 20 KM and 25 KM

Access Fee is INR 5

Fare per Km is 2.7 INR/Km

Above Fare is as before 07-09-2020

BEST slashed its min.fare from Rs 8 to 5 for non-AC buses for the fist 5km and capped the max.fare at Rs.20. Ridership increased from 17 to 27L/day

KOCHI – MODE WISE OPERATIONAL CHARACTERISTICS

MODE	INSTITUTION	FLEET	FARE SETTING	COST (in INR per day)	REVENUE (in INR per day)	SURPLUS/ DEFICIT per day
Auto Rickshaw	JDI (Joint Declaration of Intend) signed to form as a single body and 10,000 autos under 6 unions of total 18,360 autos	18,367	• Minimum Fare Rs 20 for 2.25 Km, with Rs 8 per Km after minimum fare.	INR 350 to 400	Rs 750 to 1000	**INR 400 to 600**
Ferry System	Kerala State Water Transport Department (KSWTD) – 5 divisions	6	• Fare/Km is 50 Paisa and Access Fee of Rs2 • Minimum Fare distance -4Km & stage distance -2Km	Rs 1,95,248 per day	Rs 46,630 per day	**INR 0.15 million**
Private Bus	•Private Bus Operators Association(PBOA) •1000 Private Buses 7 Unions	1137	• Fare per Km is 70 paisa & Access Fee of Rs4.5 • Minimum fare distance - 5Km and stage distance -2.5Km	CPKM: Rs37	EPKM: Rs49	**INR 3.35 million**
KURTC	Kerala Urban Road Transport Corporation (KURTC)	48 A/C 5 Non- A/C	• Fare per Km is 85paisa per Km for Non-A/C service and Access Fee is Rs6 • Fare per Km : Rs 120 paisa per Km for A/C service and Access Fee is Rs14	CPKM: Rs 69	EPKM for AC:45 & Non AC: 27	**INR 1.56 million**
KSRTC	Kerala State Road Transport Corporation (KSRTC)	139	• Fare per Km : Rs 70 paisa per Km & Access Fee is Rs 4.5 • Min.Fare for 5 Kms & stage distance of 2.5Kms	CPKM: Rs 85	EPKM : Rs 41	**INR 3.15 million**
Metro system	Kochi Metro Rail Limited-KMRL	Operational length : 18.6Km (as on 2018)	• Min. Fare: Rs10 • Max.Fare: Rs50 Fare per Km: Rs 2.7	CPKM: Rs 6,376	EPKM: Rs 2,950	**INR 1.96 million**

Source: Integrated Transit System: A Case of Kochi; Dennis Jose and H.M Shivanand Swamy

BUSES, MORE BUSES, BETTER BUSES, BUS PRIORITY, BRTS, INTEGRATED TRANSPORT

No single mode is adequate to service the varying needs of the people. Buses forms the critical base for sustainable mobility!!