

# Enabling a transition to electric mobility in Intermediate Public Transport fleets: Policies and Enabling Environment- Session 2

**Asia LEDSPartnership Clean Mobility Community of Practice**

**Second online Session**

**11<sup>th</sup> September 2018**

[www.ledsgp.org](http://www.ledsgp.org)

[www.asialeds.org](http://www.asialeds.org)

## Agenda

10 minutes	Introduction to Session 2	ALP
25 minutes	Presentation by Expert 1	Anumita Roy Chowdhury, CSE
25 minutes	Presentation by Expert 2	Madhav Pai, WRI India
20 minutes	General Discussion with the Expert on the theme	ALP
30 minutes	Question & Answer Session	All
10 minutes	Closing remarks	ALP



Advancing climate-resilient low emission  
development around the world



## Introduction to the Session 2

*The Low Emission Development Strategies (LEDS) Global Partnership was founded in 2011 to enhance coordination, information exchange, and cooperation among countries and international programs working to advance low emission climate resilient growth. The LEDS Global Partnership currently brings together LEDS leaders and practitioners from more than 120 countries and international institutions through innovative peer learning and collaboration forums and networks. For the full list of participants and more information on partnership activities, see [ledsgp.org](http://ledsgp.org).*

## Introduction to Session- 2

### Goals of the Session

- ❑ The Mobility CoP aims to address Clean Mobility and resilience in Transport which is a priority topic
- ❑ In continuation to the first online session held in June 2018
  - ❑ Electric Mobility in Public Transport- Session 1
  - ❑ Electric Mobility in Intermediate Public Transport- Session 2
- ❑ Focuses on promoting Clean Mobility through electrification
- ❑ Aims to understand the challenges/ issues being faced in the participating countries related to electrification of Intermediate Public Transport
- ❑ Address the issues/ challenges by providing no cost expert assistance and customized solutions for the participants/ members.

## Introduction to Session- 2

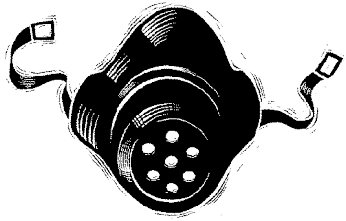
### Topics to be covered

- ❑ The session would deliberate on the following
  - ❑ Ideas for restructuring and reforming the Intermediate Public Transport Sector
  - ❑ Ideas in safer, healthier and financial secure business
  - ❑ Initiatives for capacity building, education of operators
  - ❑ Stricter Emission standards- solutions & challenges
  - ❑ Micro Financing – solutions & challenges
- ❑ Housekeeping Rules
- ❑ Introduction to the Speakers
  - ❑ Ms. Anumita Roy Chowdhury
  - ❑ Mr. Madhav Pai

# Public Transportation Fleets: Bus Electrification

## Enabling a transition to electric mobility in Intermediate Public transport fleets: Policies and Enabling Environment

**Expert presentation**



# Intermediate Public Transport (IPT) and Electric Mobility: Win-Win for Asian cities



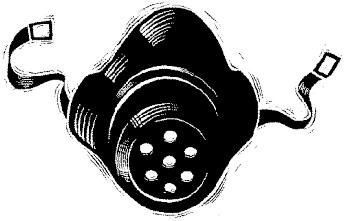
**Anumita Roychowdhury  
Centre for Science and  
Environment**

***‘Enabling a transition to  
electric mobility in  
Intermediate Public Transport  
fleets: Policies and Enabling  
Environment’***

**The Asia LEDS Partnership  
(ALP) and LEDS Global  
Partnership (LEDS GP)  
Transport Working Group**



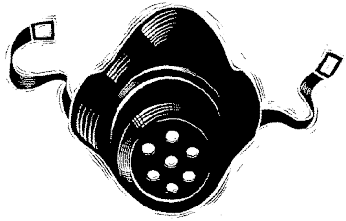
**September 11, 2018**



## **Framing the question...**

**Why intermediate public transport (IPT) or para-transit – taxis, three-wheelers, vans etc – is needed to address pollution and mobility crisis in developing country cities of Asia?**



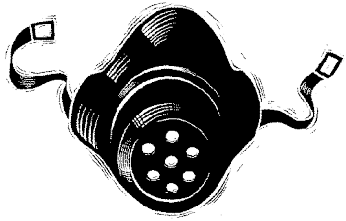


## **Positioning Intermediate Public Transport in polluted and climate constrained cities of India and Asia**



- **Air pollution and public health crisis:** Indian and Asian cities share the highest health burden due to air pollution
- In India air pollution is among the top killers
- **Energy and climate crisis:** With rapid motorisation these cities are also becoming energy guzzler and emitters of heat trapping gases
- **Cities need massive transition towards clean technology and fuels as well as sustainable mobility**

**IPT plays an important role in this transition**



# Para transit dominates Asian cities

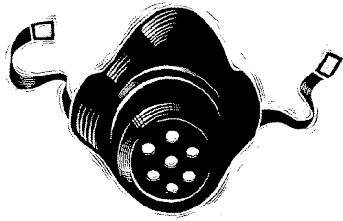


- Privately owned and are popular; Cheap and more flexible; Even motor-cycle taxis



Motorcycles taxis for locals (L) & tourists (R), an informal Jeepney (Centre)





**Why do we need intermediate public transport systems?**  
***Lifeline of affordable public transport and efficient last mile connectivity***



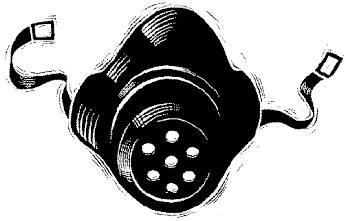
**-- IPT is an informal and home grown solution to provide reliable, efficient, and affordable public transport services to different income classes**

**-- Low volume but high frequency services are efficient feeders to formal public transport systems**

**-- Important last mile connectivity**

**-- Meet high travel demand:** In mega Indian cities they meet about 4-5% of travel demand. But in metropolitan cities around 16-17%. In smaller cities their share can be as high as 40-70% of public transport services.

**If these systems are destroyed there can be enormous public transport service deficit in cities**



# Why IPT is an opportunity in Indian and other Asian cities?



-- Advantageous in densely and closely built compact cities of India and Asia

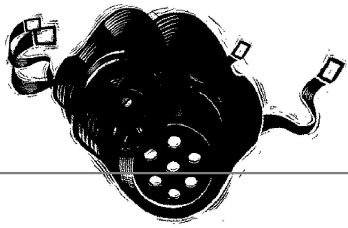
-- **Short travel distances:** In most cities – especially smaller cities - more than half of average trip length is within 3-4 km.

-- **High percentage of work trips are accessible within 15 minutes.** -- Even big buses may not be convenient for these short distances.

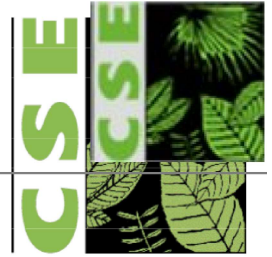
**This is an opportunity for IPT**



**Mixed traffic – cycle rickshaws, tempos, auto-rickshaws, buses ... but environmentally sustainable.**

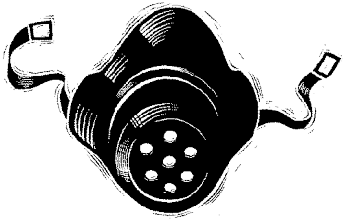


## Evidence of growth Even in mega city like Kolkata IPT is big and growing



Share of para-transit trips in Kolkata increasing 5% a year

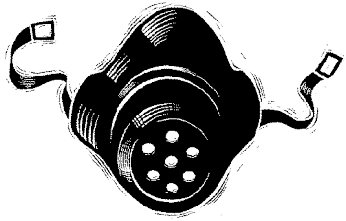
Para transit trips	% share of para transit trips
Taxi	17.1
<b>Auto rickshaw</b>	<b>46.5</b>
<b>Cycle rickshaw</b>	<b>34.0</b>
Others	2.5



## Policy muddle on IPT



- **Policies unclear on IPT:** – Basic regulations focus on route fixing and penalty, but no cohesive deployment strategy
- **Victim of pollution control action:** Due to poor technology level and use of dirty fuels (2-stroke engines, diesel, adulterated fuels etc), their services are curtailed for pollution and congestion control. Eg Indian cities and Dhaka etc; This curtails PT services
- **High contributor to pollution:** Source apportionment studies in India show high particulate pollution from three wheelers: Bengaluru – 21% of automobile PM; Chennai – 26%; Pune 15% etc
- **Conflict with formal public transport services:** Introduction of formal bus and rail based system without system integration and route rationalisation leads to conflict and curtailment of IPT services
- **Disorganised services and adhocism; but important livelihood source**



## Cities cleaning up para transit fleet: Moving towards cleaner fuels



### **Delhi is reorganising this sector:**

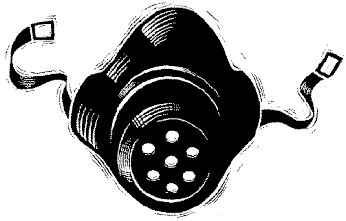
- All taxis, 3-wheelers are on CNG
- All three-wheeler drivers to get public service vehicle badge and smart cards.
- GPS connectivity to improve the meters and compliance.
- In-use vehicle fitness and emission testing systems
- Integrate with mass transit system.
- Delhi is framing cycle rickshaw policy
- Delhi has removed cap on their numbers

### **-- Nearly 60 cities have CNG autorickshaw programme**

**-- Transition to LPG:** Large number of cities including Bengaluru, Chennai, Hyderabad, Kolkata etc have LPG programme for IPT 3-wheelers

**-- Technology transition:** Cities like Always gave incentive to move existing taxi vans to move to Euro IV vehicles

**This is an opportunity for next phase of transition to electric mobility**

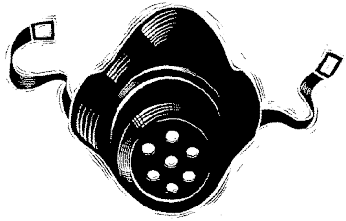


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**Informal E-rickshaws:  
First spontaneous move towards zero  
emissions in this segment**

**Important to understand its challenge  
and solution**

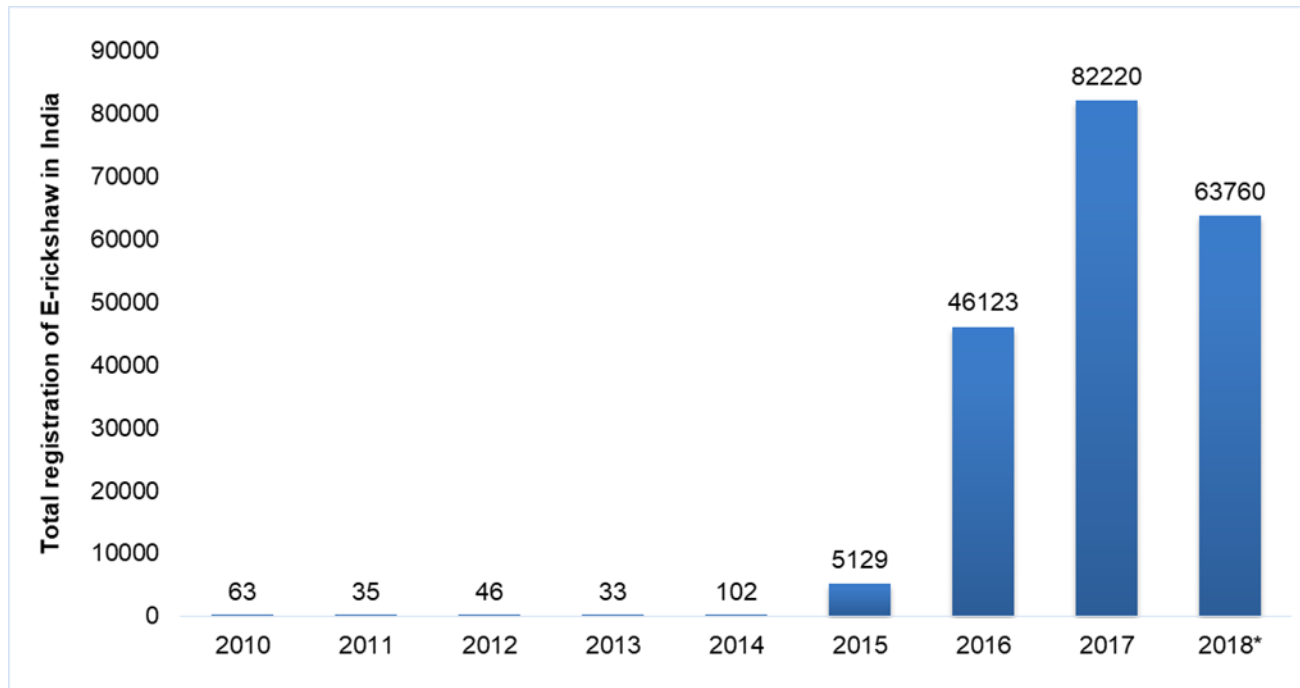




# Home grown innovation for affordable solution



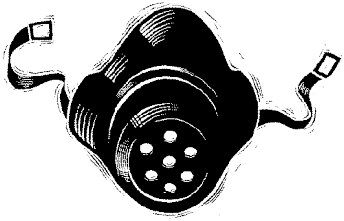
Tremendous growth in registration of e-rickshaws in India



\*Till September 6, 2018

Source: VAHAN Database

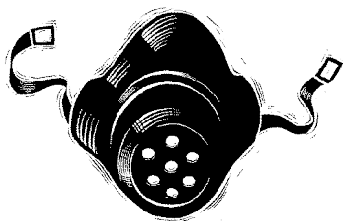
- The number of e-rickshaws have grown from 63 in 2010 to 82,220 in 2017 -- approximately **1400 times in 2017**.
- Since 2015, number of registered e-rickshaws have grown **16 times in 2017**.
- **In 2020 expected to be 60% of the total battery storage of all EVs in India**



## Why are e-rickshaws cheap?



- **E-rickshaws emerged during 2010-13, for first & last mile connectivity.**
- **2017-18**, almost 0.6 million e-rickshaws were assembled and sold.
- **Inexpensive and non-standardized** component imported and **assembled locally**. Reducing operational cost – **90%** of vehicles use **cheap lead acid batteries**, but it has to be **replaced every 6-9 months**.
- **Absence of regulatory checks –**
  - **Limited Type Approval tests, but no Conformity of Production required. Lack of safety norms**
  - **Informal lending, contracting & availing of informal ancillary services**, such as maintenance & charging
- **Several small and medium sized local assemblers dominate the market.**



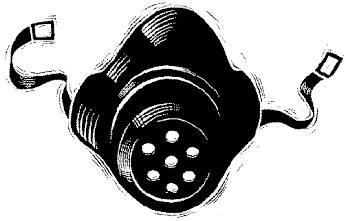
## E-Rickshaws: Largely an unregulated market: But important livelihood source



- **Delhi:** Report of Centre of Civil Society (CCS): Number of E-rickshaws risen dramatically, but a large percentage of such vehicles are still unregistered. There are only 29,123 registered E-rickshaws from April 2013 to March 2017 as per Delhi government records. Actual numbers more than a lakh
- Livelihood security: Important source of earnings in cities:

Type of Rickshaw	Number (in Delhi)	Initial Cost (Rs.)	Daily Earnings (Rs)
Cycle Rickshaw	7,00,000 (Govt. Figure)	6,000-12,000	300-450
Auto-Rickshaw	1,00,000 (Licensed- 55,000 45,000 in the process after 2011)	1,50,000-3,00,000	700-1000
E-Rickshaw	1,00,000 approximately	60,000-1,10,000	550-800 *

\*Now claimed to be 1000-1200 as per recent survey



# Challenges of regulating E-rickshaws



## Unregulated

- Almost 80% of vehicles are rented

## Traffic chaos

- Unfit for high capacity fast moving lane

## Safety

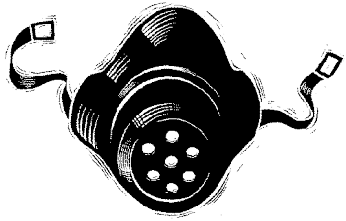
- Many violated the vehicle standard
- Over- loading of passengers

## Legal Implication

- Most of the vehicles doesn't have any registration.
- No insurance or benefits, loans.

## Environmental Hazard

- Improper disposal of batteries

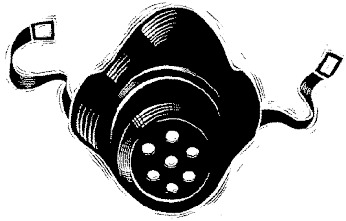


## Regulations addressing e-Rickshaws and formal electric E-three-wheelers in India



### Indian regulations

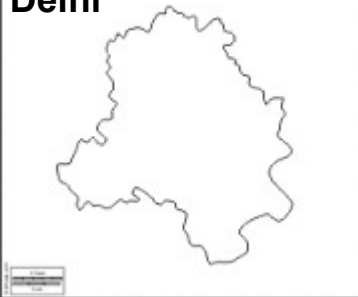
- **Made E-Rickshaws legal:** The Ministry of Road Transport and Highways included E-rickshaws into the CMVR, under Section 126 of Central Motor Vehicle Rules, 1989, vide notification no. GSR 709(E) dated 8th October, 2014 and S.O 2590 (E) dated 8th October, 2014.
- State governments have from time to time made changes to the rules applicable to the drivers and operators of e-rickshaws – Largely focussed on route restriction



## Cities adopted E-Rickshaw policy



### Delhi



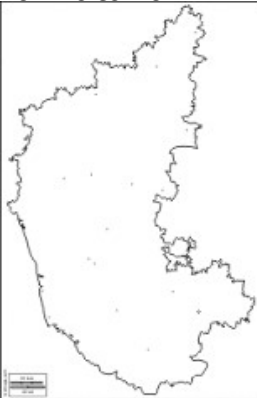
- E-rickshaws have been allowed to carry four passengers and 40 kg luggage while e-carts would transport goods up to 310 kg. Vehicle should be operated on **contract carriage permit**.

### Maharashtra



- The state government had initially allowed e-rickshaws in Nagpur, Wardha, Amravati, Akola, Latur and Buldhana via a government resolution (GR) on August 3, 2016.
- Recently, **state issued new regulation and ban e-rickshaw to ply on Mumbai road**, as it is not suitable for urban traffic.

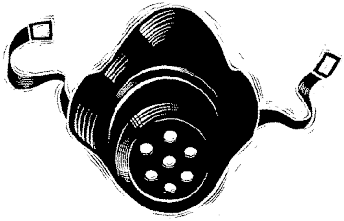
### Karnataka



- Should be registered as transport vehicle under **transport registration series** and shall be granted **contract carriage permit**.
- **Should ply on the road of the cities except on the roads where their plying is prohibited**, by respected Regional Transport Authority.

### Others

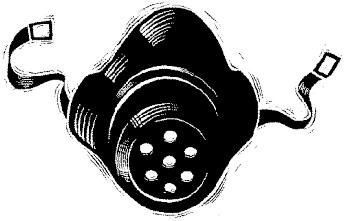
- As per now **Kochi encourages e-rickshaw as last mile connectivity** but doesn't have any clear guidelines for that.



## Address following issues



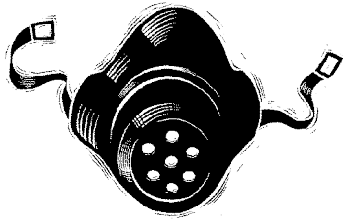
- Informal innovation requires Regulatory Framework. Important mobility provider with strong livelihood link
- Infrastructure facilities needed (Parking, no charging stations etc.)
- Bring better technology into the segment.
- Providing a **mechanism for charging** and ensuring efficiency of charging – low downtime & longer life of batteries
- Ensuring **safety norms**, as well as certain vehicle design regulations are adhered to.
- Being in informal market they fail to leverage of financial Support



## Challenges of the Formal Sector: Electric Three-wheelers



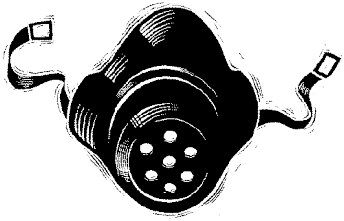




## Incentivising Electric three wheelers in India



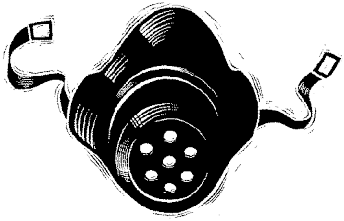
- **December 2017**, Department of Heavy Industries announced financial support for 720 e-three-wheelers in 3 cities, Ahmedabad, Bengaluru & Indore. Part of a larger focus on e-mobility in 11 cities
- **September 2018**, as part of the NITI Aayog's MOVE summit, it was announced that for para transit vehicles, the govt. is considering removing licensing and permit conditions for e-vehicles, including electric three-wheelers
- **Gov's FAME-II scheme expected to focus** on subsidising capital costs of public transport and para transit electric vehicles, including e-auto rickshaws. Details awaited
- **Vehicle manufacturers coming together with city governments** to plan deployment of electric three-wheelers – city of Mohali near Chandigarh etc
- **City and state level:** Delhi Government subsidizes e-rickshaws under the Air Ambience fund. Since 2015, more than 23,000 electric three-wheelers have been approved under this subsidy scheme, most of them since 2017. E-rickshaw and e-three-wheelers licensing systems formalised in Tripura, West Bengal, Karnataka, Chattisgarh



## Barriers to accessing subsidy



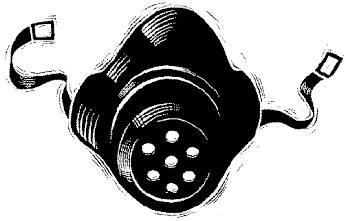
- For a vehicle to qualify for a subsidy, it has to be duly approved in accordance with the provisions of Section 126 of the Motor Vehicles Act, 1988, as per the amendments made on 8<sup>th</sup> October, 2014.
- Although many of these vehicles are “approved”, the section 126 does not mention a COP (Conformity of Production) clause for these vehicle. Hence, a duly registered vehicle need not meet all the regulations as per CMVR
- E-three wheelers fitness requirement every 3 years



## Common challenges of this segment

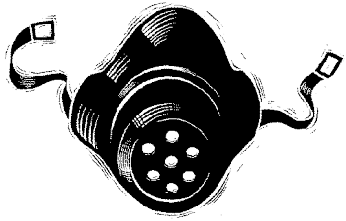


- **Scope of technology innovation limited due to domination of rental market:** A 2016 CPR study estimates that 60-70% of 3W operators in Delhi, and more than 50% in Kolkata operate rented vehicles.
- **Challenge of accessing formal avenues of credit.** For e-rickshaws availability of Finance even more limited.
- Access to capital for investment into e-rickshaws, along with formalized access to energy & charging infrastructure at affordable rates will ease financial burden of operators.
- **System to optimize use of batteries via a battery as a service model/ swapping scheme will further reduce operational costs**
- Various states and civil society organisations are now including e-rickshaw operations into the scope of NBFC loans and microfinance institutions



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## **Shared mobility: Taxi aggregators and e-taxis**



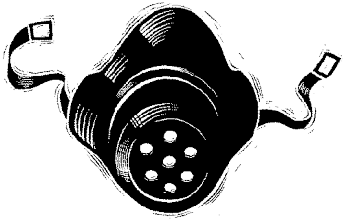
## Electric Taxis and shared mobility



### Shared mobility – taxi aggregators – Uber, Ola – deploying EV programmes in Hyderabad, Nagpur, Delhi etc

- Taxi fleets, including aggregators such as Ola & Uber have plans to launch electric fleets on specific routes in India
- Since 2017, Ola has been operating a pilot electric fleet of 200 vehicles in Nagpur
- Uber plans to launch geo-fenced electric taxi fleets in Delhi & Hyderabad in 2018.
- Shared corporate taxis and government fleets have defined routes and fixed hours of operation, making them more predictable and therefore easier to electrify
- In terms of a captive corporate fleet, Lithium Technologies Bangalore has successfully operated a fleet of 400 electric taxis, operating more than 250-300 kms per day and having run more than 20 million kms since 2015\*

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## Lessons from Ola's Nagpur electric taxi fleet

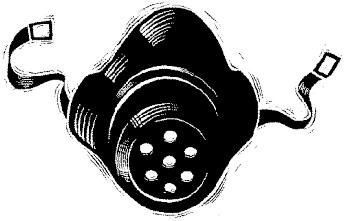


- Fleet of 200 electric taxis operating within Nagpur city since 2017
- Major pushback from drivers – charging time takes away operating time etc
- Regulatory hurdles, lack of timely clearances, and pushback from RWA's due to increased congestion in residential areas resulted in less than 30 of a promised 50 charging stations being built
- Limited range of vehicle of about 100 kms results in multiple charges needed everyday.
- Long waiting time to charge and then downtime while charging unpopular among drivers
- Lease model further complicated desirability, since high charging time complicated incentives given to drivers on the basis of number of trips completed.



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**Way forward....**



## **Need guiding principles for IPT management**



**Recognise IPT as a legitimate public transport systems; if not protected this will increase use of personal transport**

**Provide realistic IPT fleet based on route rationalisation to meet commuting demand**

**Ensure clean vehicles and fuels**

**Link with zero emissions mandate – city core can be pedestrianised with zero emissions feeders;**

**Strategy to link electric mobility with shared mobility;**

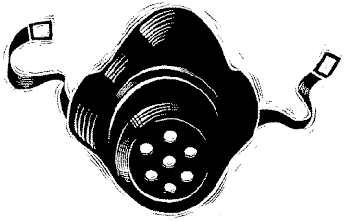
**Need fiscal strategy for quicker transition; infrastructure for electric para-transit**

**Improve service quality, monitoring and enforcement**

**Use IPT for multi-modal integration**

**Ensure street design for provide for IPT parking, drop off and pick up**





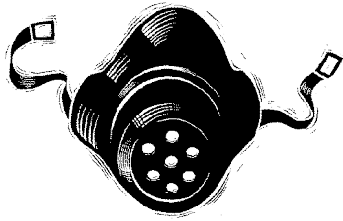
## Key Players: Shared responsibility



- **The government:** regulations on emissions and fuel efficiency, exploring incentives and subsidies
- **The power, fuel and charging infrastructure companies:** leasing of batteries, swapping infrastructure, deploying fast chargers, providing stable power supply and grid stability
- **The automotive industry:** OEMs, auto component manufacturers and battery-makers

**Sharing and mobility services:** Target shared and fleet vehicles— including two wheelers, three-wheelers, and government fleets—for immediate electrification given their favorable economics.

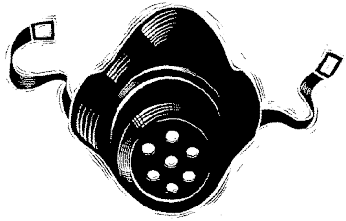
**Interoperable transit data:** Build a platform that makes interoperable data ubiquitous, enabling seamless and multimodal planning, booking, and payments.



## Steps forward for para transit based on electric 2W's & 3W's



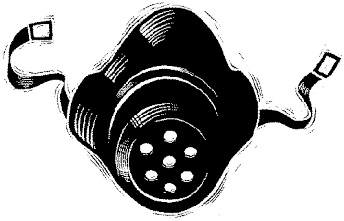
- Regulatory framework needed for e-2W based para transit– currently 2W taxis not uniformly allowed across states
- Viable routes with need for last mile connectivity and high volume passenger traffic need to be identified at the level of specific neighbourhoods within each city, for successful mass deployment of e-3W's
- Regulatory process for e-3W's must ensure safe, standardized and efficient models operate on the road, and at the same time maintain a lower Total Cost of Ownership (**TCO**) over conventional 3W's
- Incentivize electric 2W & 3W based IPT using a combination of financial incentives – subsidies, tax waivers & supply sided incentives as well as non financial incentives – mandates, preferential treatment & policy measures



# Steps forward for electric E-taxi's and E-vehicle based shared mobility



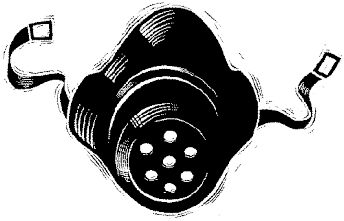
- Electric taxi fleets at the moment are at par with ICE vehicles on **TCO basis**. This to become more favorable after BS VI, and even more after in-use emission standards - FE norms, RDE etc. are factored in after 2020.
- Reflect the true cost of ICE vehicles through a combination of financial incentives – subsidies, tax waivers & supply sided incentives as well as non financial incentives – mandates, preferential treatment & policy measures
- Learn from experiences of existing electric taxi fleets –
  - Initiate operations on routes & timings that are predictable, such as those of offices
  - Create captive user bases, such as corporate customers
  - Create distributed charging infrastructure in advance to minimize downtime of fleet vehicles
  - Optimize battery management and maximize range
  - Create lucrative financial models for drivers & operators through incentives and sops



## Steps Forward for charging infrastructure and batteries



- **Battery manufacturing:** Set up a manufacturing consortium on batteries and EV components, and begin building a battery pack assembly industry immediately, with favourable policies and fiscal incentives
- For **EV charging infrastructure**, it is important to clear the regulatory hurdles and create a space for private players as well as the small & micro enterprises sector to enter this space
- Identify specific crucial routes to **deploy charging infrastructure**, where it will mobilize modes of shared mobility – electric 2W's, 3W's and taxis
- Mobilize a mix of plug-in charging and battery swapping models to be carefully deployed based on the dynamics of various vehicle segments



Thank You

# Public Transportation Fleets: Bus Electrification

## Enabling a transition to electric mobility in Intermediate Public transport fleets: Policies and Enabling Environment

**Expert presentation**



# Paratransit & Electrification

Madhav Pai |  WRI INDIA

WATER RESOURCES INSTITUTE

A photograph of a busy city street in Delhi, India, featuring several red e-rickshaws. The rickshaws are three-wheeled motor vehicles with a red canopy and a driver's seat. They are carrying passengers, including men, women, and children. The background shows a mix of urban elements: trees, buildings, and other vehicles like a white car and a blue car. The scene is captured in a slightly blurred, candid style, emphasizing the movement and density of the city.

# Case Study: Delhi e-rickshaws



## DELHI: RICKSHAW MARKET

Type of Rickshaw	Number (in Delhi)	Initial Cost (Rs.)	Daily Earnings (Rs)
Cycle Rickshaw	7,00,000 (Govt. Figure)	6,000-12,000	300-450
Auto-Rickshaw	1,00,000 (Licensed- 55,000 45,000 in the process after 2011)	1,50,000-3,00,000	700-1000
E-Rickshaw	1,00,000 approximately	60,000-1,10,000	550-800 *

# COMPARISON- 3 WHEELERS



## Vehicle cost

- INR 85,000

## Fare

- Rs 10 for a distance between 2-5 km

## Law

- Municipal corporations yet to formulate a policy to govern them

## Speed

- To be driven at a speed of 25 kmph

## Safety

- Seating capacity is four. But drivers ferry more as they cannot be fined



## Vehicle cost

- INR 1.68 lakhs

## Fare

- Rs 25 for first 2 km, Rs 8 for every additional km

## Law

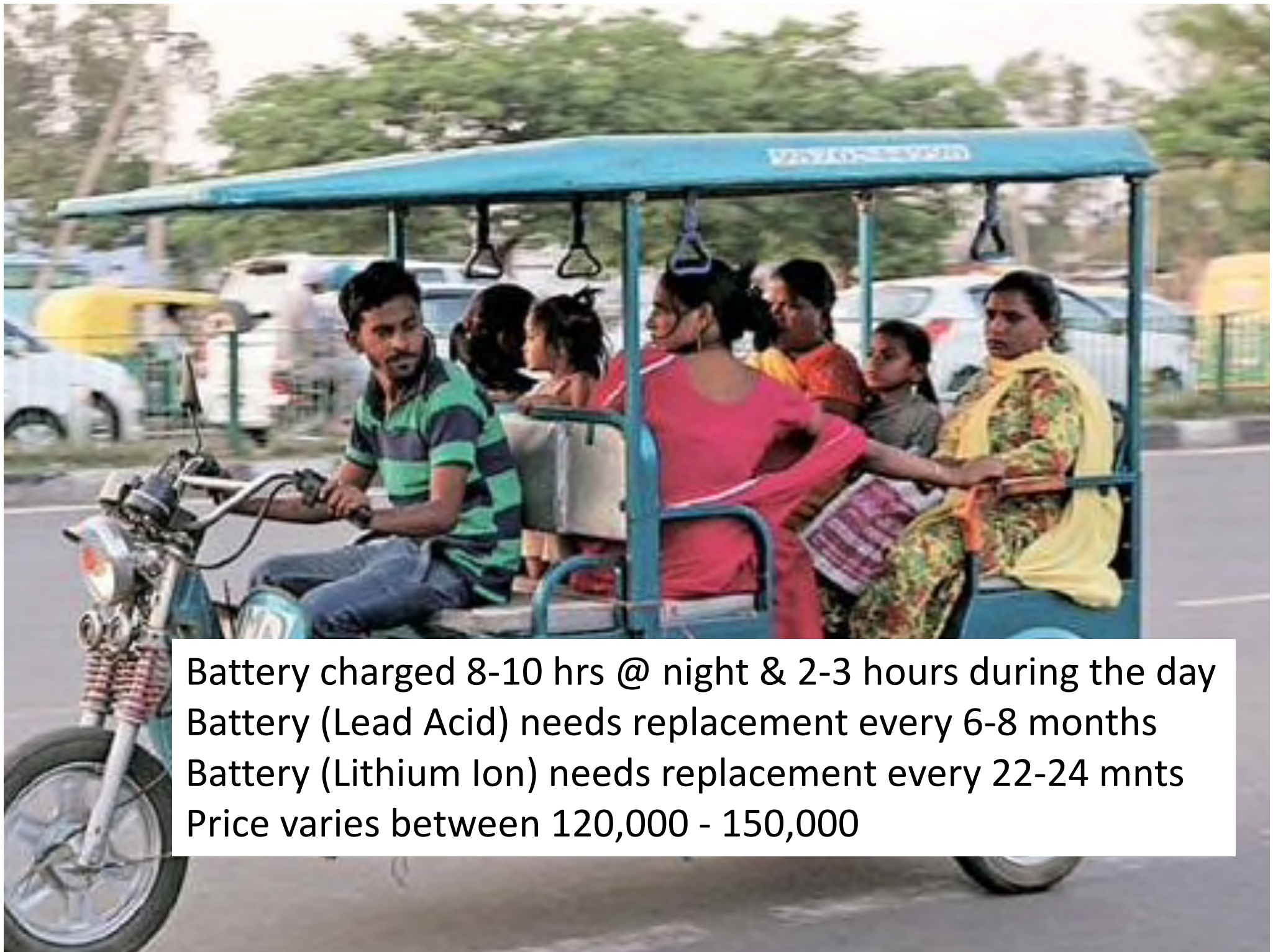
- Comes under the Motor Vehicles' Act, 1988

## Speed

- Maximum speed of 60-70 kmph

## Safety

- Maximum capacity is three. Overloading can incur a fine from the traffic police



Battery charged 8-10 hrs @ night & 2-3 hours during the day  
Battery (Lead Acid) needs replacement every 6-8 months  
Battery (Lithium Ion) needs replacement every 22-24 mnts  
Price varies between 120,000 - 150,000

# E-RICKSHAW SPECIFICATIONS AND COST BREAKDOWN




**Battery Specifications**  
100Ah | 12V | 4 Nos  
Available Variants: Lead Acid , Lithium Ion



**Charging Time**

- 8-10 Hrs for full charge, Lead Acid
- 2-3 Hrs for full charge, Lithium Ion



**Range**

- 80- 100 kms on one full charge



**Operating Cost**

- 50p / Km



**Battery Life**

- 6-8 Months for Lead Acid
- 24- 28 Months for Lithim ion

Image source:

<http://indianpowersector.com/2017/07/the-thriving-market-of-e-rickshaws-in-delhi/>

Battery woes - in the words of e-rickshaw drivers - <https://youtu.be/qd!8uMFPoJc> (quote similar numbers on battery life as in the image on the left)

# ADVANTAGES

- Last mile connectivity to metro stations
- Lower pollution than other fossil fuel options
- Jobs for auto-rickshaw drivers
-

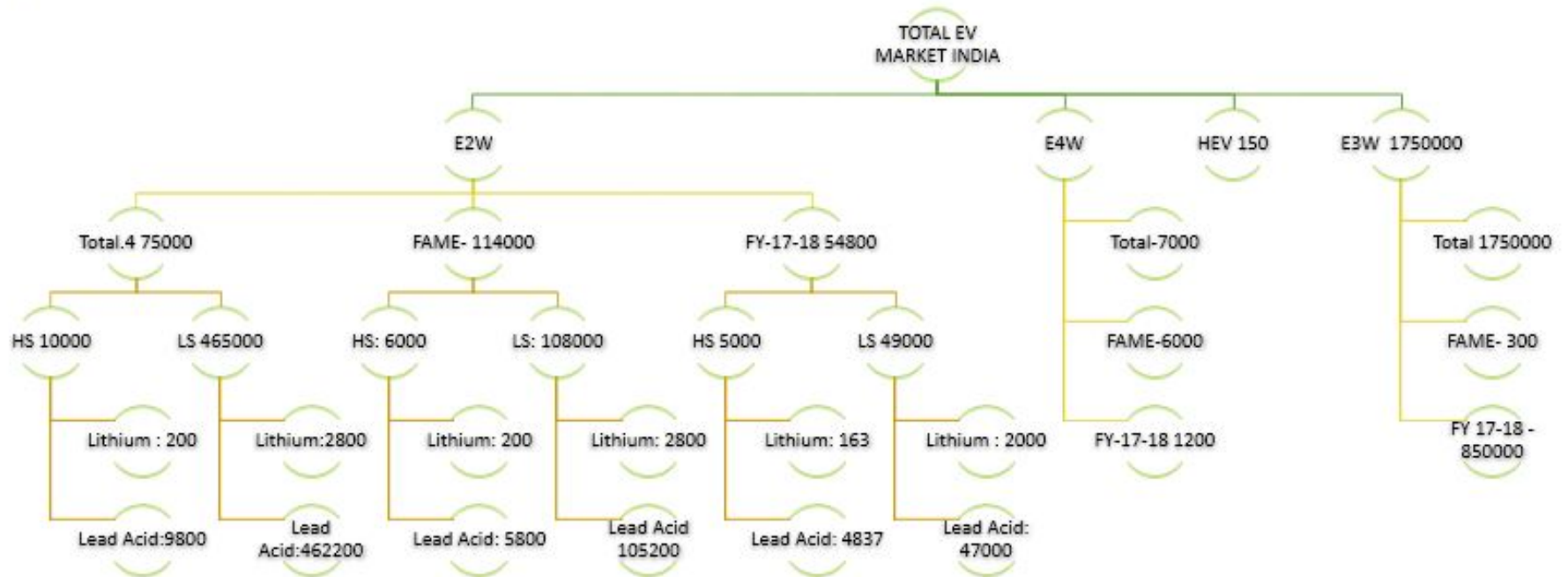
## KEY ISSUES

- Large number of e-rickshaws are un-registered
- Large number of drivers without licenses
- Government permits do not allow them on arterial roads, limited to a few routes
- E-rickshaw drivers face police harassment
- Insufficient infrastructure - Lack of public charging stations, parking spaces
- Overcrowding is an issues
- Police harassment is a problem
- Battery disposal especially lead acid is not organised

# EV MARKET SCENARIO (SMEV,



## EV MARKET SCENARIO INDIA



Source: <https://www.smev.in/productImage/EV%20india.JPG>

# NEW ENTERPRISES – PROVIDING ELECTRIC LAST MILE CONNECTIVITY



## ABOUT **SMARTE**

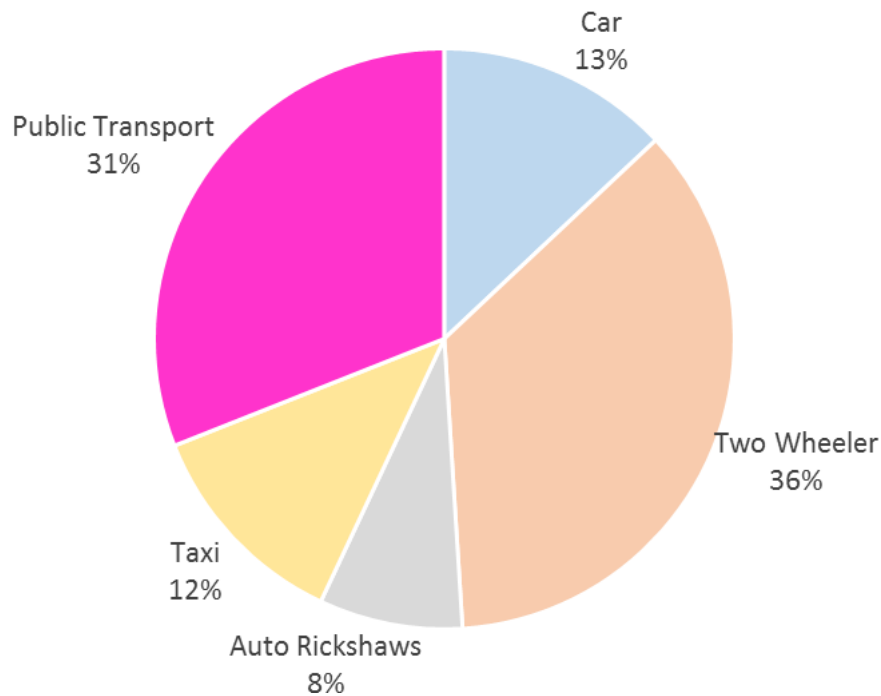


SmartE is India's first and largest electric mobility service, offering first & last mile connectivity to tens of thousands of commuters every day. SmartE has served over 15 million 'zero-pollution' rides over last 30 months.



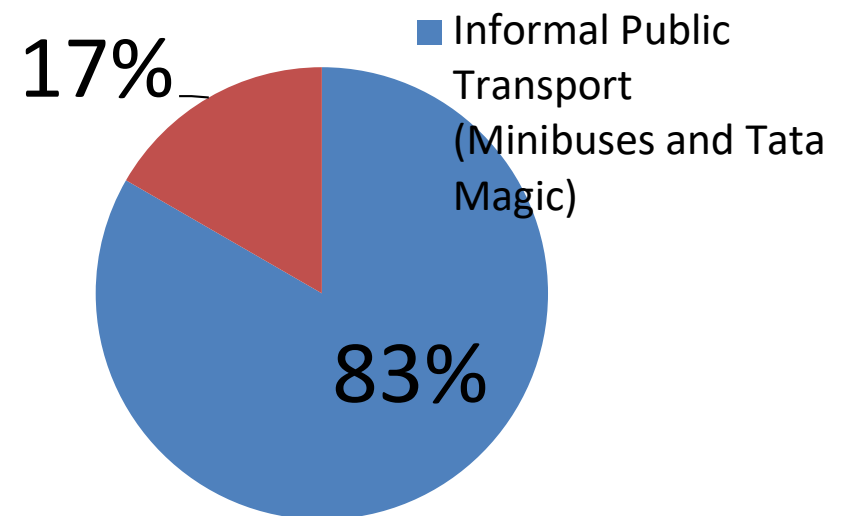
# CASE STUDY - JAIPUR

## Modal Shares 2015 – Jaipur



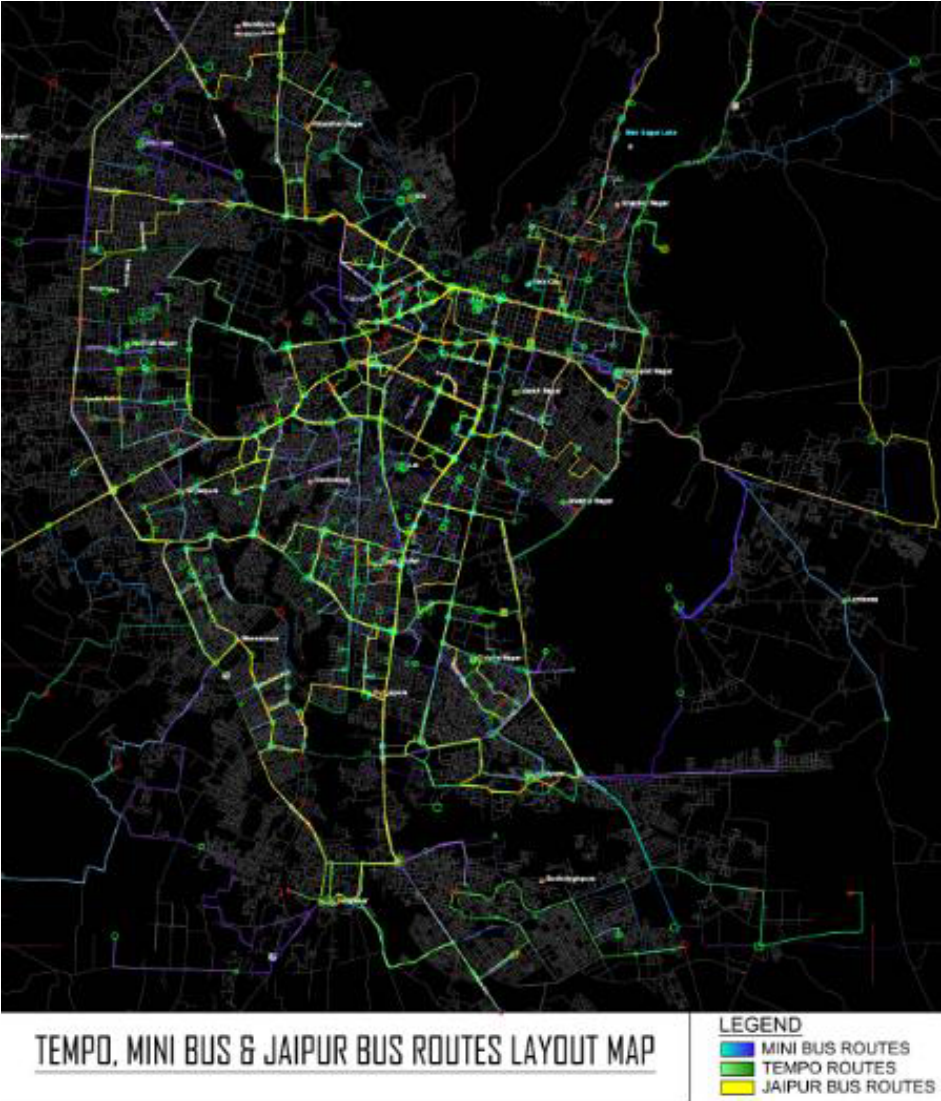
**Increasing Share of Motorcycles**

Type	Service	Fleet Size	Average Daily Ridership
Formal	Jaipur City Transport Services Limited (JCTSL)	408	200,000
	Tata Magic	1,375	350,000
IPT	Minibuses	2,130	650,000
	Tata Magic	1,375	350,000



**80% public transport is IPT**

Extensive Coverage, Low Fares but low quality of service



Mini Bus



TATA Magic



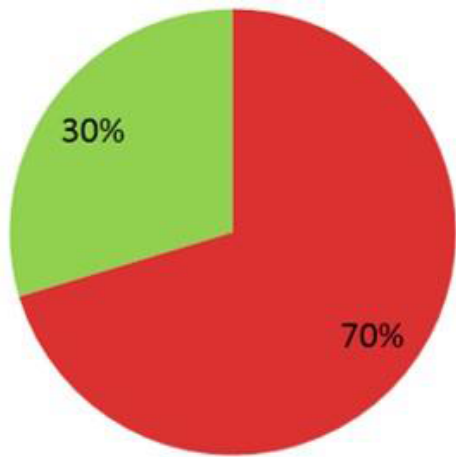
JCTSL BUS

- Between 2002-2005, mini-buses introduced to replace tempos (old engines, adulterated fuel). Route permits were issued and tempo owners were provided financial support to purchase new mini buses
- Mini bus owners organized to create route associations, route associations self regulated to ensure their hired drivers and conductors stuck to permitted routes and did not compete by appointing field monitors
- 2010 – Jaipur started operating big (12.5m) buses on 25 routes using 300 buses received via JnNURM support through an SPV (Jaipur City Transport Services Limited)
- 2008-2010 – CNG Tata Magics were introduced to replace diesel rickshaws outside city limits. These TATA Magics would service passengers within the City as well without necessary route permits. Passenger preferred the TATA Magics since they were newer vehicles and provided better quality of service.
- By 2007-2008 – Minibuses were old, unreliable and with very bad crew behavior. Higher maintenance costs meant lower incomes for drivers and more down time for buses both impacting service quality and crew behavior.

	2014	2017
Age(yrs)	% of minibus fleet	%% of minibus fleet of vehicle
<6	18%	5%
6-7	62%	25%
7-15	20%	70%

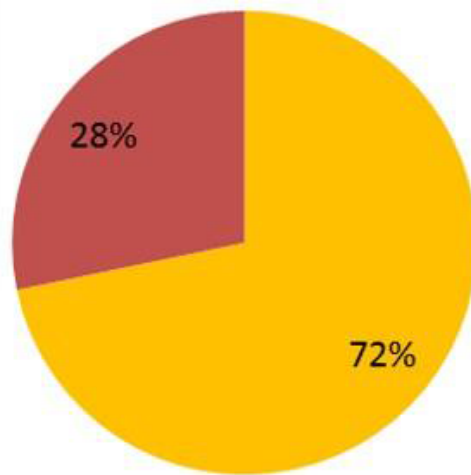
	2014	2017
Age(yrs)	% of Tata Magic fleet	% of Tata Magic fleet
<5	100%	30%
5-8	0%	70%

## Deteriorating Vehicle Stock



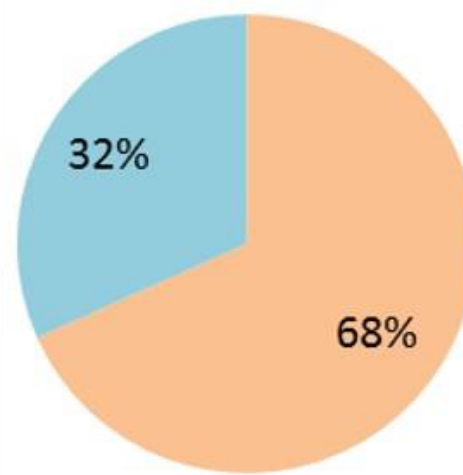
■ Unreliable ■ Reliable

*Reliability of Service*



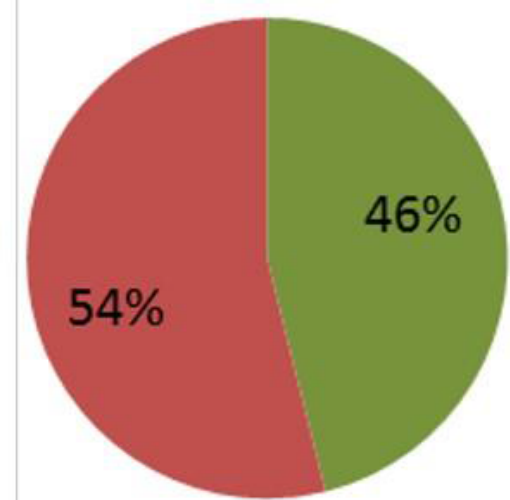
■ Yes ■ No

*Skipping of Bus Stops by Minibus*



■ Good ■ Bad

*Crew Behaviour*



■ Yes ■ No

*Overall Satisfaction with the Service*

# Poor Quality of Service

Parameter	TATA Magic	TATA Magic: No Overloading	Mini Bus: 6m	Big Bus: 12m	Midi Bus: 9m
# in operation	1375		2130	320	
Revenue/Km	10.40	5.20	21.87	30.00	
Operation Costs/Km	11.08	11.08	20.41	42.00	24.41
EMI	0.41	0.41	0.91	4.00	2.00
Maintenance and depreciation	0.89	0.89	1.37	7.00	1.37
Permit, Insurance and Taxes	0.11	0.11	0.37	1.00	0.37
Fitness	0.01	0.01	0.04		0.04
Fuel	4.07	4.07	10.00	25.00	12.00
Conductor remuneration	0.15	0.15	2.50	1.50	2.50
Miscellaneous	0.44	0.44	0.22	2.00	0.22
Driver Remuneration	5.00	5.00	5.00	1.50	5.00
Avg Age of Vehicle	5	5	8	5	NA

## Detailed Costs & Revenues of Public Transport Operations

# FRAMEWORK FOR EVALUATION

- A city can regulate paratransit operations on six parameters – vehicles, routes, permit, fares, drivers and quality of service
- High quality systems like TransMilenio in Bogota has regulations for all 6 parameters and is able to enforce all 6 parameters
- Most cities will regulate 3-4 of these parameters
- Most cities are not able to enforce more than one or two parameters

Parameters	Regulation	Enforcement
Routes		
Permits		
Fares		
Drivers		
Vehicles		
Quality of Service		



# FRAMEWORK FOR EVALUATION

- We recommend a framework for evaluation paratransit systems in Cities
- The framework scores a paratransit system on regulation and enforcement
- A system that scores 6:6 is the best
- A system that scores 5:1 have poor quality of service
- A system that scores 4:3 or 3:2 has usually better user satisfaction than a system that scores 5:1 or 4:1

Parameters	Regulation	Enforcement
Routes		
Permits		
Fares		
Drivers		
Vehicles		
Quality of Service		

# APPLYING FRAMEWORK FOR EVALUATION

- Framework for evaluation can be used as structure to approach an incremental reform program
- If your system scores a 5:1, and you have the ability to develop route maps using GPS tracking. You can deregulate one or two parameters that are currently not being enforced. Enforce route maps once digitised and mapped and run a driver training program in parallel and move to a 4:3 or 3:3 system

Parameters	Regulation	Enforcement
Routes		
Permits		
Fares		
Drivers		
Vehicles		
Quality of Service		

# INCREMENTAL CHANGE VS. BIG BANG

- Big Bang: New requirements for all parameters – routes redefined, new permits, newer vehicles, reformed drivers, new fare structure and new quality monitoring measure
- Big Bang is usually possible alongside a major system reform with associated finance. In the last two decades, such system reforms have occurred alongside infrastructure implementation for bus rapid transit.
- Prior to 2000, big bang or large system improvements were done around fuel switch (e.g. Delhi CNG) or vehicle switch (e.g. New minibuses in Jaipur)
- Incremental: Service quality of paratransit is a growing concern and there is a lack of finance to drive any big system reform
- Incremental reform can be
  - Introducing route or schedule adherence using a digital platform
  - Running a driver training program
  - Re-organising routes and schedules on a single corridor
- The proposed 'framework for evaluation' can be used to structure a systematic incremental change program

# PREPARING FOR CHANGE

## 1. Data Collection

1. Current cost of operation data for all paratransit and formal buses in the City
2. Current age of fleet

## 2. Political Economy

1. Tracing the history of paratransit reform or regulation in the City
2. Current and Incumbent Operators and their investors/protectors
3. Willingness of operators to enter negotiations

## 3. Building a vision for future

1. Growth in population and transport demand
2. Identifying infrastructure requirement (# of buses, land, skilled labor) to meet this demand.

# Vicious Cycle of Public Transit

- Informal Public Transport or Paratransit reforms are not permanent
- Key Aspects to watch to ensure continuity of reforms
  - Life and Quality of a bus is an important parameter to monitor
    - As quality of bus deteriorates, ridership declines or the quality of service declines
    - Buses need regular maintenance after first two year of operations; life of poorly maintained buses is 5-7 years; life of well maintained buses can be as high as 15 years
    - Most cases where paratransit operations run, there is need to renew/rehaul the system every 5-7 years
  - Capture by private operators – loosing power to enforce negotiate
    - Services run well on profitable routes if multiple operators are not competing
    - Service quality deteriorates significantly on non-profitable usually left to driver running a poor quality pocketing the difference between fare and cost of operation

**THANK YOU**

# Discussions

# Closing and next steps



- Technical assistance
- Keep in touch
- Follow us on linkedin- Community of Practice- Clean Mobility for cities in Asia Pacific & ALP <http://www.asialeds.org/> website for updates
- Write to us through email
- Share with your peers
- Session would be followed by a Summary
- Survey questions



# Thank you!

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