

Impact of Improving Public Transport and NMT Facilities on CO₂ Emissions in Indian Cities

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BACKGROUND

Problem statement

Degrading bus service and increasing risk to pedestrians and cyclist

Declining use of NMT and public transport system

Increasing use of personal motorized vehicles

Increasing emission levels

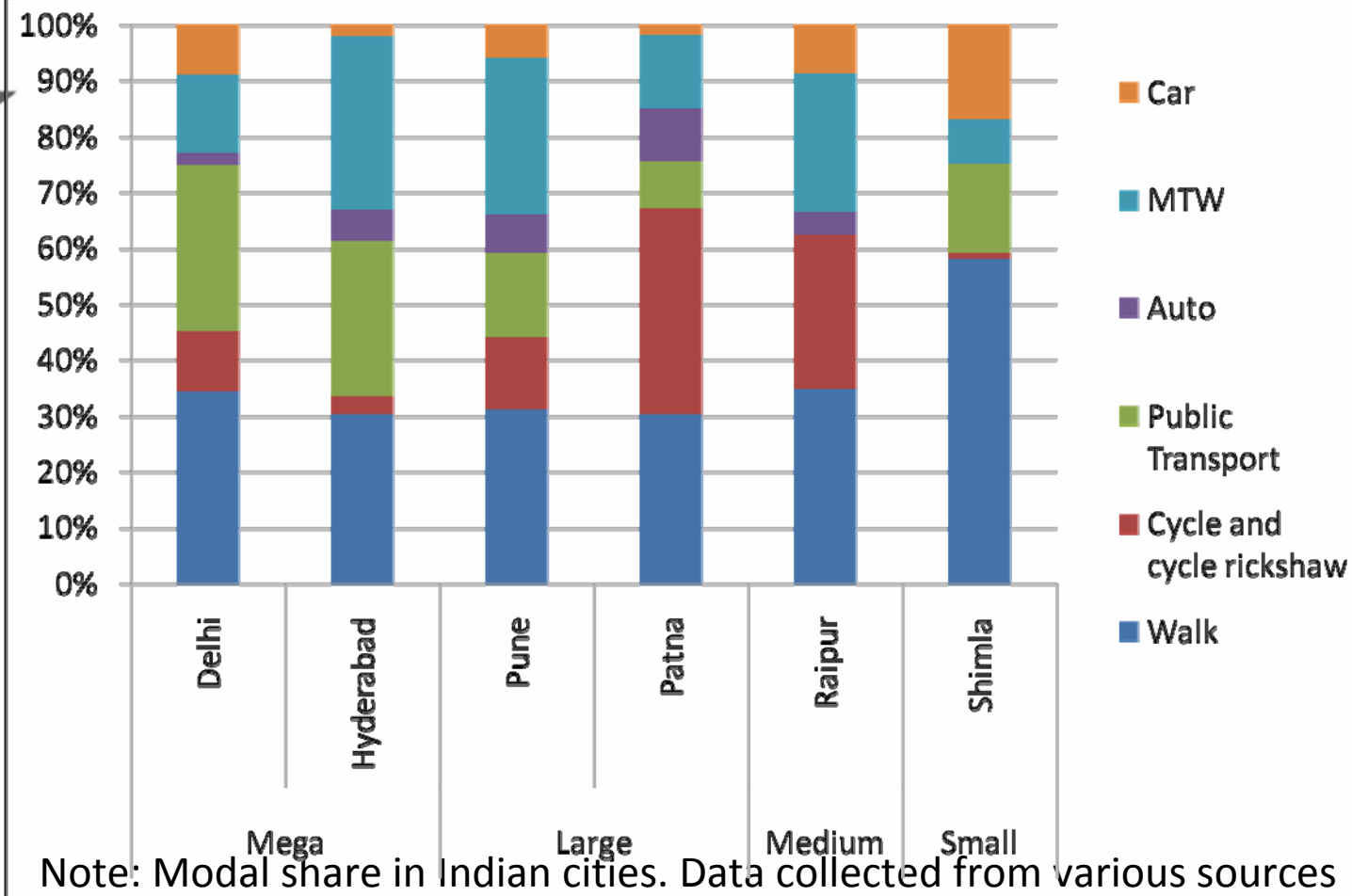
NEED TO RESTRAIN INCREASING EMISSION LEVELS

RETAINING EXISTING MODAL SHARES IS REQUIRED

Improve Public Transport System

Infrastructure for safe and secure use of NMT



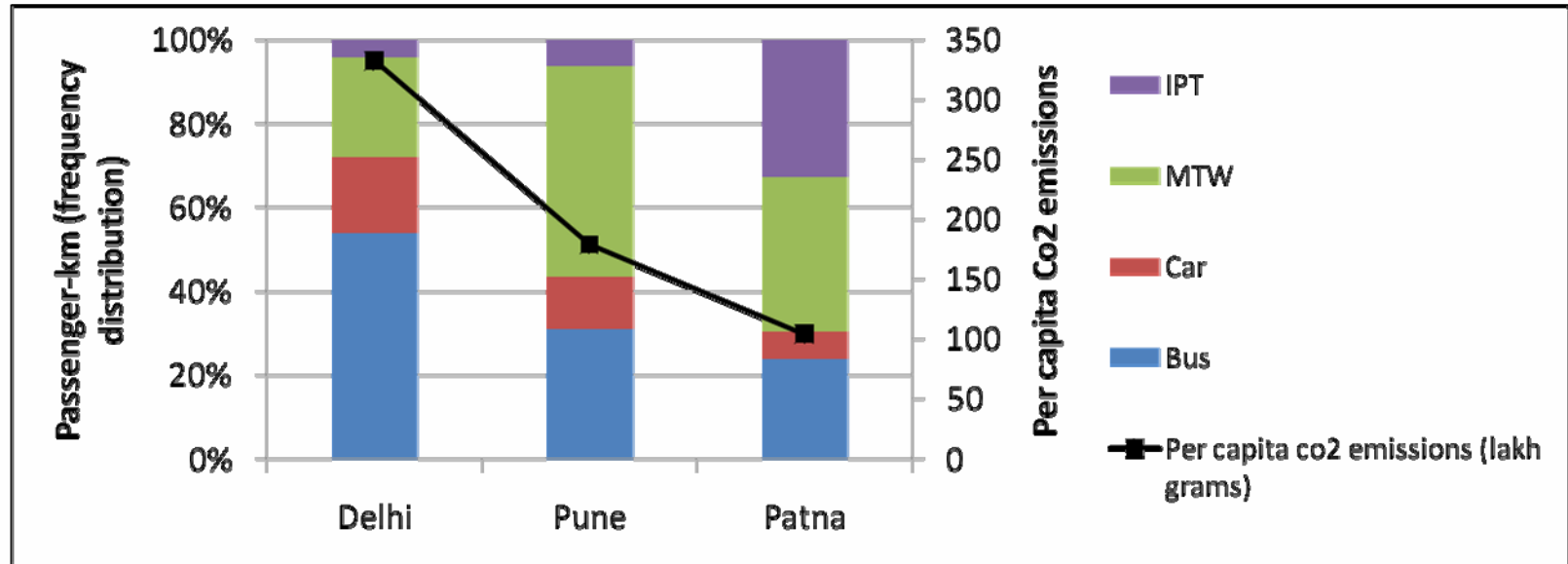


MODAL SHARE

- NMT is the dominant mode of transport in all cities
- Existing use of the public transport in Indian cities is high
- In the cities where formal bus service does not exist motorized two wheeler and informal para-transit service dominates the motorized transport modal share

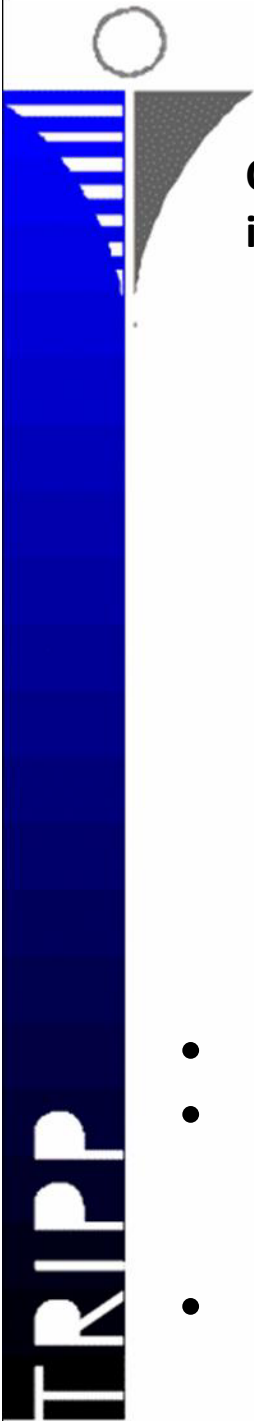


Equivalent CO₂ emissions



- cars and MTW contribute 65 - 80 percent of the total transport emissions.
- Delhi has highest emission levels because of more motorized vehicles travelling longer distances





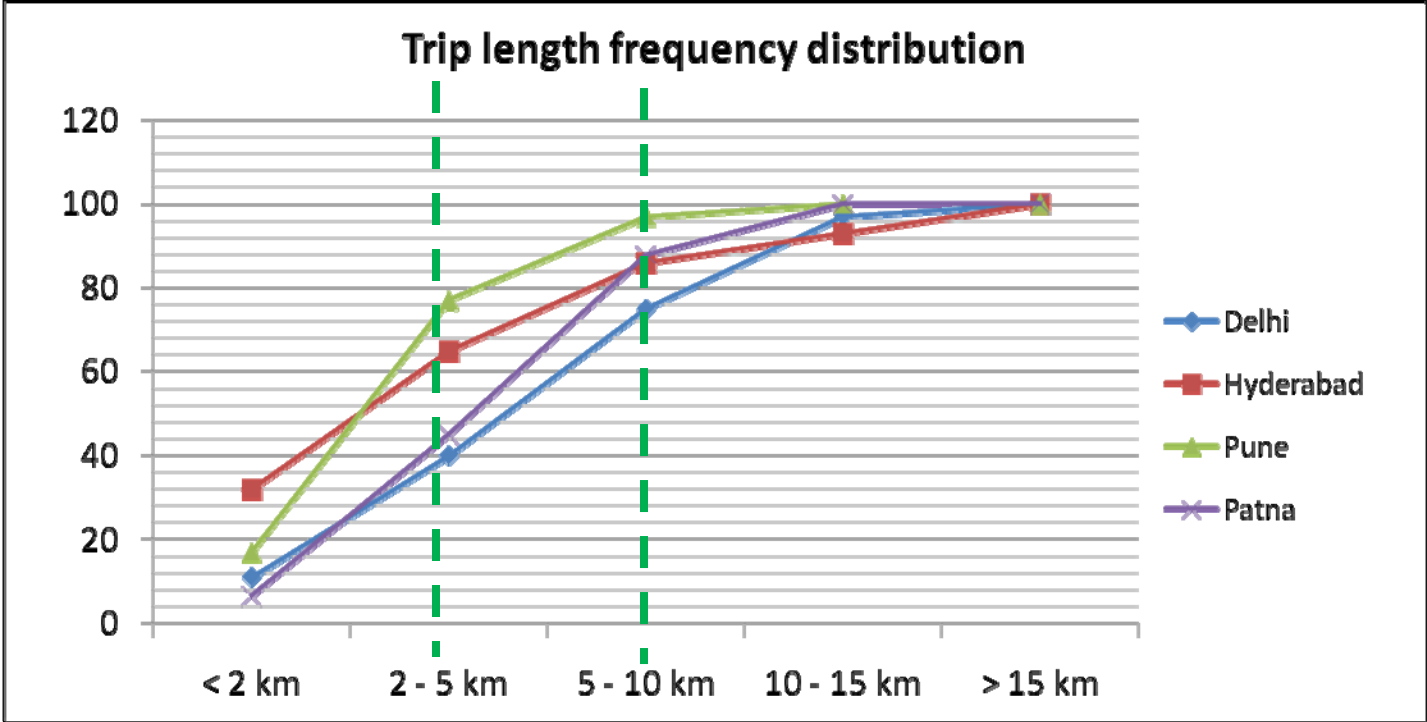
CO₂ equivalent emissions per passenger-km from vehicles and transport modes in developing countries

Type of vehicle	Load factor	CO ₂ equivalent emissions (full energy cycle)
Car (gasoline)	2.5	130 – 170
Car (diesel)	2.5	85 – 120
Car (natural gas)	2.5	100 – 135
Car (electric)	2	30 – 100
Scooter (two-stroke)	1.5	60 – 90
Scooter (four-stroke)	1.5	40 – 60
Minibus (gasoline)	12	50 – 70
Minibus (diesel)	12	40 – 60
Bus (diesel)	40	20 – 30
Bus (natural gas)	40	25 – 35
Bus (hydrogen fuel cell)	40	3 – 6
Rail transit*	75% full	20 – 50

- Bus is the least CO₂ emitting mode of transport
- Emissions from rail transit is low if the electricity supply is not by coal and in India approximately 53.3% of the electricity demand is sufficed by coal.
- *Source: (Sperling, 2004)*



Trip length frequency distribution



Cities	Trips shorter than 5 km	Trips shorter than 10 km
Delhi	40%	70%
Hyderabad	65%	88%
Pune	77%	95%
Patna	45%	90%

Scenario development

- Three scenarios
 - Improving only bus infrastructure
 - Improving both bus and NMT infrastructure
 - Improving only NMT infrastructure
- For each scenario
 - Maximum Shift Scenario and
 - Minimum Shift Scenario

Maximum shift scenario

1. **Improving only bus infrastructure**
 - Longer trips shift to the use of bus
 - Existing use of bus for shorter trips continues
2. **Improving both bus and Non-motorized transport infrastructure**
 - Longer trips shift to the use of bus
 - Shorter trips shift to walking and cycling
3. **Improving only NMT infrastructure**
 - Shorter trips shift to the use of

	Share of trips longer than 5 km shifting to bus	Share of trips shorter than 5 km shifting to NMT
Scenario 1	50% of the long trips made by MTW and IPT	0%
Scenario 2	50% of the long trips made by MTW and IPT	30% of the short trips made by bus, MTW and IPT
Scenario 3	0%	30% of the short trips made by motorized transport

Note:

Modal shift does not occur from four-wheelers

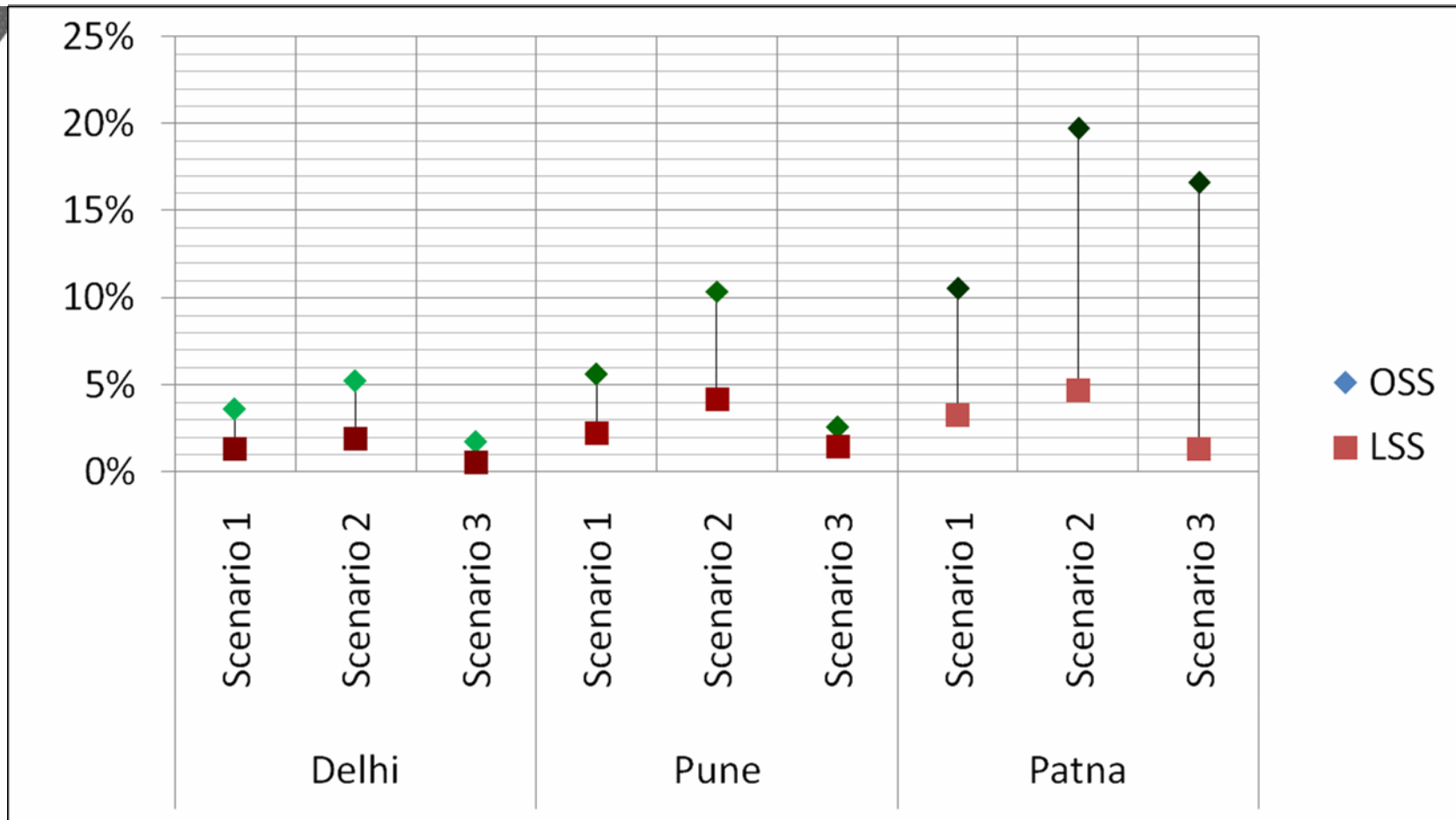


Minimum shift scenario

- 1. Improving only bus infrastructure**
 - Longer trips shift to the use of bus
 - Existing use of bus for shorter trips continues
- 2. Improving both bus and Non-motorized transport infrastructure**
 - Longer trips shift to the use of bus
 - Shorter trips shift to walking and cycling
- 3. Improving only NMT infrastructure**
 - Shorter trips shift to the use of

	Share of trips longer than 5 km shifting to bus	Share of trips shorter than 5 km shifting to NMT
Scenario 1	20% of the long trips made by MTW and 5% of the long trips made by IPT	0%
Scenario 2	Same as in Scenario 1	10% of the short trips made by bus, MTW and IPT
Scenario 3	0%	Same as in Scenario 2
Note:	Modal shift does not occur from four-wheelers	

CO₂ Emissions in Maximum and Minimum Shift Scenario



- Maximum reduction in CO₂ is in Patna and least in Delhi.
- As per previous studies,
 - Three mega cities of India – contributes to 50% of the total emissions
- Need to emphasize on megacities to reduce maximum amount of Co2 emissions
- Need to focus on large cities to get maximum benefit

Resulting Emissions and Modal Share as Per Maximum



Maximum decrease in total emissions is in scenario 2 for all the three cities.

The result highlights the need of NMT infrastructure along with improved bus service in the cities to reduce emissions in all the cities.

Maximum impact of the strategy can be realized in Patna followed by Pune and least being in Delhi.

Resulting Emissions and Modal Share as Per Minimum



Maximum decrease in total emissions is in scenario 2 for all the three cities.

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CONCLUSION

- Scenario 2 i.e. NMT infrastructure along with bus infrastructure is required to reduce emissions from mega and large cities
- 15% of the total urban population lives in 3 megacities of India contributing to 50% of the total emission from urban transport
- Measures are required to be done Delhi reducing quantitative total emissions
- Though emissions from Patna are low, however, scenario results in reducing 20% of the total emissions thereby having maximum impact of strategies



THANK YOU



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