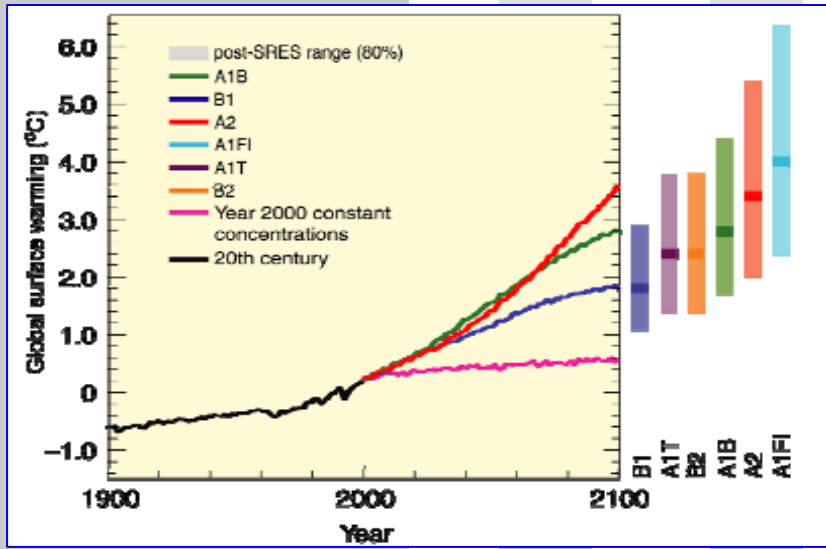


Urban mobility in an era of global warming



Dinesh Mohan

CITIES

“I regard the growth of cities as an evil thing, unfortunate for mankind and the world, unfortunate for England and certainly unfortunate for India...It is only when the cities realize the duty of making an adequate return to the villages for the strength and sustenance which they derive from them, instead of selfishly exploiting them, that a healthy and moral relationship between the two will spring up.”

M. K. Gandhi

“The unprecedented urban growth taking place in developing countries reflects the hopes and aspirations of millions of new urbanites. Cities have enormous potential for improving people’s lives, but inadequate urban management, often based on inaccurate perceptions and information, can turn opportunity into disaster.”

State of World Population 2007, UNFPA.

What kind of city do we want?

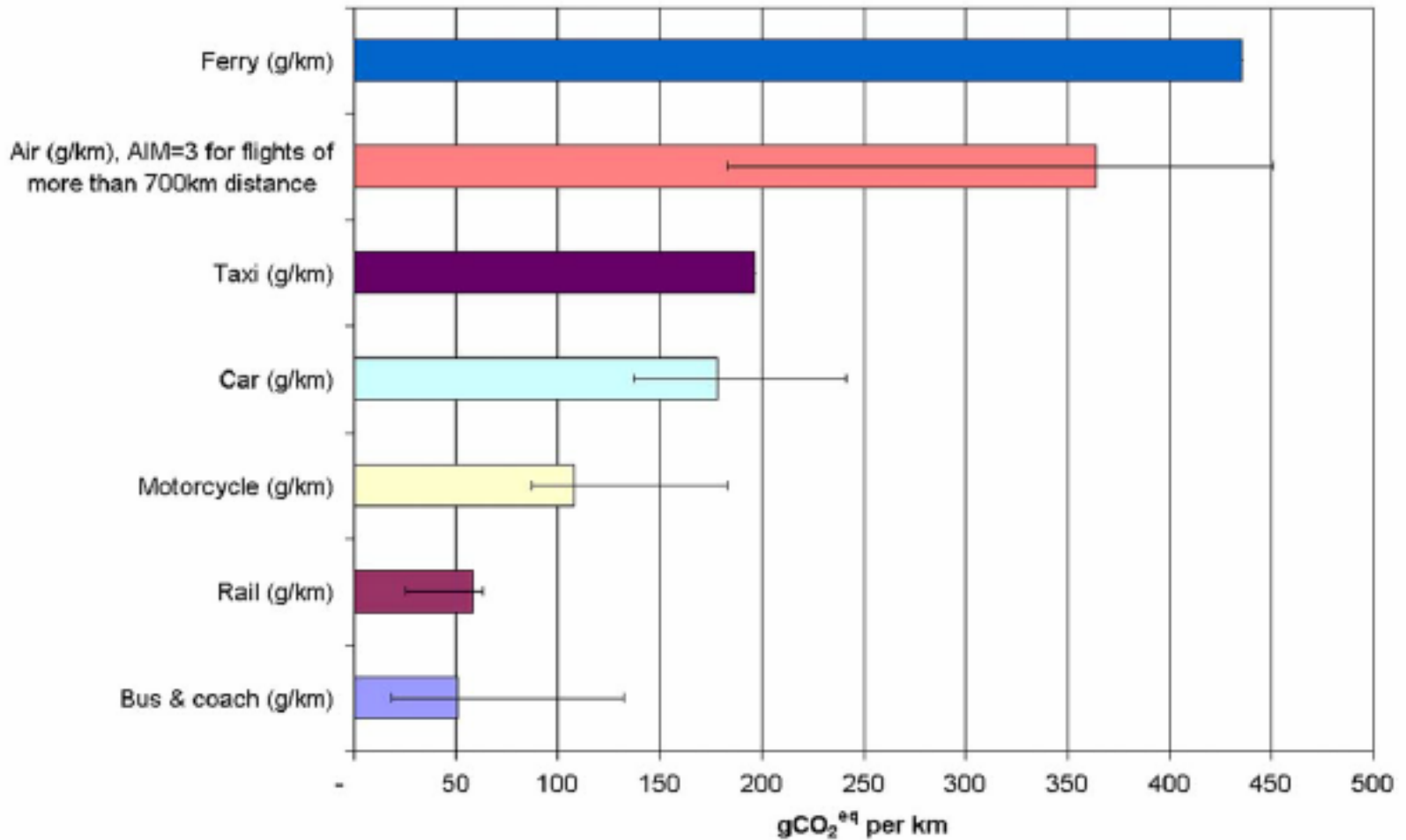
- Where my daughter and grandmother can walk and cross roads alone in the evening
- I have all my daily needs available within walking distance of home
- Where I share space as an equal citizen with all others
- One that I am proud of and want to show others for its beauty, quiet and civility

Encourage suburban living?

- In bigger cities, suburbanites are more likely to drive longer distances relative to central city resident
- In the case of New York City, more than one-third of the gains in reducing car-related emissions that are associated with central city residents are offset by higher emissions from public transit
- In New York, central city residents emit more than 5600 lb of carbon dioxide less than suburbanites
- In bigger cities, suburbanites are more likely to drive longer distances relative to central city residents.

Glaeser, E. L. & Kahn, M. E. (2010). The greenness of cities: Carbon dioxide emissions and urban development. *Journal of Urban Economics*, 67, 404-418.

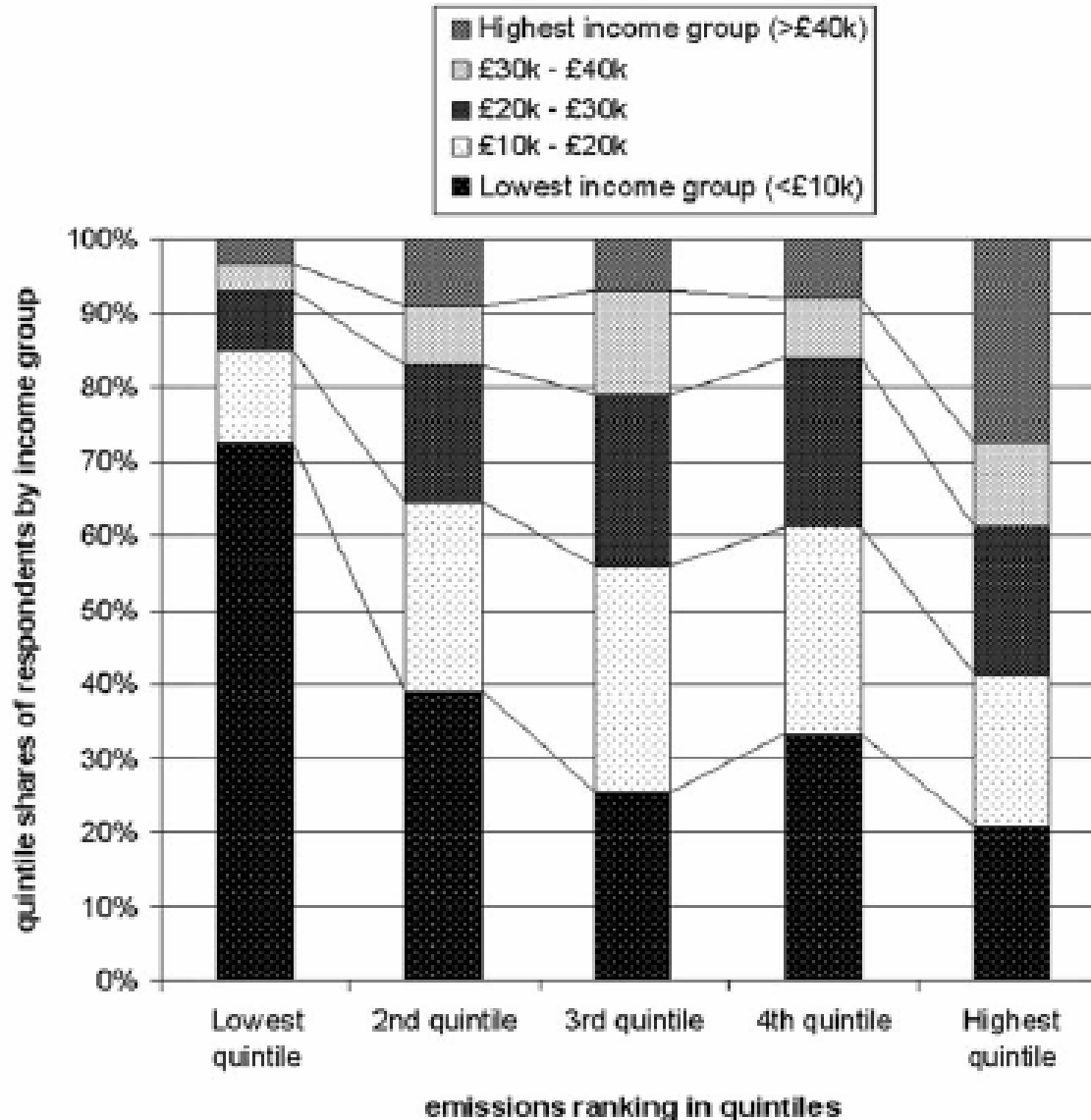
Average emissions of greenhouse gases, UK



C. Brand, J.M. Preston (2010) '60-20 emission'—The unequal distribution of greenhouse gas emissions from personal, non-business travel in the UK. *Transport Policy*, 17:9–19.

Average emissions of greenhouse gases, UK

Different income groups



C. Brand, J.M. Preston (2010) '60-20 emission'—The unequal distribution of greenhouse gas emissions from personal, non-business travel in the UK. *Transport Policy*, 17:9–19.

A century of developments

- ❑ Early 20th century road surfaces not smooth – same materials and technology used by the Romans
- ❑ The use of asphalt and bitumen only gets perfected between 1910 and 1930
- ❑ The pneumatic tyre for large vehicles takes shape after 1930 and so does the heavy duty diesel engine
- ❑ Therefore, mechanised transport could be comfortable only if vehicles moved on steel rails up to 1920 or so. This is why street trams became very popular as they were more flexible in operation and cheaper to build than underground rail systems.

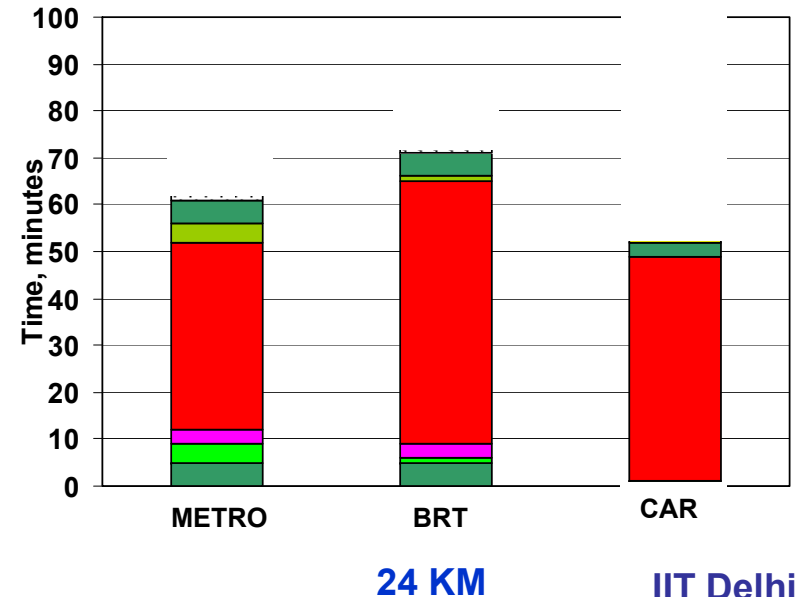
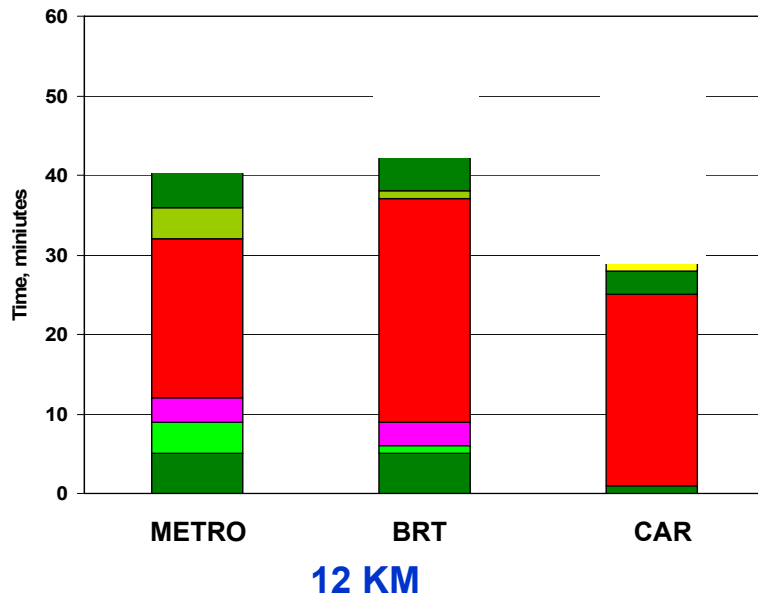
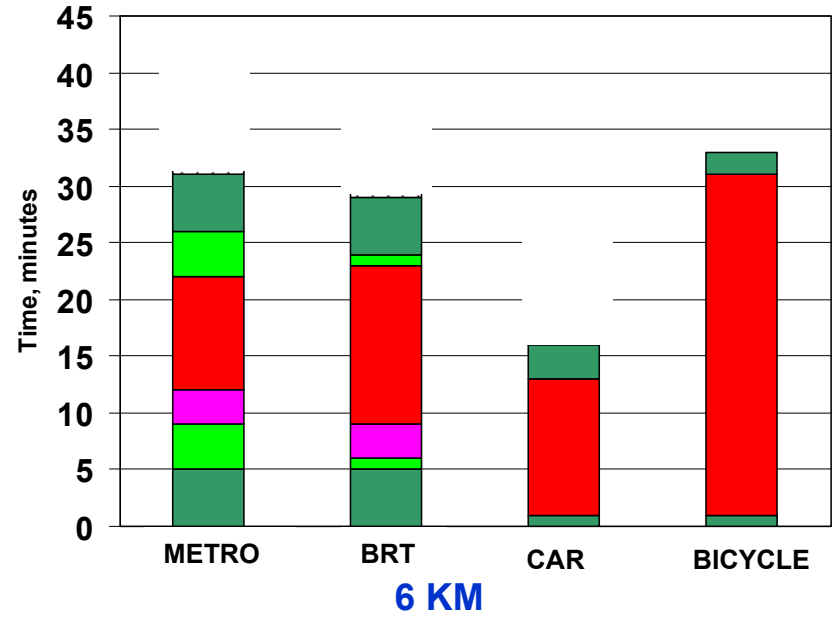
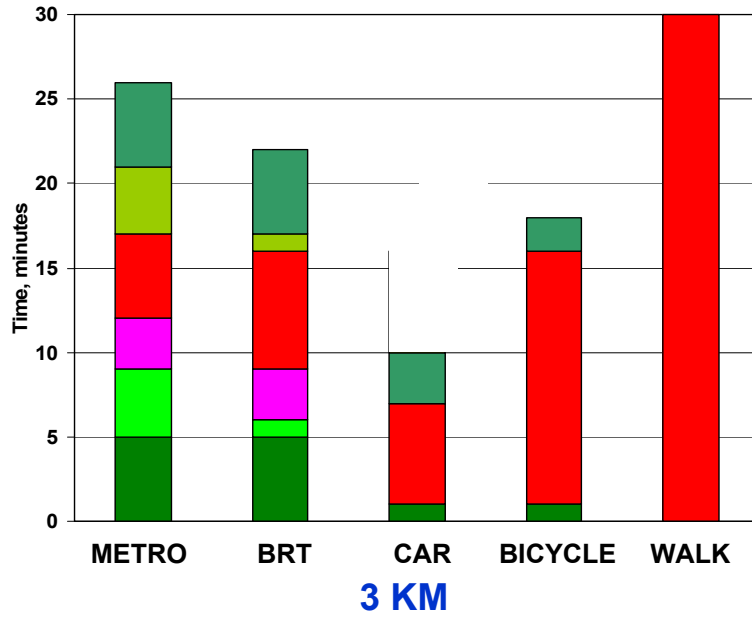
Rail preferred for public transport – large vehicles

A century of developments

- Public Transport came before cars**
- No more Central Business Districts (CBD)**
- High motorcycle ownership in many countries – personal mobility, peg on fares**
- Cars much more comfortable**

DOOR TO DOOR TRIP TIMES

- Walking to station/veh
- Journey in vehicle
- Congestion (car)
- Walking in station - in
- Walking in station - out
- Waiting at station
- Walking to destination
- One change



DELHI BRT CORRIDOR - BEFORE



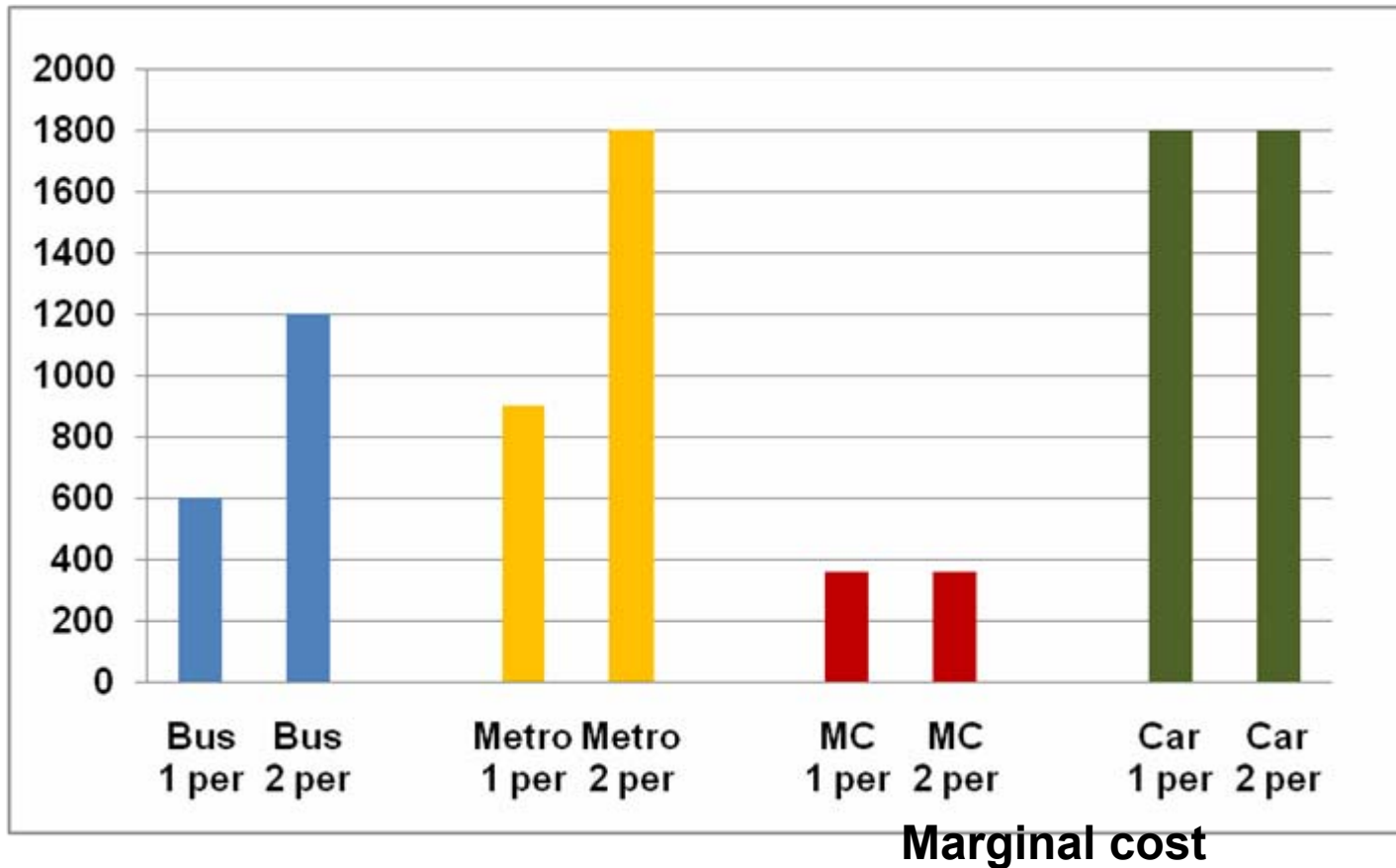
Fatalities per year: 15-23

DELHI BRT CORRIDOR - AFTER



Fatalities in 2009: ZERO

Expenditure in Rs - 6 km round trip per day for 1 month

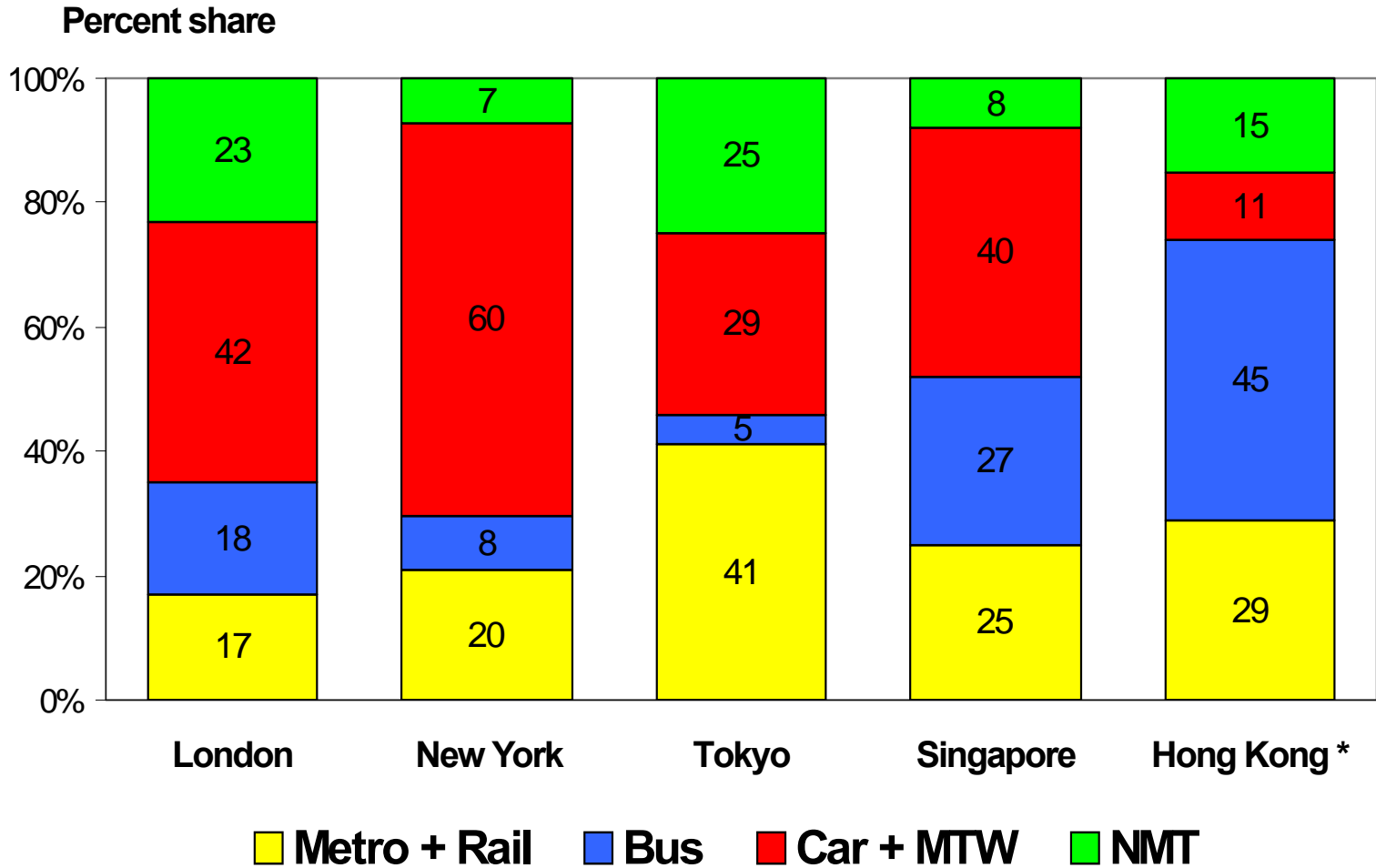


Minimum family income in Rs per month:

Bus use -	6,000	Metro -	9,000
Motorcycle -	30,000	Car -	60,000

20-30% families earn less than Rs. 5,000 per month
70% families earn less than Rs 35,000 per month

Travel patterns – old world cities



ISSUES

- ❑ Even cities in high income countries have not been able to solve the problems that all of us have to deal with in the near future

City	Modal share, percent		
	Car + MTW	PT	W&C
Bristol, UK	65	12	23
Leeds, UK	61	36	3
Nantes, France	58	14	28
Helsinki, Finland	54	20	26
Marseille, France	53	12	35
Edinburgh, UK	52	29	19
Newcastle, UK	48	19	33
Brussels, Belgium	44	18	38
Frankfurt, Germany	42	21	37
Stuttgart, Germany	36	25	39
Amsterdam, Neth's	32	16	52

NO INDIAN CITY HAS CAR USE MORE THAN 15%

CO2 and roads

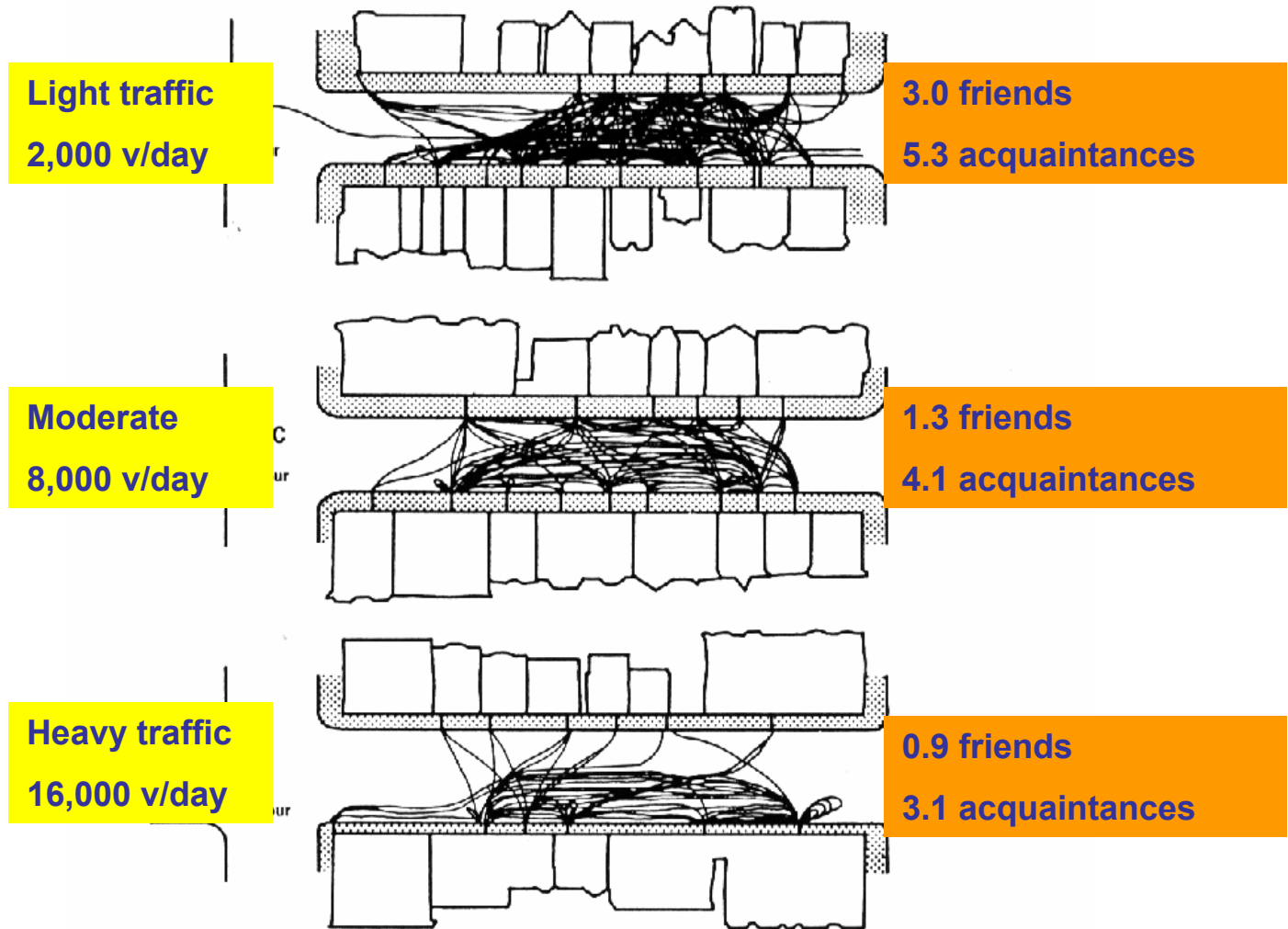
20th CENTURY SOLUTIONS:

- One way streets?
 - Road widening & expansion?
 - Flyovers, elevated/underground corridors?
 - Metro/LRT/Monorail/Skybus - providing corridor capacity to serve link demand
 - Underground trains seen as a major solution during cold war as nuclear shelters
-
- Surface transport less energy consuming
 - Underground or elevated transit does not reduce congestion, provides extra supply > CO2↑
 - CO2 \approx road area + distance of travel



**Solutions contractor driven
Not people driven**

FRIENDS & URBAN TRANSPORT



Safe roads a precondition for the future low CO2 city

- ❑ Children, elderly, walking speed ~ 0.8 m/s
- ❑ Pedestrian green phase < 30 s
- ❑ Therefore, motorised lanes $< (30 \times 0.8) = < 24$ m

- ❑ Shops and/or street vendors by design
- ❑ City blocks ~ 800 m square
- ❑ Maintain urban average speeds at 15 km/h
- ❑ Public transit on surface