ASIF the Data Mattered

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Data

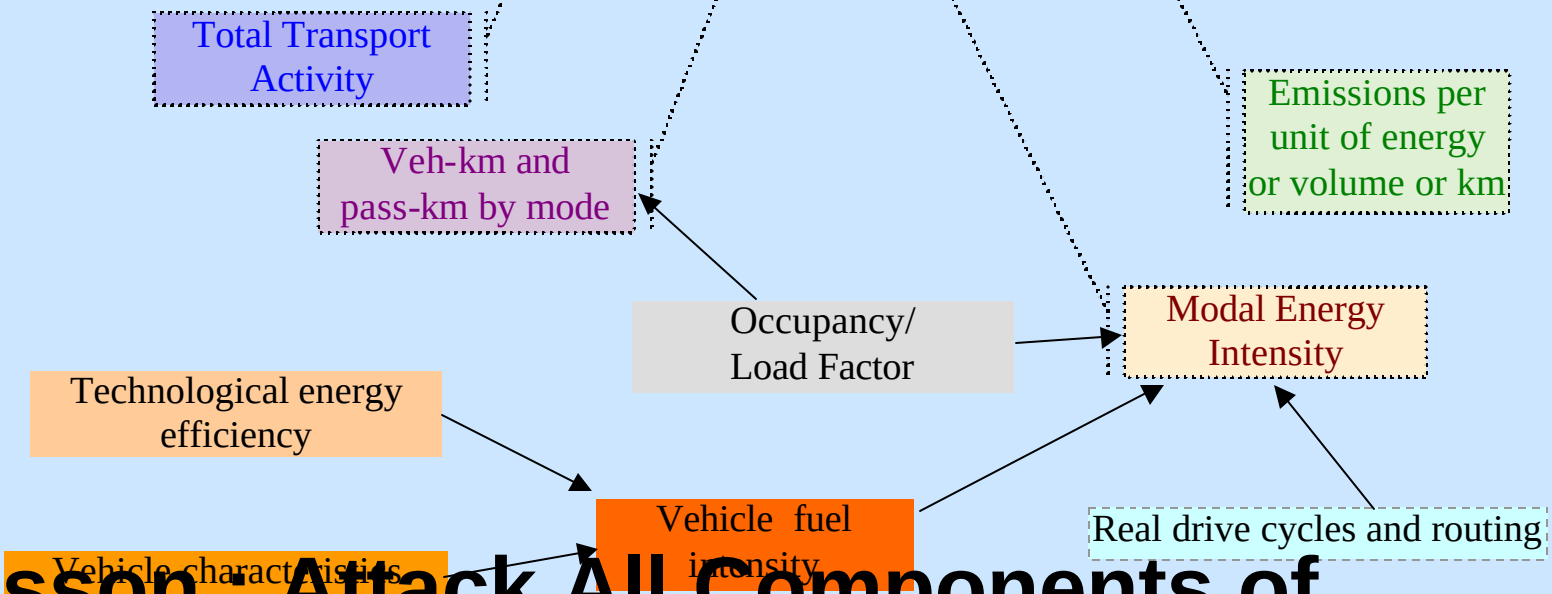
- I am generally a data user, not a collector nor, usually, a major questioner
- But we should always be wary of data quality in transport, and it's potential impacts on analysis and policy recommendations.
- Going to mention two projects I've been involved in where help is needed
  - Buses in Developing countries
  - Global transport forecasting

ASIF Decomposition

See http://www.iea.org/pubs/free/articles/schipper/flexing.htm

Emissions from Transport

$$G = A * S_i * I_i * F_{i,j}$$



Lesson : Attack All Components of Pollution

Source: IEA

ASIF Components

- For developing (and often developed) countries…
  - Activity measures may be available but are generally of very poor quality
    - How measured?
    - Time series available?
    - Details of travel structure? (trip purpose, demographic breakdown, etc.)
    - Freight a particular problem
  - Travel "structure" data somewhat better (modal shares, passengers per vehicle)
    - Usual modal share surveys exist
    - Registration data is problematic
    - Tracking scrappage is problematic

ASIF Components

- Vehicle energy intensity data is often available but beware…
  - In-use data is scarce
  - Data does not reflect real driving conditions, often not from the city where it is applied
- Emissions data…
  - Pollutant emissions factors suffer from same problems as intensity – little in-use data
  - Upstream GHG emissions data is still very poor for most countries

On the other hand…

- Some data issues are probably not that relevant to developing a sound transport policy – many "bigger picture" aspects are not particularly data-dependent
  - A "pro" v. "anti" stance to automobile ownership/use/dependence is more a function of what type of city/country/world we want to live in
  - A goal to meet basic transport needs for all is more of a political decision than a data-driven decision
- Yet even for basic questions sound data and analysis can shed important light on the impacts of different policies and pathways.

Buses in Developing Countries

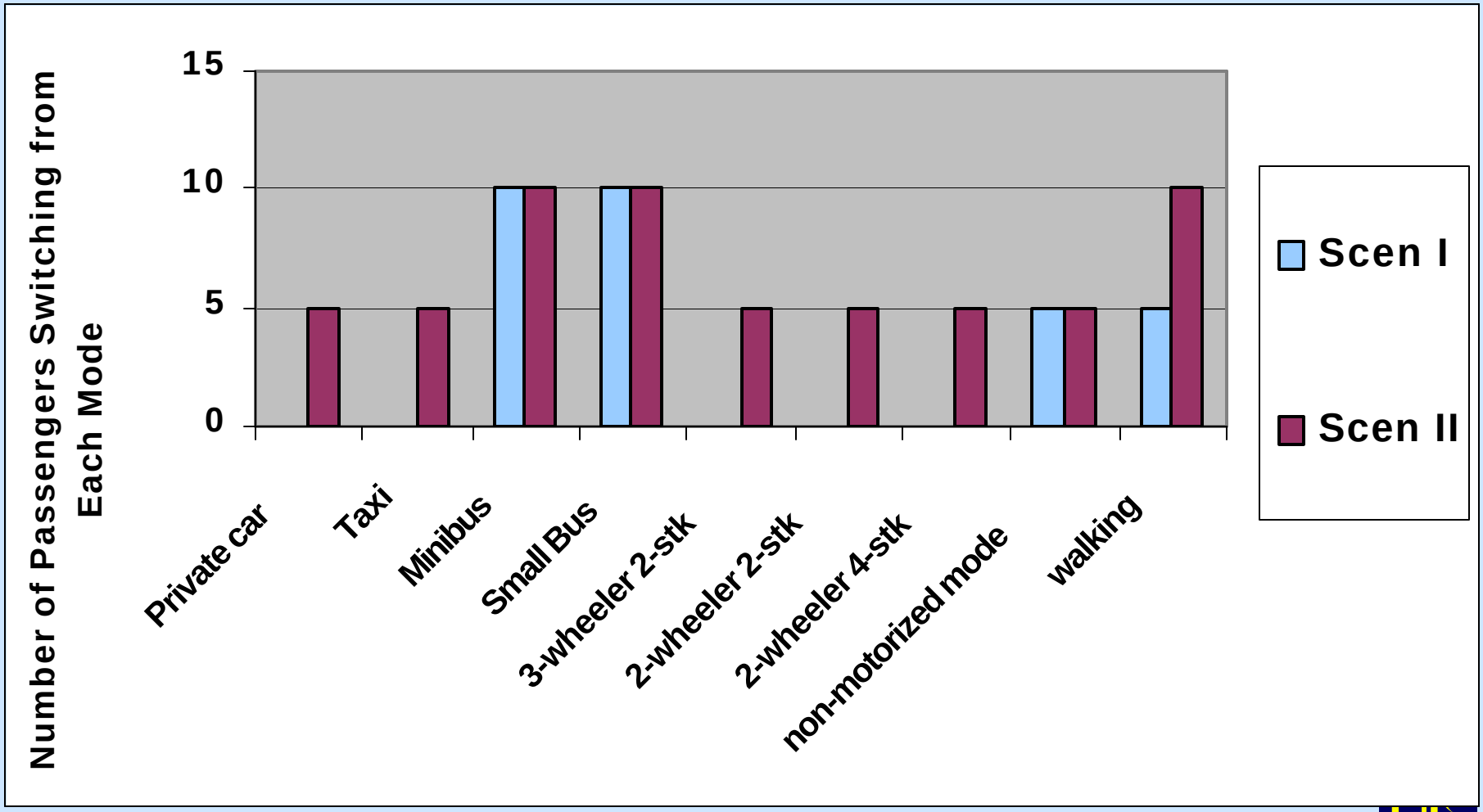
- Ridership is declining, emissions per vehicle are often very high
- Many officials seem to see buses as part of the problem
- Key issue is what are the impacts per passenger-km – not well understood
- Also, what are the mode switching impacts of adding buses or improving bus systems – again, very poorly understood
- For buses – should we invest in high tech? Answer can be surprising

An example – how can we compare the importance of bus technology vs bus utilization?

- Can we achieve significant reductions in emissions and congestion without spending large sums on advanced technology buses?

- We would like to understand how travel changes with the introduction of better bus systems.
  - Almost no data on mode switching behavior in developing cities. So IEA has developed a scenario approach to the problem.
  - At the margin, suppose we add one more bus to the roads, and the passengers come from a variety of previous modes. What are the impacts, and how do these impacts vary by bus technology?

Impacts of adding one bus: assumptions regarding what modes passengers switch from



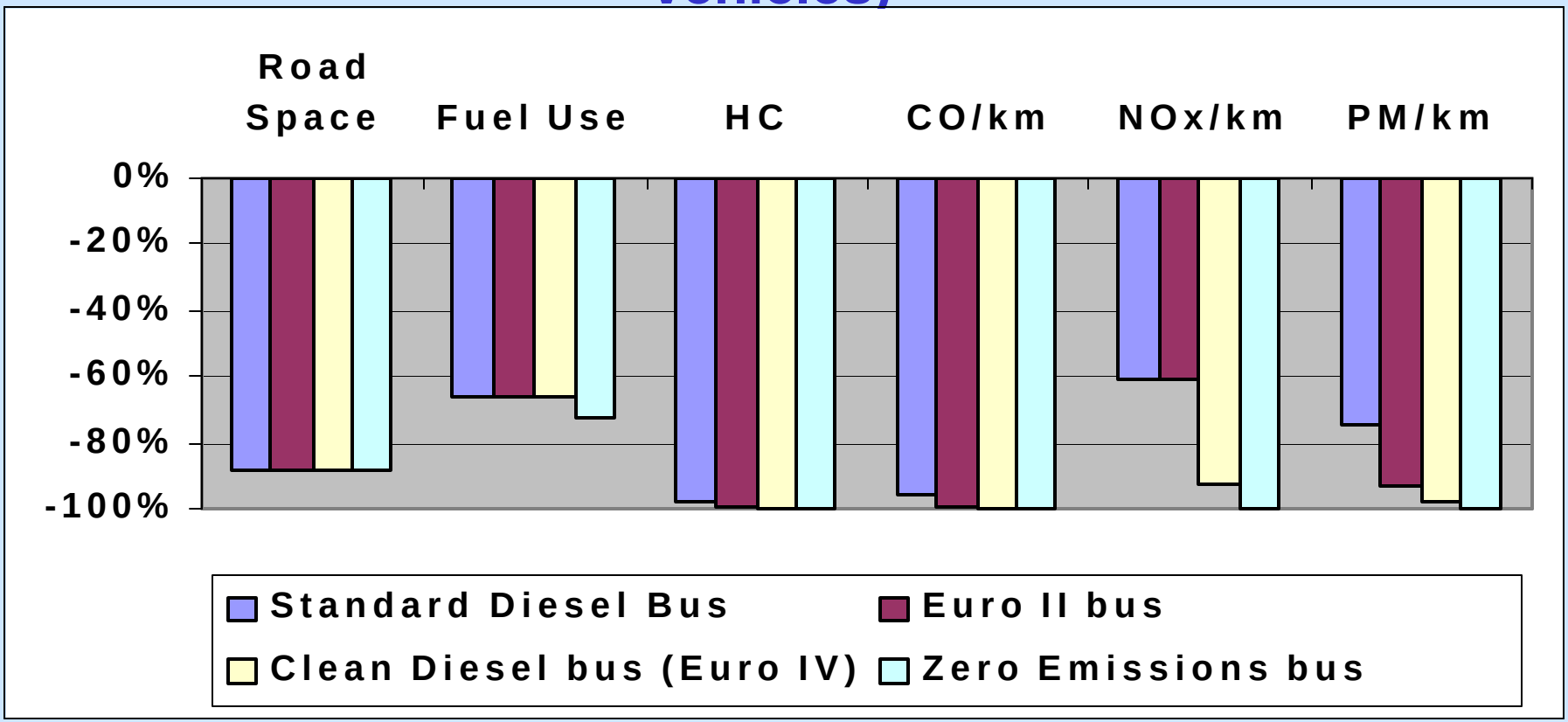
Impacts of adding one bus: Assumptions

(data based on available data for Delhi)

Mode Characteristics					Pollutants (grams per km)			
	Vehicle passenger capacity	Average passenger load	Road space required (in units of one bus)	Fuel Consumption L/100km	HC	CO	Nox	PM
Private car	5	1.5	0.5	9	1.50	9.50	1.90	0.25
Taxi	3	1.2	0.5	9	6.20	28.90	2.70	0.33
Minibus / Paratransit	15	12	0.65	20	0.66	5.39	2.50	0.90
Small Diesel Bus	40	30	0.8	30	2.10	12.70	10.00	2.00
3-wheeler 2-stk	3	1.5	0.33	5	7.65	12.25	0.10	0.50
2-wheeler 2-stk	2	1.2	0.25	3.5	5.18	8.30	0.10	0.50
2-wheeler 4-stk	2	1.2	0.25	3	0.72	8.30	0.39	0.08
non-motorized mode	3	1.5	0.25	0	0.00	0.00	0.00	0.00
Pedestrian (Walk)	1	1	0	0	0.00	0.00	0.00	0.00
Standard Diesel Bus	80	60	1	50	2.10	12.70	10.00	2.00
Euro II bus	80	60	1	50	0.50	2.00	10.00	0.50
Euro IV bus	80	60	1	50	0.10	0.50	2.00	0.20
Zero Emissions bus	80	60	1	40	0.00	0.00	0.00	0.00

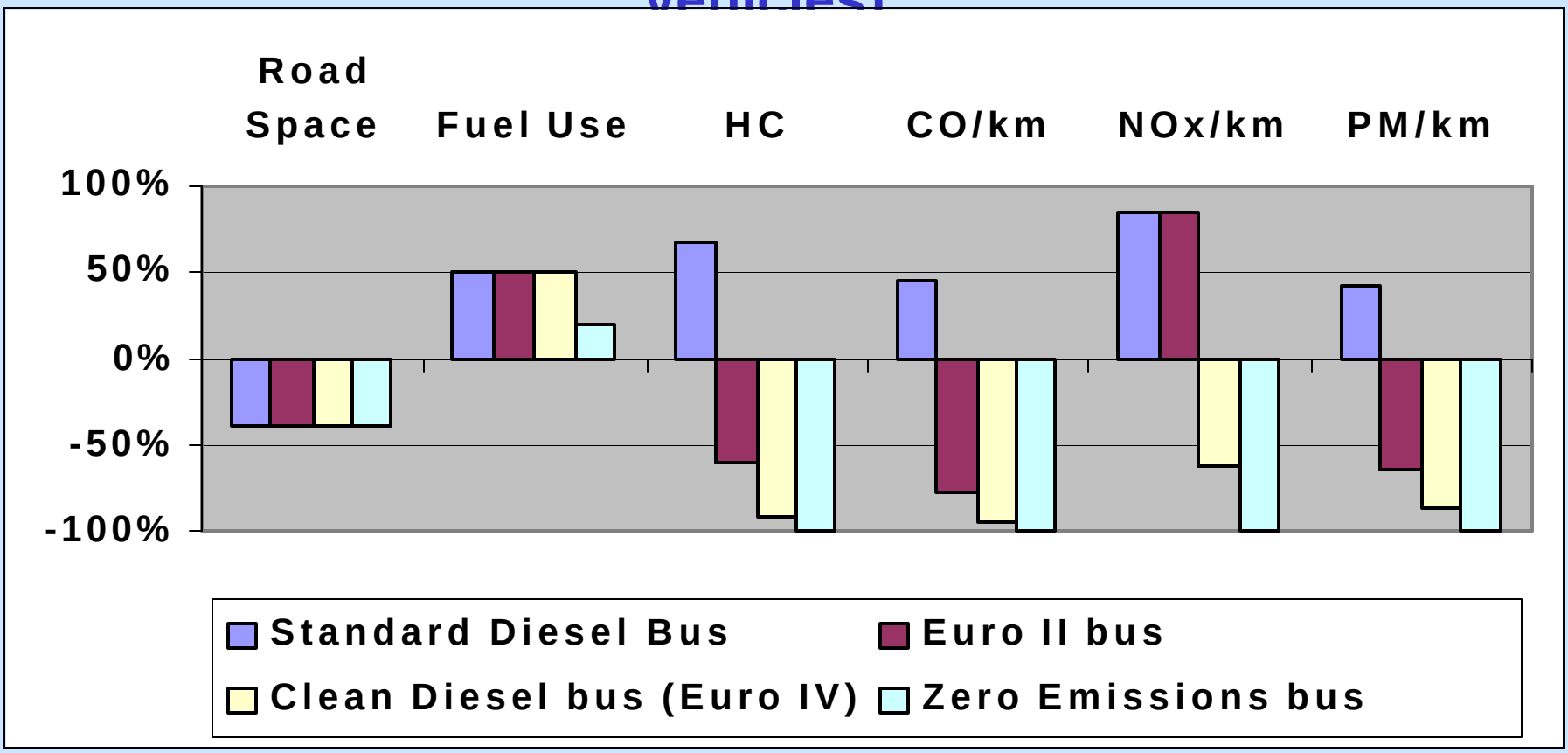
Impacts of adding one bus: optimistic mode switching case

(as a percentage change relative to all displaced vehicles)

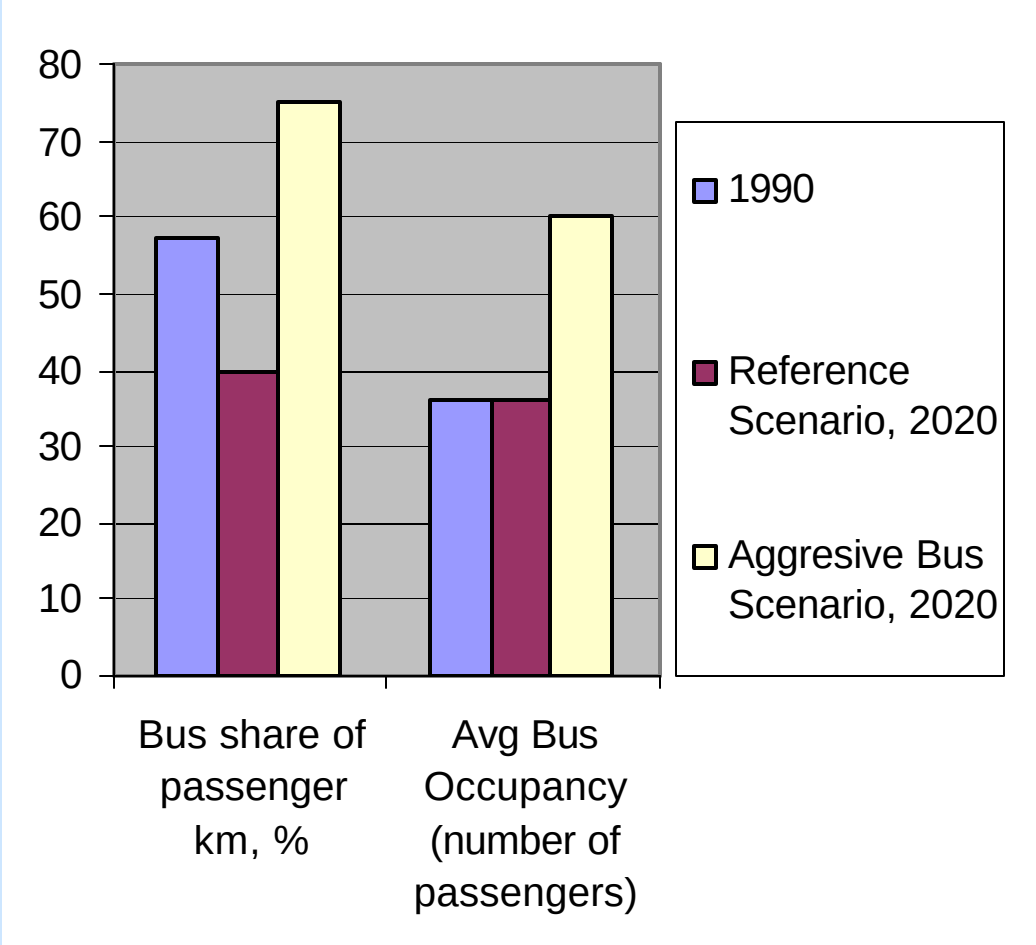


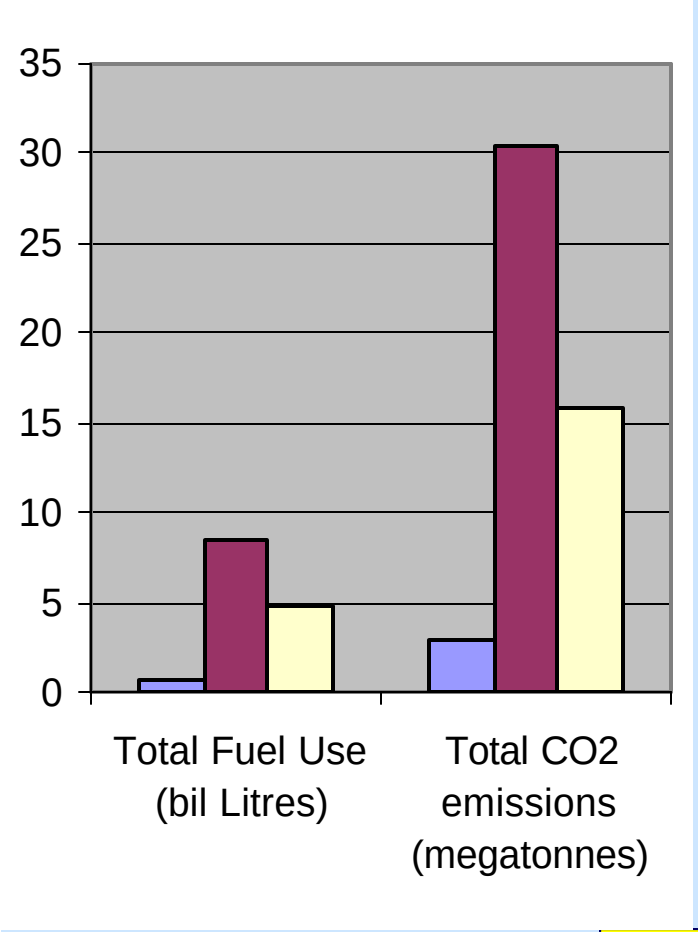
Impacts of adding one bus: Pessimistic mode switching case

(shown as a percentage change relative to all displaced vehicles)



Oil Use and CO_2 Emissions: Two Future Visions for Delhi





Source: IEA, based on Bose and Sperling, 2001

Forecasting blues…

- IEA undertaking development of a new global forecasting tool, ETP model
- Technology-rich optimization model that starts from WEO and allows analysis of a variety of policies in a cost framework
- Transport module under development
- Developing a base case at the needed level of detail is challenging

Example forecast: travel per light-duty vehicle

1000 km/vehicle/year						
	1995	2000	2005	2010	2015	2020
Western Europe	15.3	15.3	15.3	15.3	15.3	15.3
North America	22.4	22.4	22.4	22.4	22.4	22.4
OECD Pacific	11.4	11.4	11.4	11.4	11.4	11.4
Former Soviet Union	12	12	12	12	12	12
Eastern Europe	12	12	12	12	12	12
Middle East and North Africa	12	12	12	12	12	12
Sub-Saharan Africa	12	12	12	12	12	12
South Asia	12	12	12	12	12	12
China and centrally planned asia	13	13	13	13	13	13
Other Asia-Pacific	11	11	11	11	11	11
Latin America	14	14	14	14	14	14

Example forecast: vehicles per capita

Vehicles per 1000 population						
	1995	2000	2005	2010	2015	2020
Western Europe	437	465	489	507	518	530
North America	746	781	797	798	790	765
OECD Pacific	541	576	597	610	608	590
Former Soviet Union	104	120	140	163	184	205
Eastern Europe	174	207	243	275	344	450
Middle East and North Africa	24	31	34	39	39	38
Sub-Saharan Africa	21	21	21	21	21	21
South Asia	6	10	14	18	24	32
China and centrally planned asia	8	13	19	24	30	35
Other Asia-Pacific	57	79	100	121	143	160
Latin America	99	110	124	141	159	180

Conclusions

- We need good data in order to understand problems, compare options, and measure the effectiveness of solutions

- Variety of data types are typically needed (but hard to find)
  - Periodic surveys of travel patterns, mode choice, average travel by vehicle type, etc.
  - On-road emissions factors for new and older vehicles
  - Fuel consumption / efficiency estimates
  - Detailed studies and modeling - relative cost effectiveness analyses, willingness to pay, airshed modeling, etc.

- One approach - a well funded, permanent transport data collection/analysis agency, with clear mission and sufficient ongoing funding. Could receive analytical support from consultants, academics, etc.