

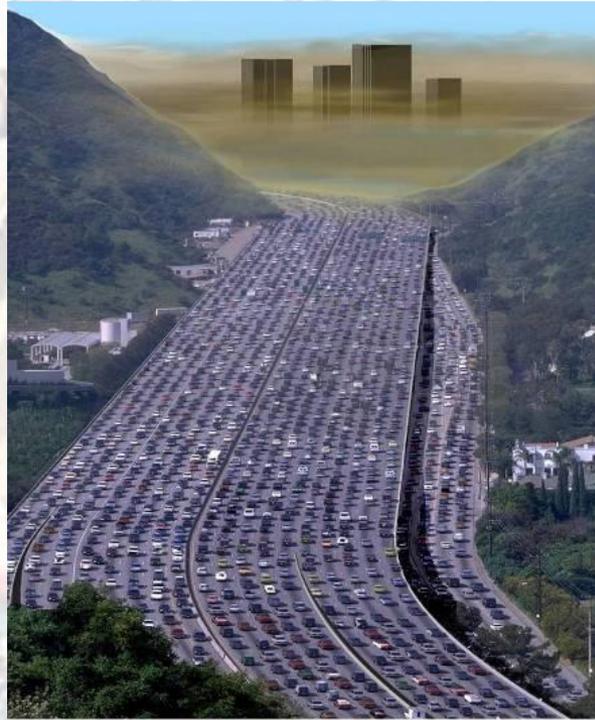
Mobility and Carbon: The Blind Side of Transport Fuel Demand in the Developed and Developing World

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and

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Courtesy Transfuture net



Two Wheels in Kuala Lumpur



Three Wheels in Lahore, Pakistan



**Formerly Two Wheels
(with pedals and feet) in Shanghai**



Four Paws in Pune, India



The Mexican Standoff

Features of Mexican Traffic

Playing chicken with the bus in the counter flow lane



BRT -
Bovine Rapid Transit



Irritated by Parked Cars in Istanbul? Strong Men to the Rescue



Transport Approach: Stuckholm?



Religious Approach to Sustainable Transport?



Endangered Species Approach to Sustainable Transport?



How Sustainable Transport Serves, not Severs, Urban Development

- **Economic Sustainability**

- Affordable to users and authorities
- Attractive as a business
- Each mode bears social costs

- **Social Sustainability**

- Promotes access for all, not just a few
- Makes room for all
- Avoids irreversible binds



- **Environmental Sustainability**

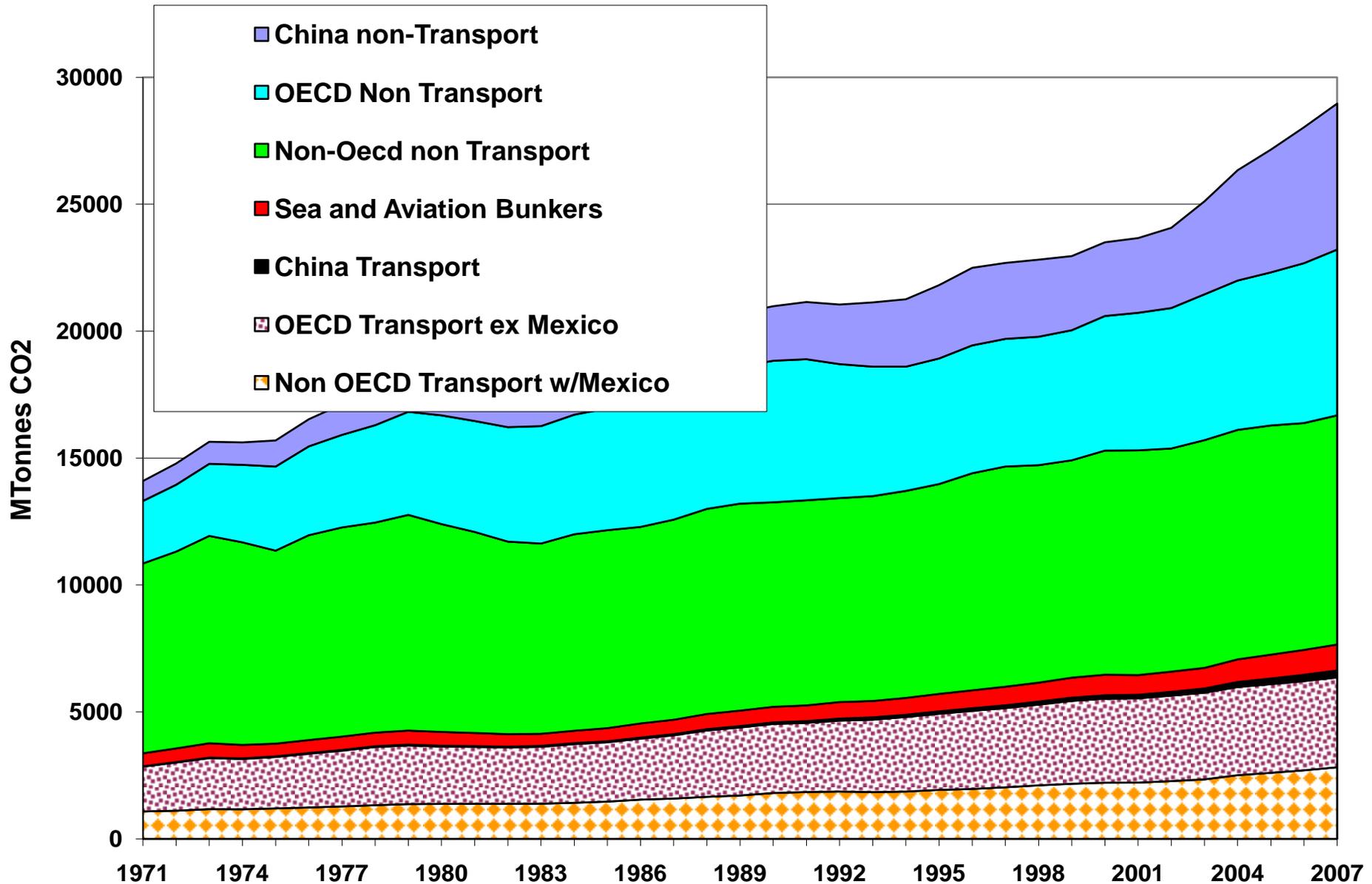
- Leaves no burdens for future generations
- Minimizes accidents and damage to human health
- Reduces greenhouse gas emissions

– *Governance - The Roof Over these Pillars*

– *Make and Keep the Rules, Protect the Weak*

WORLD CARBON EMISSIONS SINCE 1971

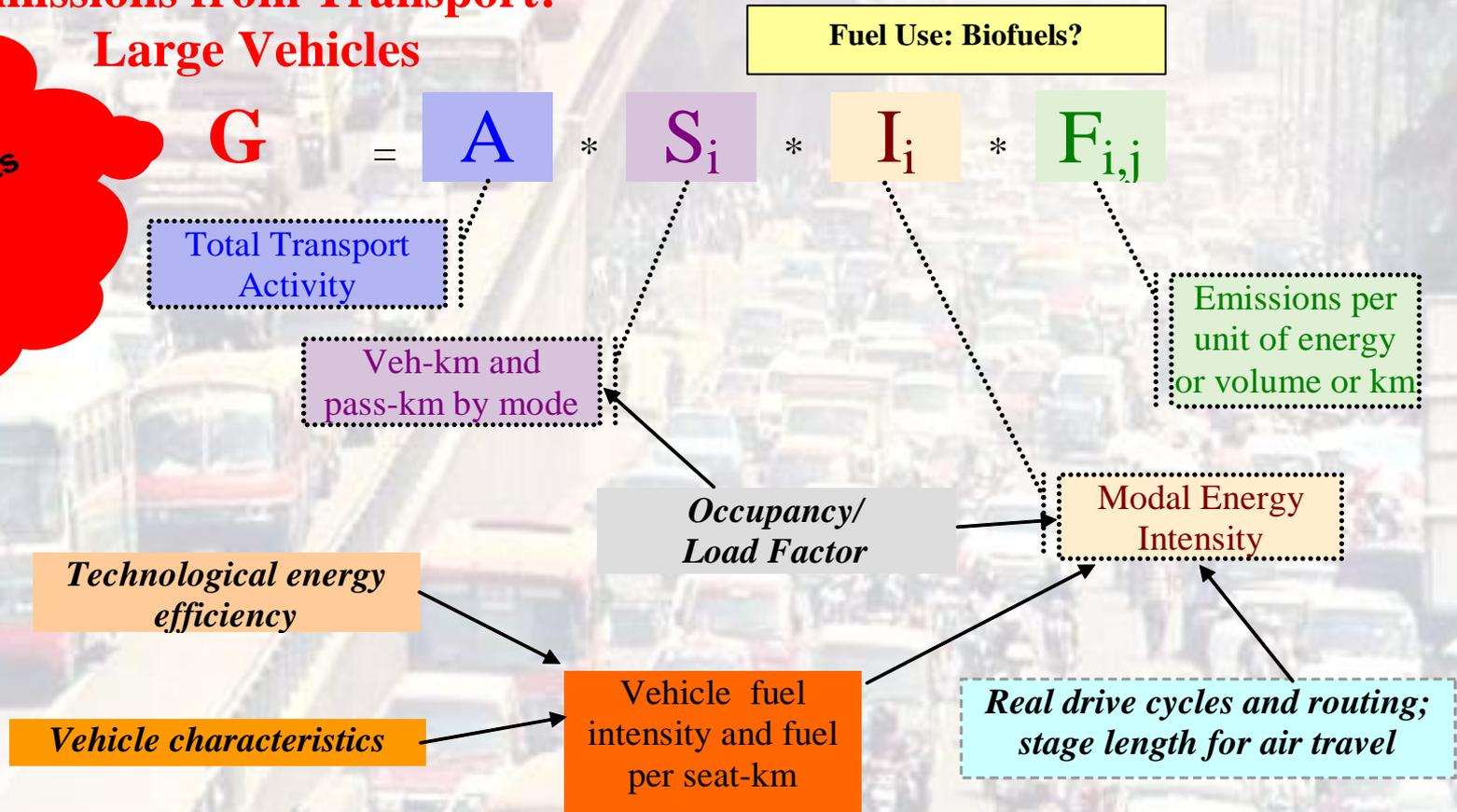
Rising Role of Transport: Does CO2 Drive Transport Decisions?



“ASIF” Decomposition: First Approach to Understanding Energy Demand in Transport

Emissions from Transport: Large Vehicles

Air pollution,
health impacts
Global CO2



Understand links of each component to income, fuel prices, fares, land uses, lifestyles, regulations

The new “ASIF”

Avoid the Problems, Shift Away, Mitigate (and finance)



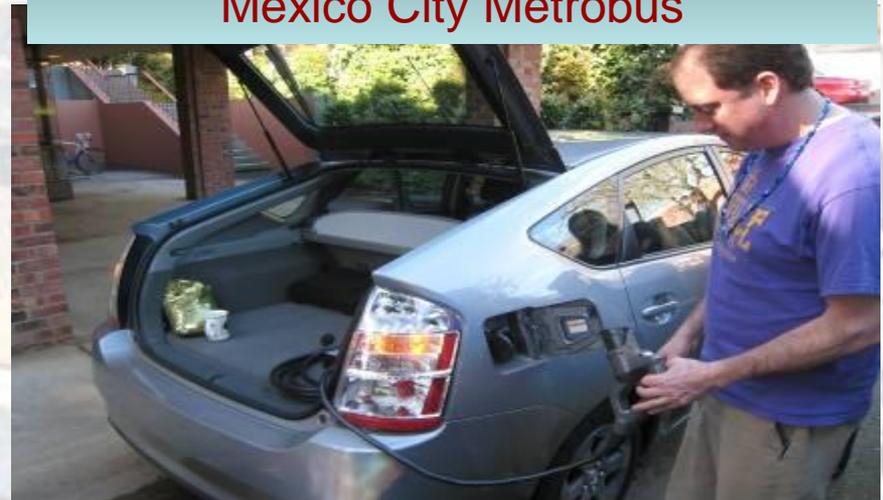
Avoid CO2-Intensive Development:
Singapore Land Use Planning,
Congestion Pricing



Shift and Strengthen:
Mexico City Metrobus



Improve and Mitigate:
Efficient Vehicles

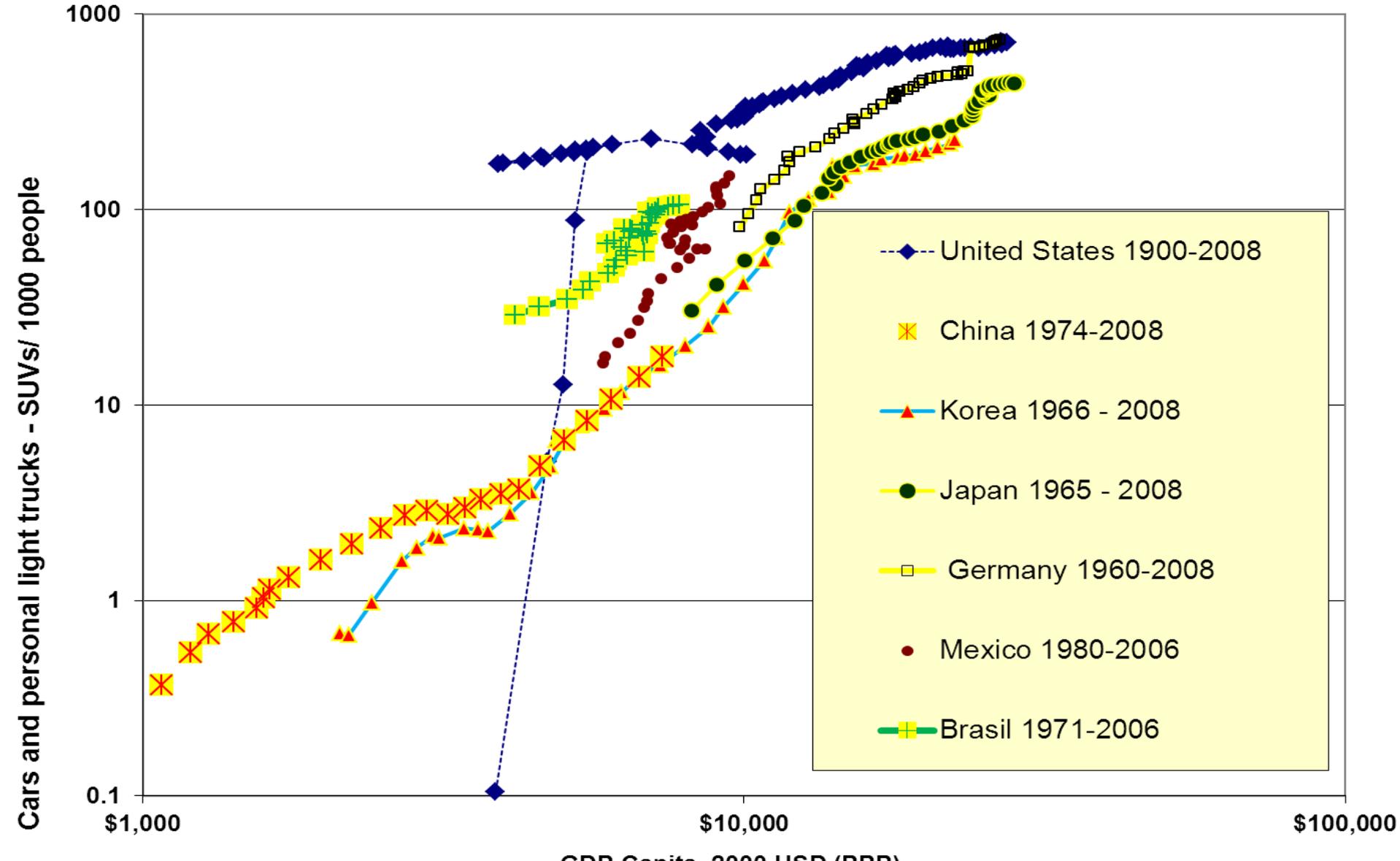


Improve and Mitigate:
True Low Carbon Fuels

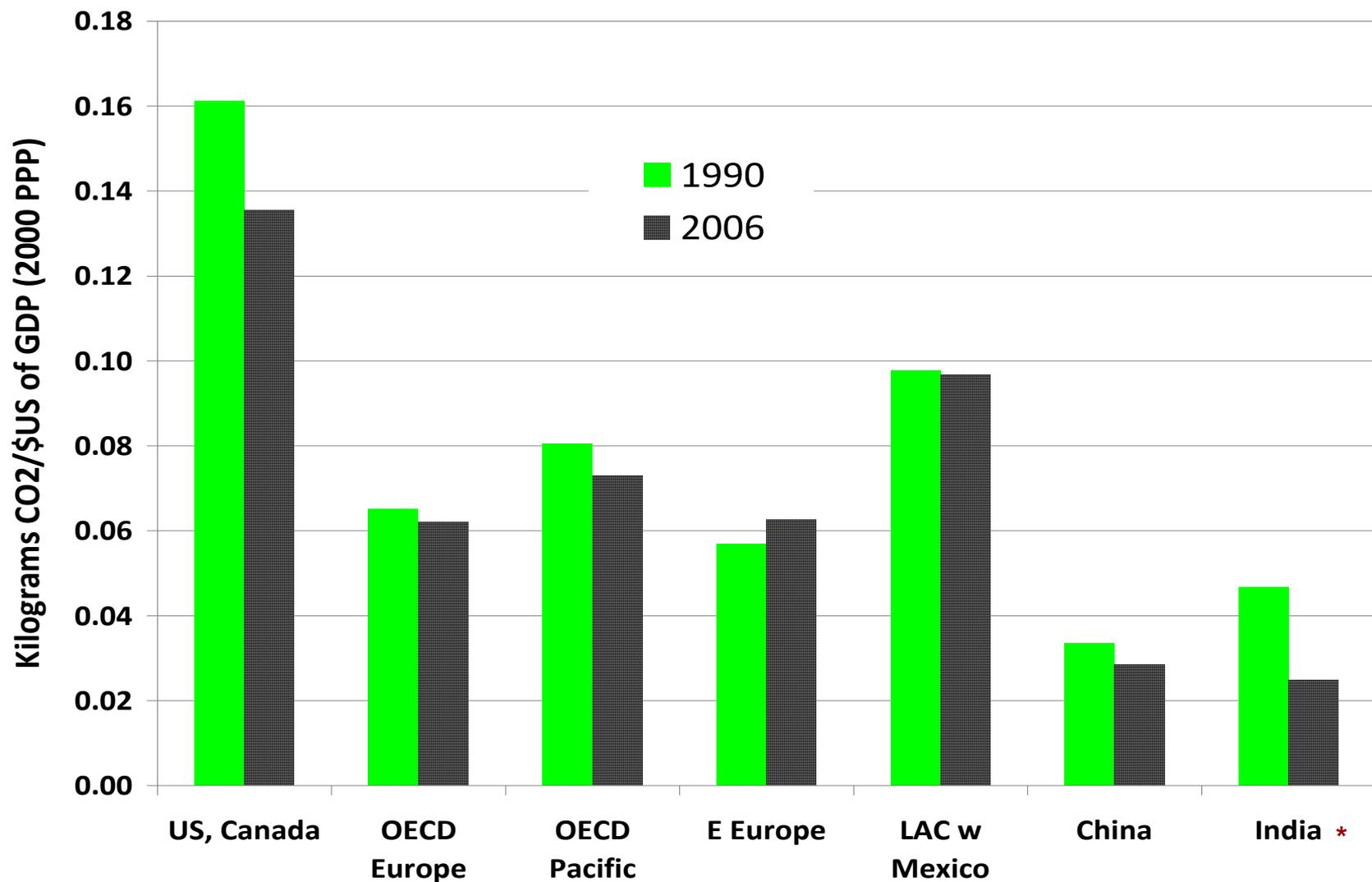


The Developing World: Slow Reform in Latin America

Motorization and Economic Growth: The China Syndrome? China Car Ownership 2008 = US 1924



Road Transport Emissions Relative to GDP? Developing World Lags US



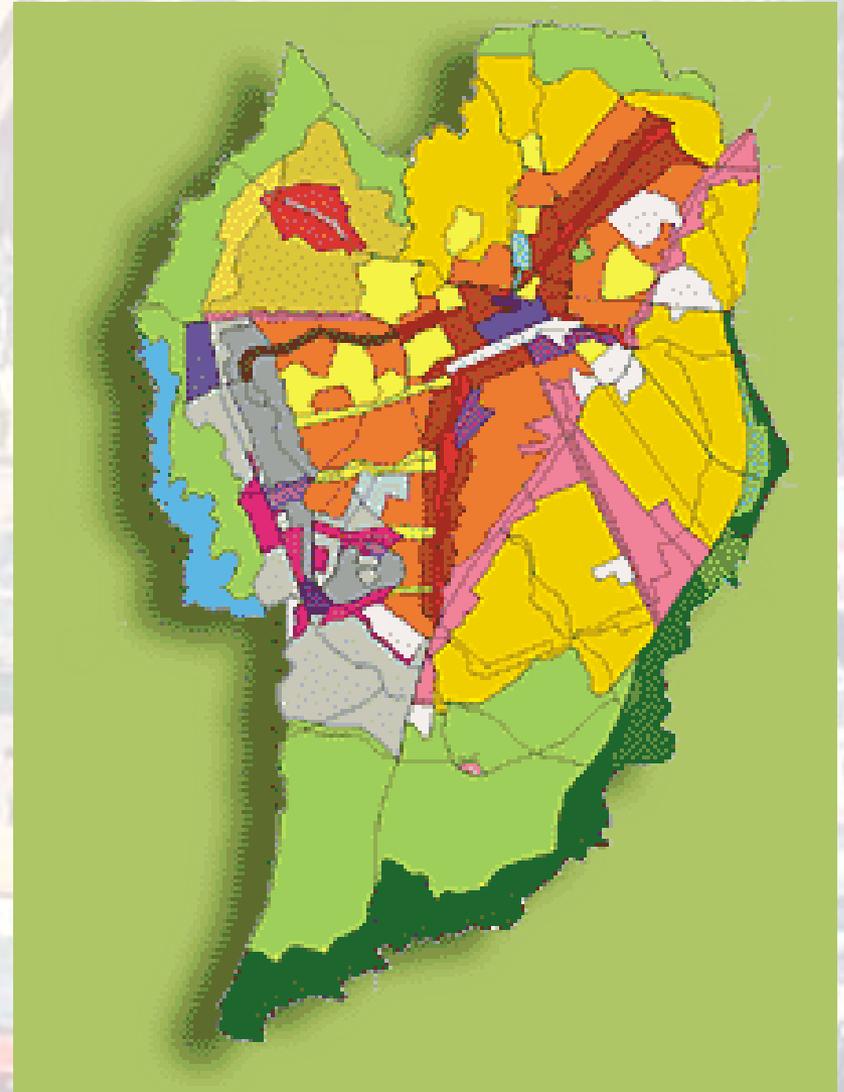
* 1990 figure includes many non-transport uses

Framework for Integrating CO₂ into Urban Transport: About Transport, Not Climate Change

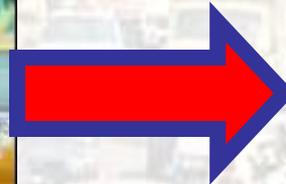
- Determine Scope and Scale of Intervention
 - Scope: Urban Development, Transport, or Vehicles
 - Scale: Entire Country/Region, Subarea/corridor, or localized
 - For vehicles: (National) tax and efficiency stds, or specific vehicles?
- Economics – CO₂ Savings as Cobenefit of Better Transport
 - Values of key transport variables and other outcomes
 - Value of fuel and CO₂
 - Valuation of other changes – **these drive reductions in CO₂**
- Time Frame/Evaluation: What Would've Happened Otherwise?
 - What counts in evaluation, for how long?
 - How to compare: before/after or with/without?
 - Long-term monitoring and evaluation

High CO₂ Emissions in Transport a Symptom of Poor Transport
Improved Transport Brings Larger Savings than Technology Alone

Avoid High CO2 Emissions Through Development: Curitiba's BRT, street plan and land use system



Scope and Scale: Shift and Strengthen Low CO2 Transport: Region wide or One Route?



Scope and Scale: Low Emission Vehicles

Light Duty Vehicles Usually Depend on National Policies



Low Carbon Vehicles: The CO₂ Impact of EEV's

Not a Simple Matter of Calculation Even for Bio Fuels, Leaf or Volt MPG



Electric Cars: EEV's*?:
When to charge, when to
run plug in hybrids on fuel



Zero Emissions?



Swedish Car on Brazilian
Ethanol: How do we scale up
by a factor of 100?
Fuel cycle, land use implications

– *"Elsewhere Emissions

Transport Externalities in US Context

Range of Costs/Mile large- Which are Most Important?

Range External Costs in Cost-of-Driving Studies	Low	High	(JEL)Journal Of Economic Literature	Comments on Lat Am situation
Air Pollution	1	14	2.3	Values are probably higher for LAC cities because of higher levels of air pollution, even after adjusting for Quality-adjusted value of life. See Vergara et al 2002 and Harvard School of Public Health 2003
Climate Change	0.3	1.1	0.3-3.5	Value widely disputed (Nordhaus 2008; Stern 2006) and certainly dependent on national and local situation. 0.3 cents/mile = \$10/tonne CO ₂ ; 3.5 cents/mile= \$80/tonne CO ₂
Congestion	4	15	5-6.5	Does not apply to all travel. Depends on value of time (60% of wage rate?) and actual wages
Accidents	1	10	2-7	Depends on valuation of accidents and life. See INE 2006 for MC perspective
Energy Security	1.5	2.6	0-2.2	Values depend on local energy supply situation.

*Range of academic national and local studies, official national studies (Canada):
CO₂ Externality (even at \$85/tonne, Stern's value) small compared to others
This means CO₂ should be a co-benefit of transport strategies*

Bus Rapid Transit – Mexico's 1st Metrobus Line

260,000 people/day over 19km for US \$80mn

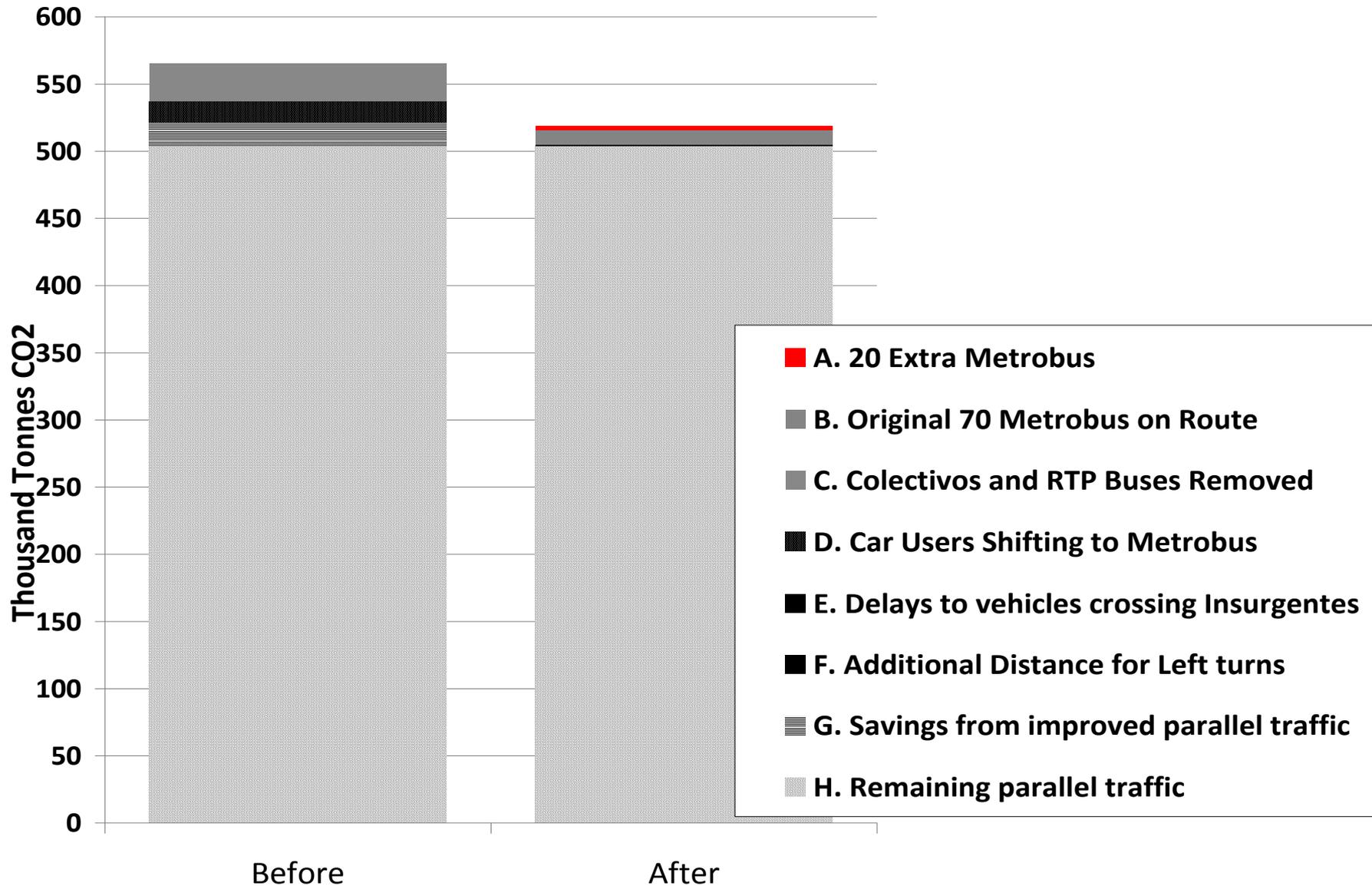
Lower emissions, 40 000 tonnes/CO2 saved, reduced car traffic



Metrobus CO2 Changes by Component

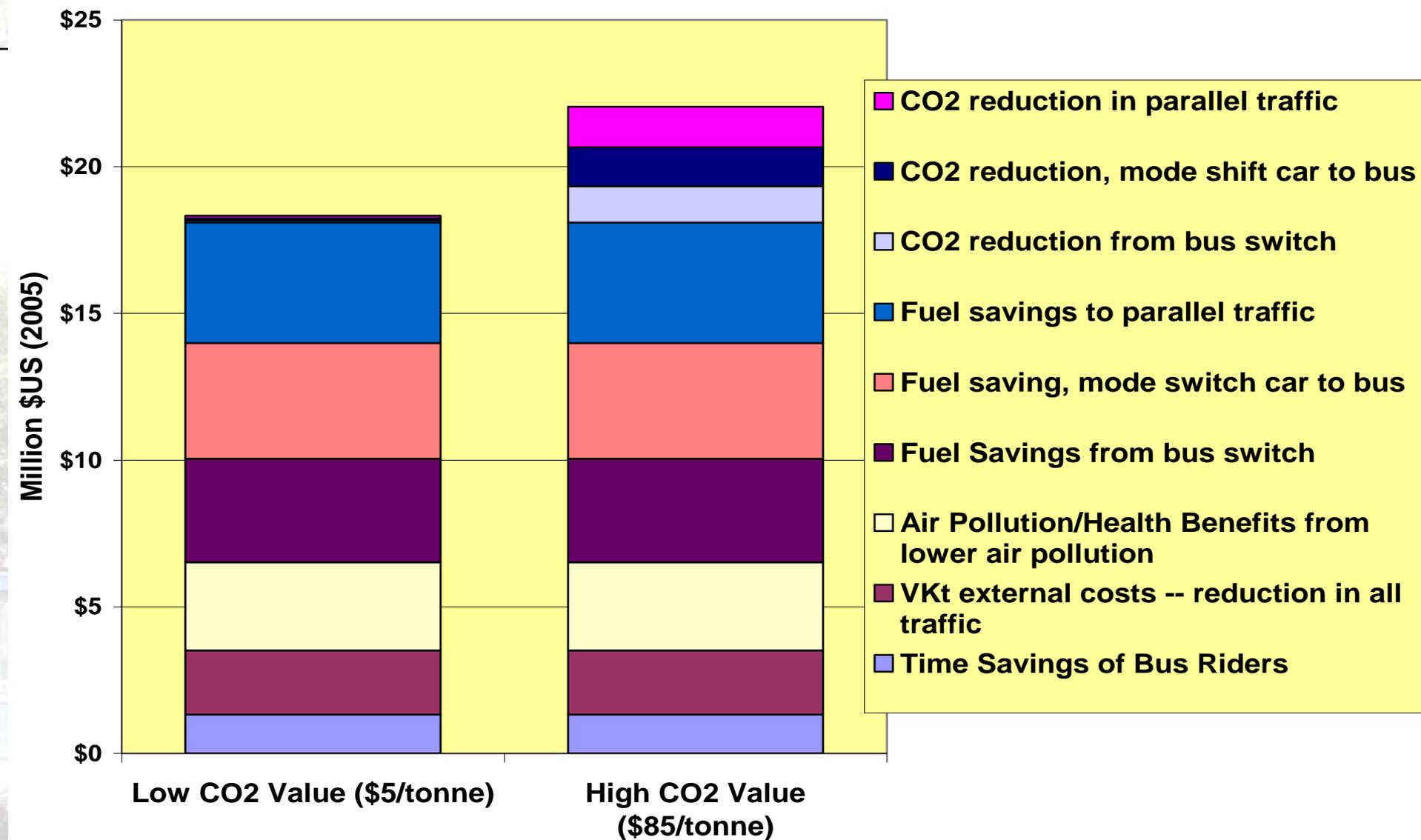
Savings roughly 1/3 mode shift, 1/3 parallel traffic, 1/3 bus switching)

Source Roaers 2006, 2009



Benefits from Metrobus: Broad Than Just CO2

Transport, Health Benefits >> CO2 Benefits



Mal-Asia? (and Dozens of other Developing Cities)



Dilemma for Developing World: Can Traditional Four Wheels Provide Real Mobility?

• China

- Ring roads, freeways, and traffic fatalities
- Cities suffering from car oriented development
- Fuel economy standards but skyrocketing car ownership



• India – Motorization Exploding?

- Hectic, polluting mix of hooves, feet, and wheels
- Few cities have organized public transport
- Transport very contentious in big cities



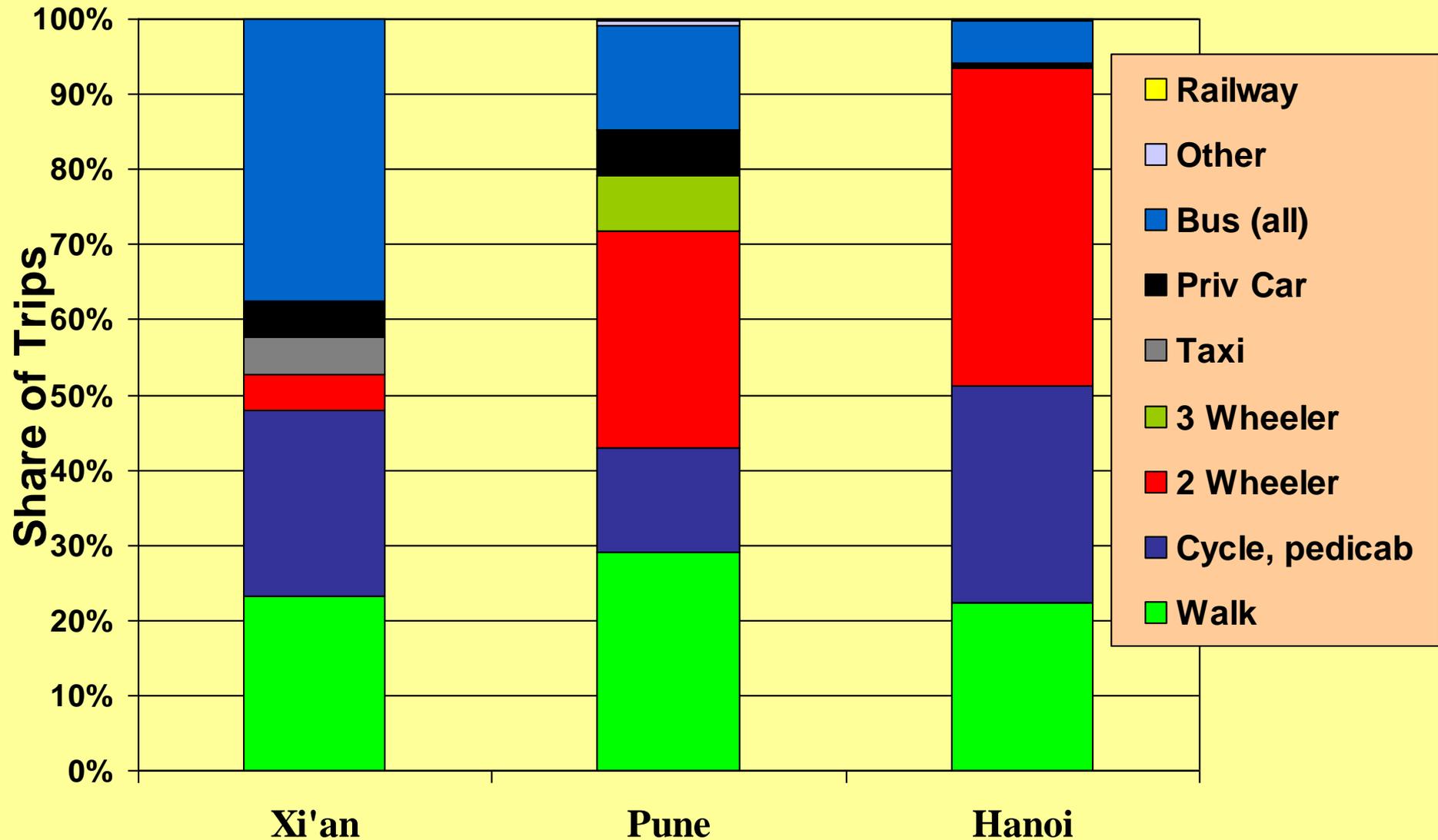
• Viet Nam (Hanoi): Bikes of Burden

- 1+ moped/household –works until cars overwhelm
- Bus and rail development could provide backbone
- A sustainable pattern for much of the world?



ACCESS AND CONGESTION: Modal Splits 2002-3

Roughly 1.75-2 trips, 5-15 km/day/person



Basic Thesis about (Hyper)-Motorization: What Happens When the System Crashes?

Speed of Motorization leaving officials, walkers behind

- Incomprehensible growth rate in “car” ownership
- Vehicles increasingly snarled in traffic
- Very poor data on travel, vehicle use, fuel consumption, etc

Little Policy Experience to Slow or Control Hyper-growth

- Glory of modern motorization trumping other concerns
- Whole city sections rapidly transformed into asphalt
- Over-reliance on “technology” – human beings not in picture

“Unintended” (or unknown?) Consequences

- Burgeoning road fatalities (over half walkers, cyclists)
- Air Pollution from vehicles rapidly replacing that from coal
- Congestion now major threat to productivity, well being

Nanjing, China: The New “Great Wall of Cars”

Why Are We Talking about Electric Vehicles with China?



Photo: Cornie Huzeng

Street Capacity Lowered by Congestion at Intersections

(source E Deakin and N . Duduta, UC Berkeley)



Average Traffic Throughput Per Lane Per Hour

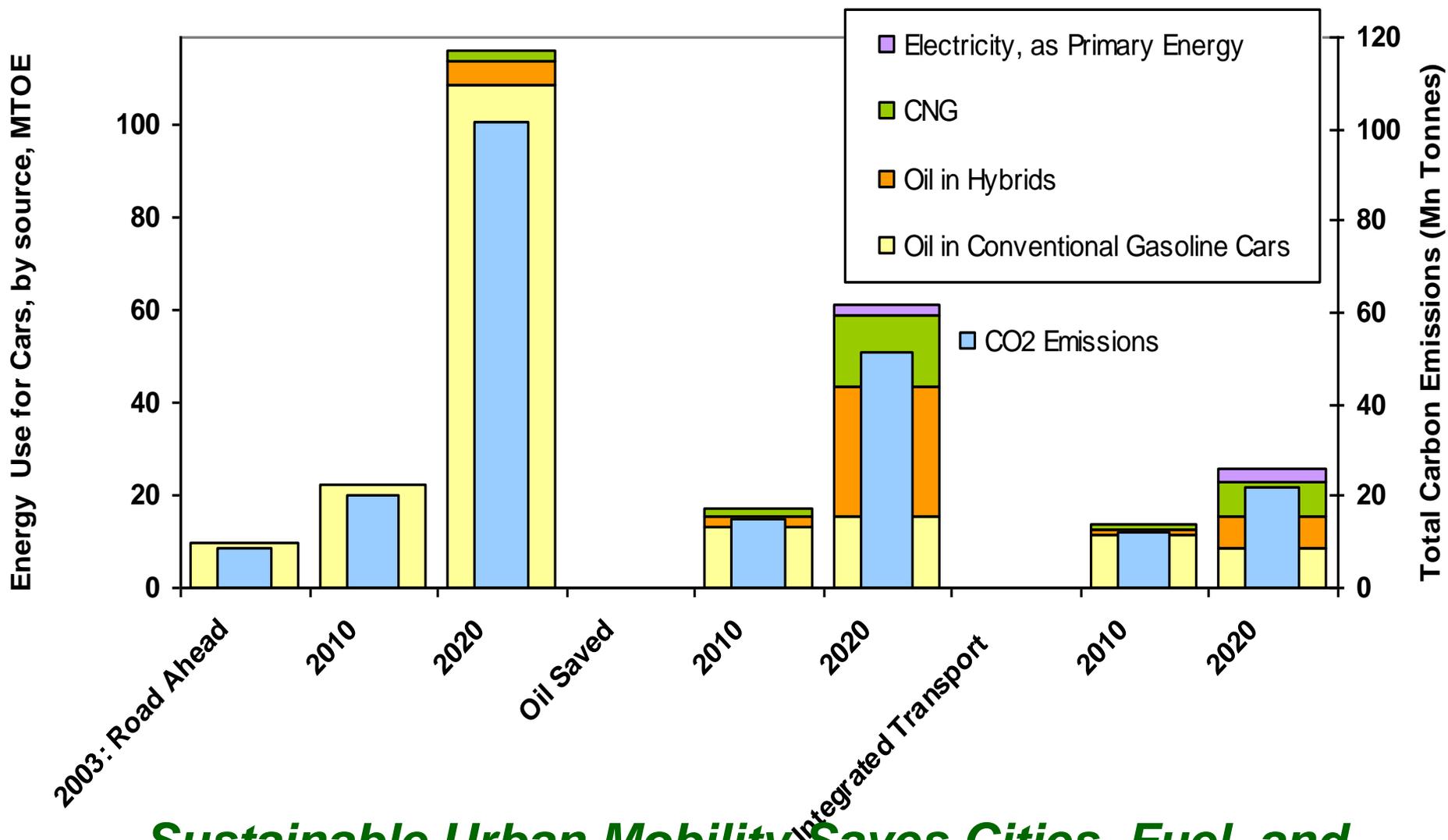
Motorization rate exceeding infrastructure capacity: Paris Style Parking, or the French Connection?

Source E Deakin and N Duduta, UC Berkeley



The Sustainability Challenge: China Choices for Cars and CO₂ Emissions in 2020

Source: Ng, Schipper and Chen JTLU



Sustainable Urban Mobility Saves Cities, Fuel, and Above all, Greenhouse Gas Emissions

Dilemma for the Developing World? Cheap Cars and Slow, Costly Transportation

Cheap Two Wheelers,
but No Sidewalks in Pune
1/3 of cities > 1mn in India
Have no public transport

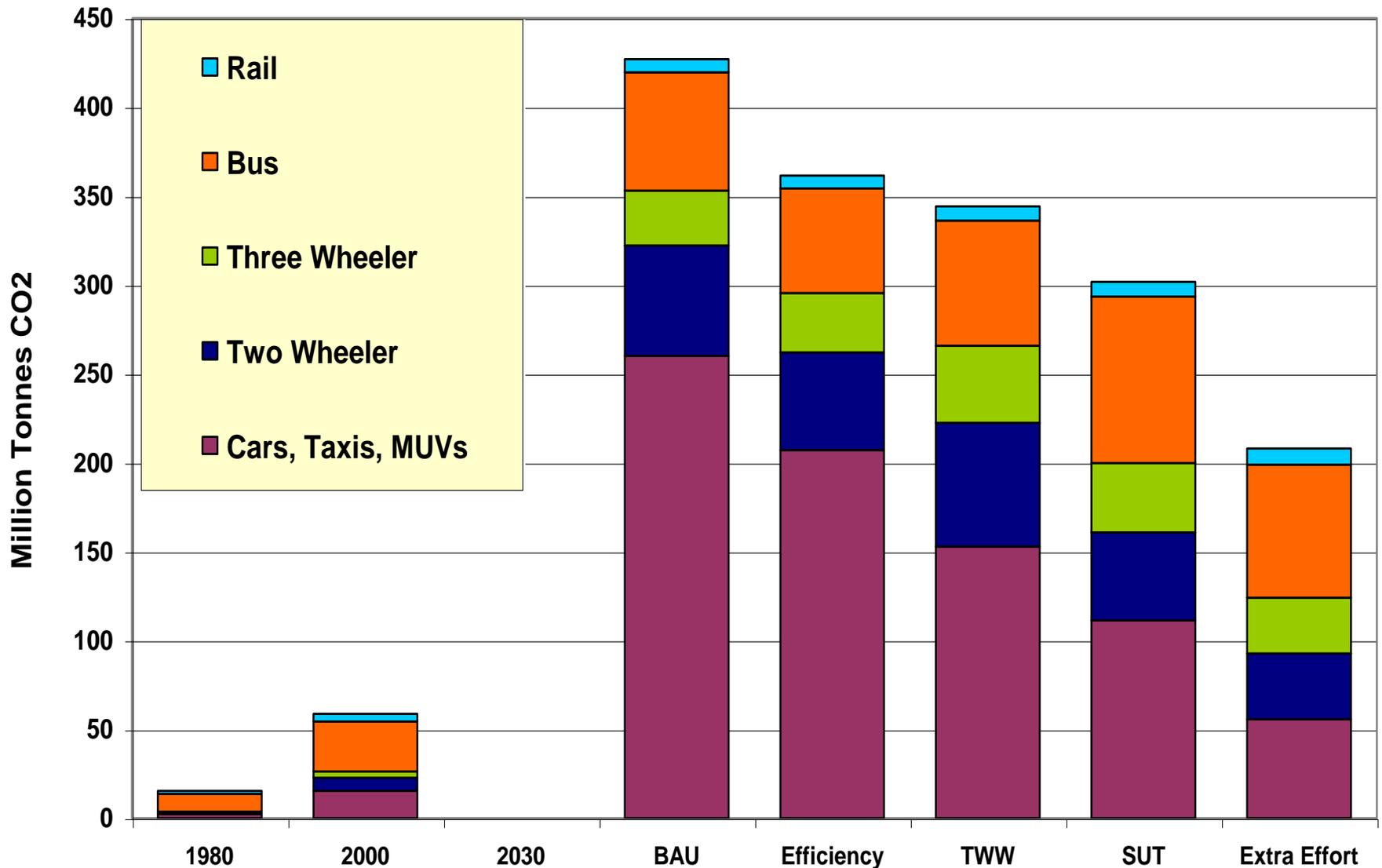
Nano or Nono?
The Peoples' Car..
but the People Didn't Buy



*Nano is not Efficient, Just Small
Millions Could Clog India's Streets, Slow Economic Growth*

India Inclinations in 2030

CO₂ Emissions by Transport Mode



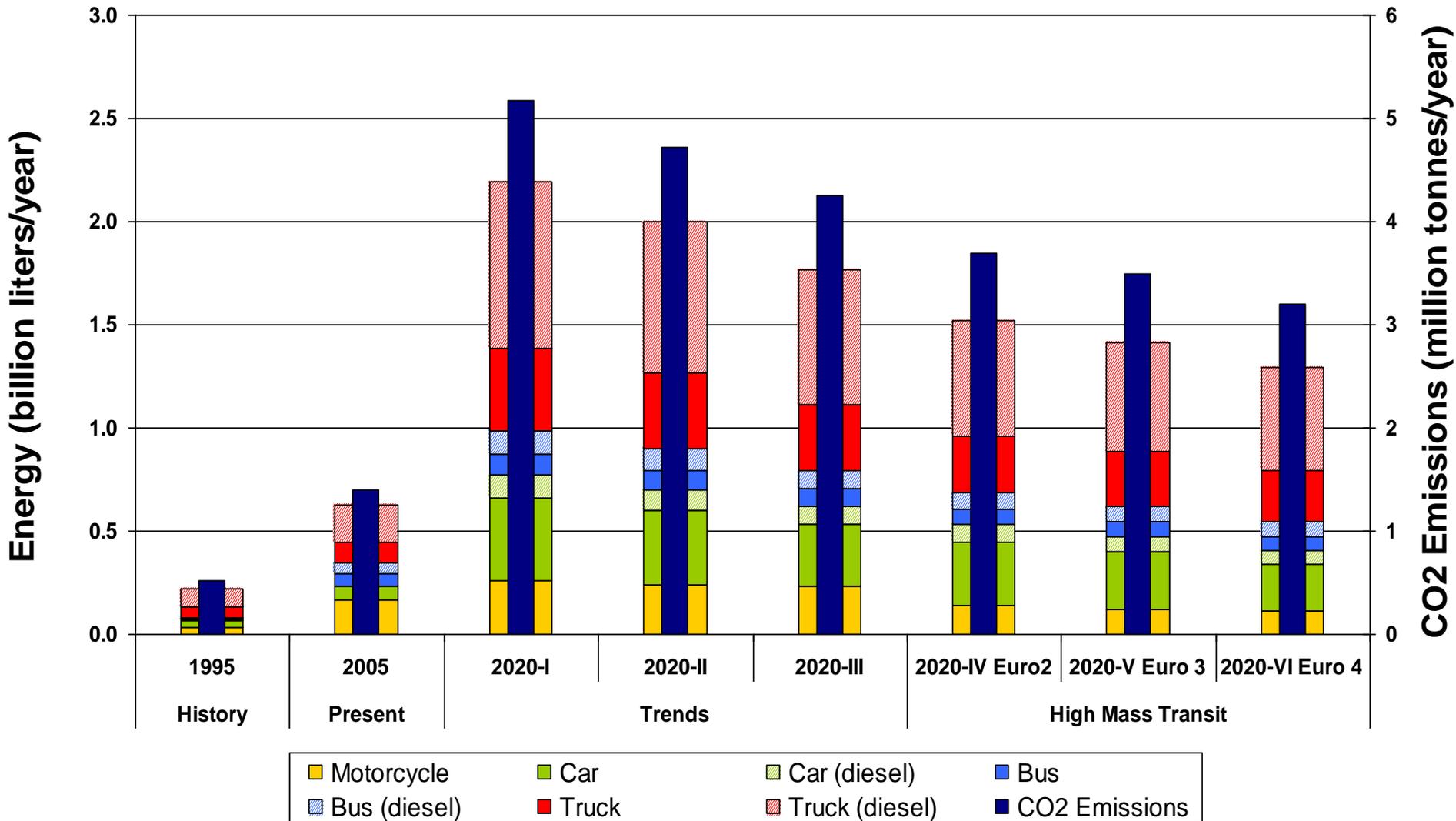


Hanoi Happenings with Maximum Freedom – No Rules -- And Maximum Chaos

- **Two wheeled paradise or purgatory?**
 - 1+ moped/household – One of most motorized cities in world
 - Go with flow slow
 - No discipline or enforcement
- **Consequences**
 - Very high fatality rate – few helmets
 - Clean bikes, but high CO and PM
 - “Bikes of Burden” ->
- **If cars come?**
 - Historic area will freeze
 - Fatalities increase
 - No way back? New rail and BRT might have impact



Hanoi: Fuel by Vehicle and Type; Resulting CO2 emissions



THE JOKER OR AN ACE IN THE HOLE?

Unexpected “Solutions” for Personal Mobility
80 million on the streets of China (in seven years!)



Sustainable Transport? Yes, but Bigger Than a Fuel Problem



OR



+

OR



Will Developing Country Transport *Carbonize*? Not if the Majority Wants Access

Sane, Safe Transport is the Umbrella

- Make room for 1 billion more urbanites – land use planning
- Scale up of bus rapid transit, metros where affordable
- Next steps – congestion pricing and other policies with teeth

Clean Air Also Means Big Changes

- Better intercity roads for freight, people
- Cleaner fuels and realistic fuel and vmt taxes to finance
- Protection for non-motorized plurality

Fuel Economy and Alternative Fuels

- Fuel economy is necessary but not sufficient
- Alternative fuels prospects grim – competition for land
- Main threat/hope – cut future demand down to size

*The Future of Oil and Emissions in Developing Countries
Will follow the future of (im-mobility), not the other way
around*

Ongoing Lessons

- **Developed Countries**
 - Fuel economy improving, car use stagnant, but for how long?
 - Policies “incentives” important, but we lack price signals to point to future
 - Need a transport system overhaul (Bipartisan Commissions[s])?
- **Developing Countries – Its Transport, Stupid**
 - Mexico City BRT – Saving oil and CO2 without trying
 - Motorization the “driver”, but is there any where to drive?
 - Scenarios for China, India and Viet Nam – take transport first
- **Future Oil Use, CO2 Emissions from Transport**
 - Urban transport problems will hover over oil demand
 - Focus on improving access, not just efficient vehicles to save fuel
 - “Sustainable Transport” must be umbrella for low fuel, low CO2 futures

Key Messages: What's In the Way

All Levels of Govt and Private Sector Involved

Improving Vehicles and Making Cars Smaller

- ✓ Much bolder price and regulatory strategies to accelerate improvements
- ✓ Fiscal regimes that price vehicle size and use properly
- ✓ Increased involvement of vehicle and fuels industry to find new paradigm

Improving Freight Transport

- ✓ Specialization within a country/region and globalization means more freight
- ✓ Dematerialization could meet less freight for a given GDP
- ✓ Improved handling and logistics more important than technology alone

Integration of CO2 into Other Major Problem Solving

- ✓ Sustainable Development taken seriously
- ✓ Poverty reduction yes, subsidized energy and CO2 no
- ✓ Transparency in government and resource related decisions

Getting the Horse (Transport) before the Cart (CO2) is Hard
Strong Policies, not Money, is What is Missing

Thank You



**The Ultimate Clunker? – Absorbs its own CO₂ but
Does not Fix Transport Policy
(with thanks to the late Barry McNutt**

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