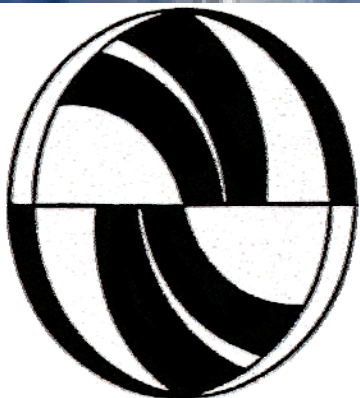


# Counting “DeCarbs”: The Way Forward Means Finding the Right Track

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Center



Alex Farrell 1962-2008



# Counting De-Carbs

## Contents

- **What We Need To Know and How Well – as They Change**
  - What is the base case? Is it good transport development? Land use?
  - What are the transport and CO2 policy goals and their components?
  - How do we know we have changed things?
- **Policies and Components that Go Right – and Wrong**
  - Good transport first (Mitric-Zimmerman)
  - Fuel economy and clean air standards, fuel pricing, vehicle maintenance
  - Diesel cars, corn ethanol, and low-carbon biofuels
- **Closing Remarks – de-Carbs Now, Tomorrow Too Late to Fix Mistakes**
  - Avoidance now easier than dieting later
  - Use transport-land use planning to reduce growth in individual vehicle use
  - Options and stakeholder analyses as important as technical studies

*If You Don't Know Where You Were Going  
You Can't Tell if You Changed Direction*

# Which of These Are Sustainable Transport?

Delhi CNG



Shanghai Maglev



Delhi Metro



Chicken in Hanoi?



Congestion Pricing Singapore

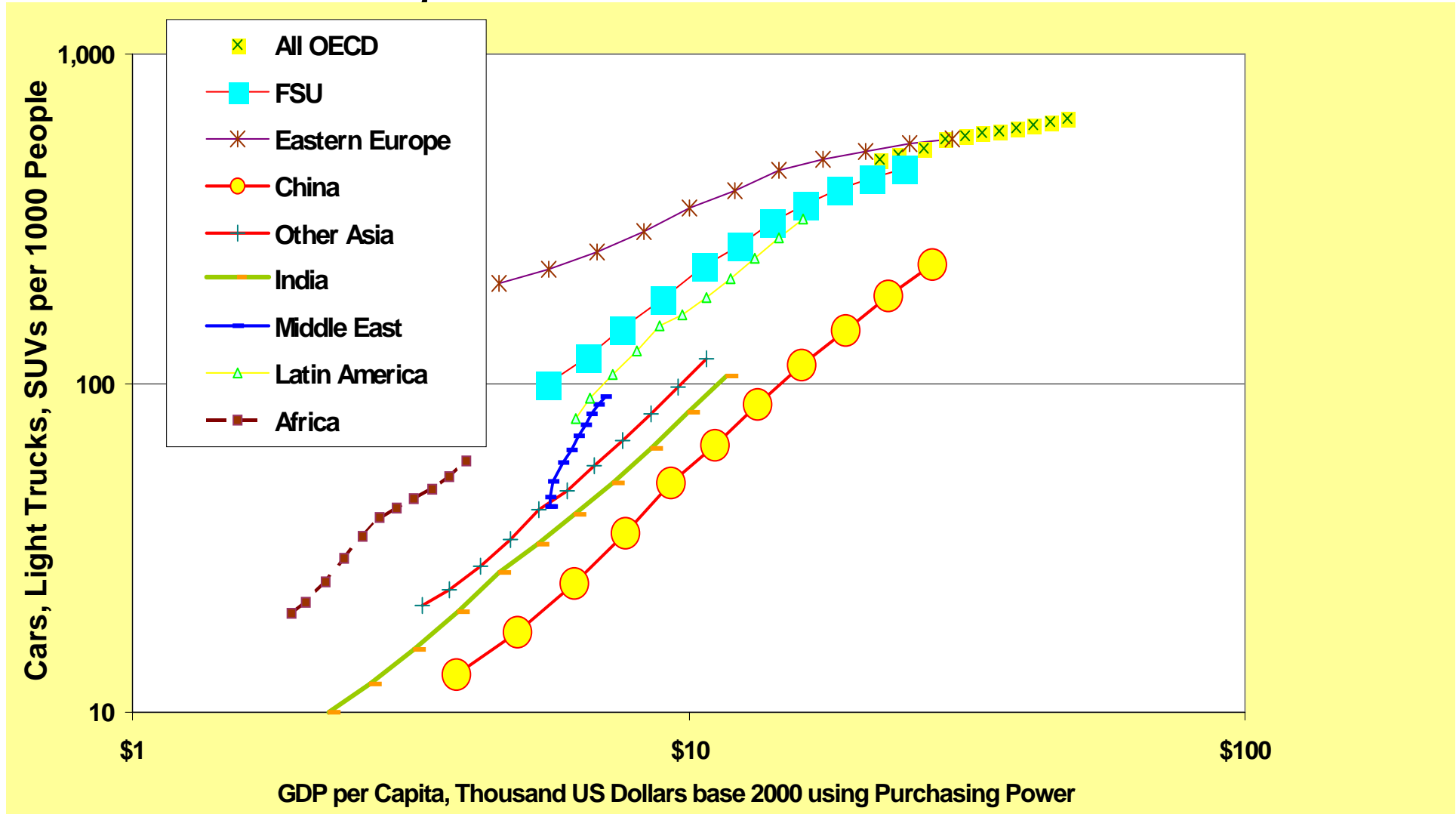


Busses in Bangalore





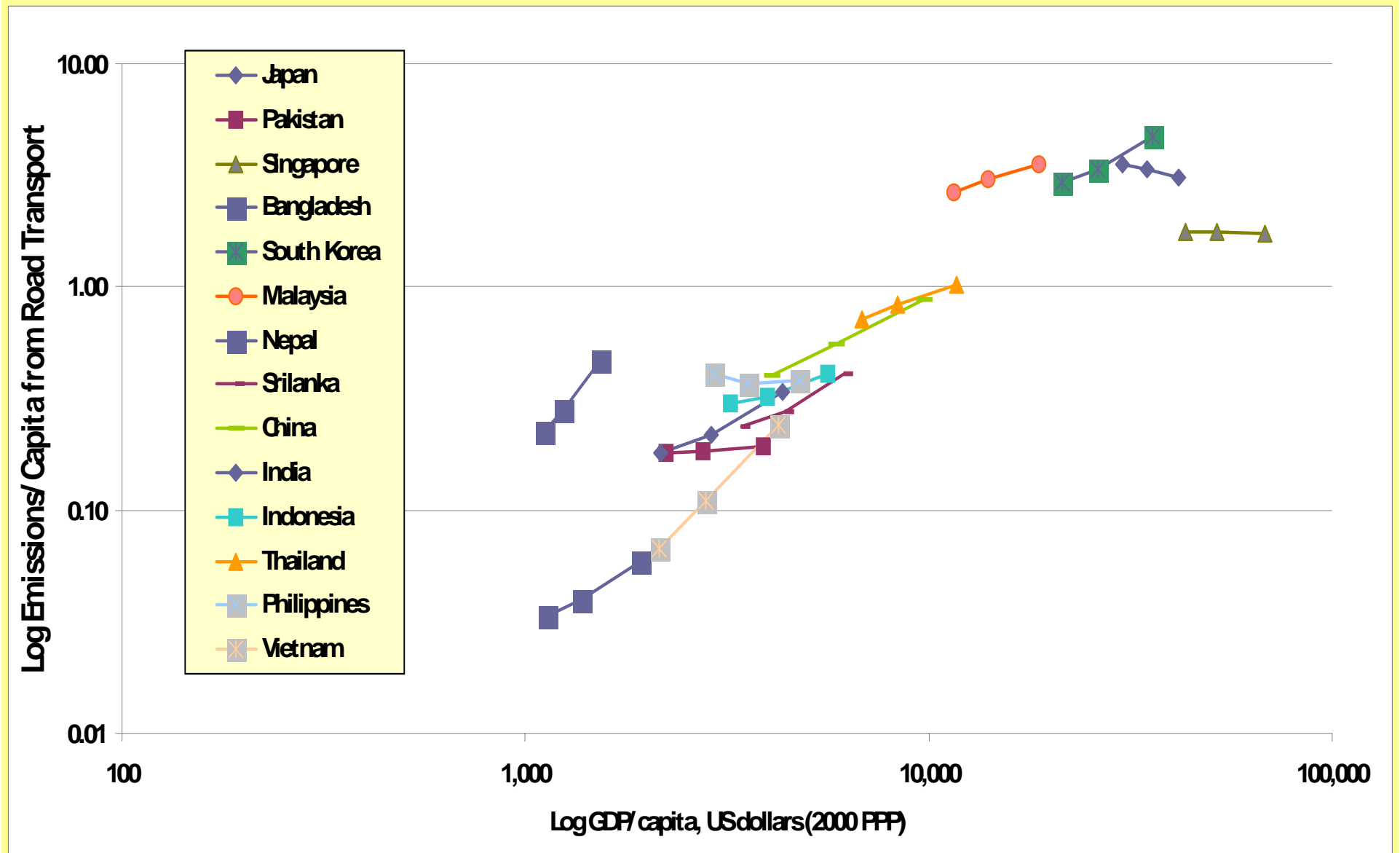
# Carb-Loading? Light Duty Vehicle Ownership WBCSD Projections from 2000 to 2050 -- vs GDP

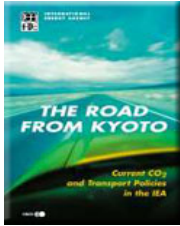


GDP per Capita, Thousand US Dollars base 2000 using Purchasing Power

**Asian LDV Ownership Rising rapidly  
Equitable? Desirable? Sustainable?**

# CAI-ASI FORECASTS OF LAND TRANSPORT EMISSIONS 2005-2010-2013





## “The Road From Kyoto”: Transport/CO2 Policies in 6 IEA Countries”

- **Potential Large, Progress Slow, Risks High**
  - Technology getting better there but economic signals still weak;
  - Political will missing in 2000, stronger now
  - Absence of meaningful initial progress in the US notable
- **Main Elements Still Important Today**
  - Transport sector reform as umbrella for process
  - Voluntary agreements (soon mandatory) on car fuel economy important
  - Fuel pricing also important (except US, which is in denial)
- **Hard Lesson: Many Years to See Impacts**
  - Countries moved weakly towards better transport policies
  - Voluntary agreements achieved half their goals
  - Threats from distractions (bio-fuels, oil-price fluctuations, CO2 denials)

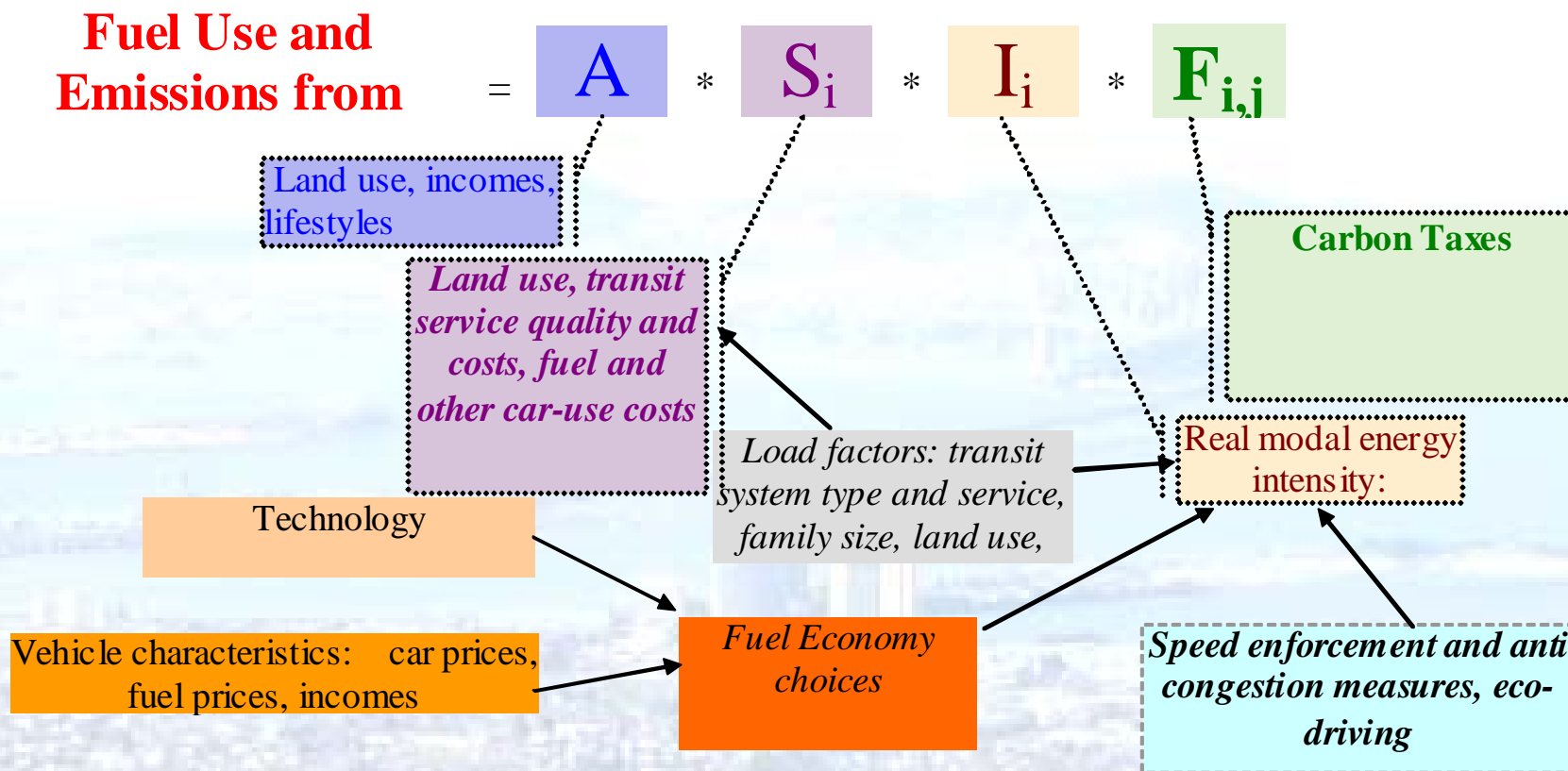
*Oil and CO2 more important in 2008 than before: What are the next steps?*

# Counting “De-Carb” A Balanced Diet



# Changes in Transport-Project Emissions

What Causes Changes to the Components?



*Note Most Carbon is in Cars, Trucks  
Impacts through Standards and VKT restraint*



# Key Issues in Counting DeCarbs

## Untangling Causes, Measuring Effects

- **Exogenous, “Top Down”, and “Bottom Up” Changes**
  - Demographic changes affect transport
  - Top down changes like fuel prices, fuel economy standards, zoning
  - Changes in urbanization, trade etc driven by economic growth
- **Role of Policies, Technologies, Measures**
  - Hard to measure in most Asian economies – no base line
  - Transport policies distorting modal mix (subsidies, taxes, fuel issues)
  - Fuel smuggling, adulteration, even biofuels distort carbon measurement
- **Key Issues – What We Should Know Nationally and in Large Cities**
  - Fuel Use, vehicle activity by type, pass, tonne-km by mode
  - Measured local and CO2 emissions for representative set of vehicles
  - Travel surveys, freight flow surveys to measure real flows

*Without The Details, Impacts of Policies and Measures Can't be Sorted from Other Effects*

# Examples of Counting deCarbs

## Indicators of all Sorts

- **Base Cases and Future Projections**
  - Whose carbon are we counting?
  - What are we saving, and how?
  - How do we know we have de-carbed?
- **By Transport Projects or Technology**
  - Good transport, good transport projects, and carbon saving technology
  - Potentials and potential backfires
  - CO2 savings from BRT and non-project vehicles – what matters most?
- **CO2 in Avoidance – Scenarios for Hanoi and India**
  - Project present vehicle and travel patterns
  - Estimate different CO2 and local emission factors
  - Construct future emissions scenarios

*Most of What We Need to Know for Carbon  
We Need for Other Things.. but Don't Have*

# Saving and De-Carbing

## Restraint, Reduction, or ?

- **Avoidance – Carbon is a 2<sup>nd</sup> tier Consideration**

- Land Use: Building a city or country differently (Singapore, Curitiba, ?)
- Internalizing costs at an early stage of development
- Shifting the balance away from high-carbon transport

- **Co-benefits of Transport, Urban Dvpt Strategies**

- Bus Rapid Transit and other improvements to transport system
- Congestion pricing and other strategies to reduce externalities
- Improved fuel use in pursuance of lower air pollutant emissions

- **Direct Approach – Mitigation by Tech, Operations**

- Technology to reduce fuel use/km with improved traffic flow
- Fuels with lower carbon/unit of energy
- Improved vehicle or system utilization, modest restraint in km

***Saving Carbon Today Important***

***Avoidance Tomorrow by far Largest Potential***

# Saving Carbon

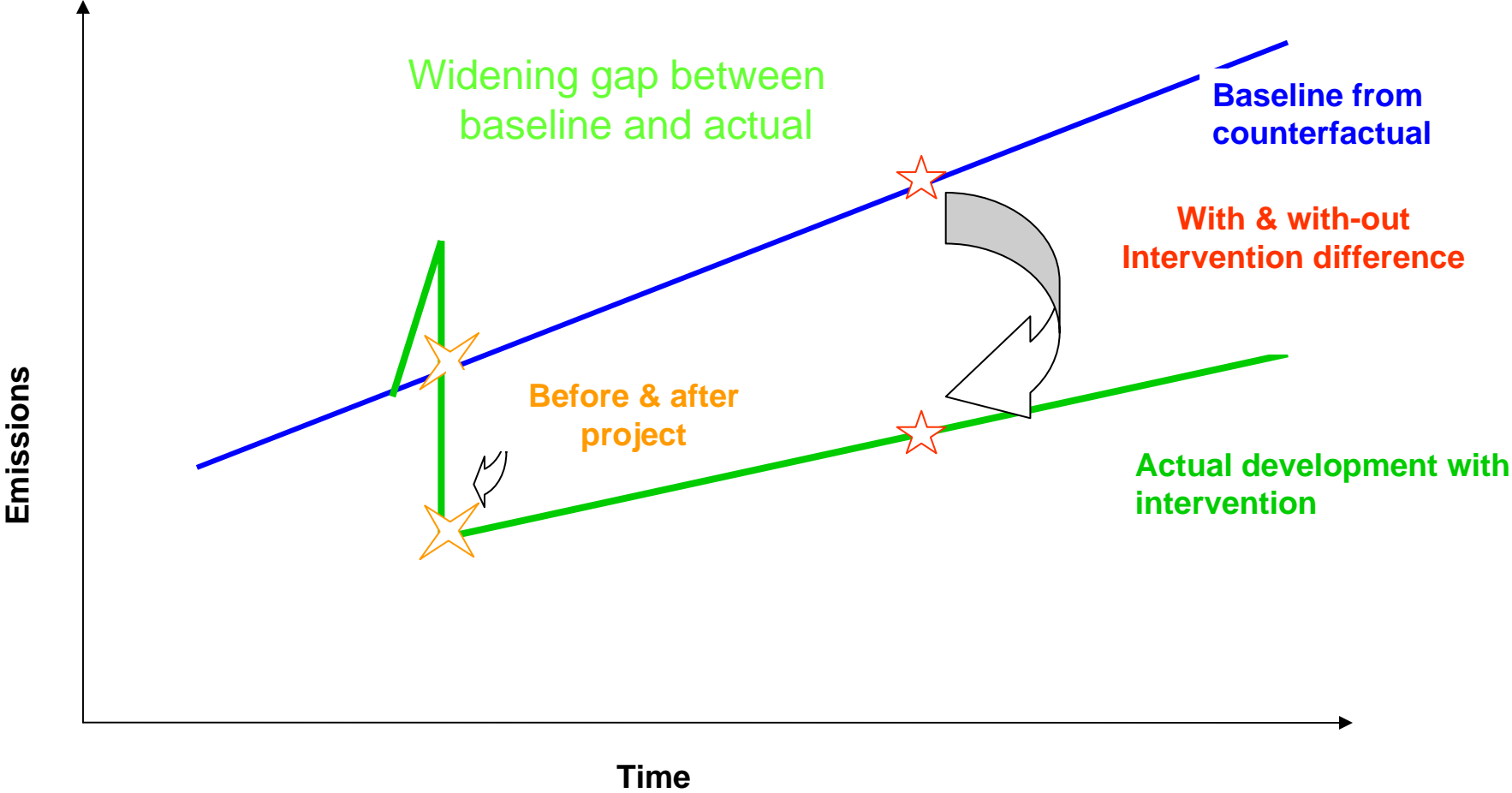
## How Would You Know?

- **Avoidance – Carbon is a 2<sup>nd</sup> tier Influence**
  - Comparisons of vehicle use, motorization, travel/freight flows
  - Direct surveying of travel, vehicle use as function of location
  - Meaningless to use “cost of saved carbon” indicator
- **Co-benefits of Transport, Urban Dvpt Strategies**
  - Estimate with/without projects using well calibrated models
  - Monitor traffic, vehicle characteristics, fuel sales etc
  - Difficult to construct “cost of saved carbon” indicator
- **Direct Approach – Mitigation by Tech, operations**
  - Measure before/after in vehicles, fuel content, etc. by careful monitoring
  - Estimate with/without from traffic measurements and macro indicators
  - Possible to construct cost of saved carbon/fuel indicator

***Mitigation, Co-benefits Impacts relatively Easy To Measure  
Large Avoidance Impacts Easy to See, but Hard to Measure***

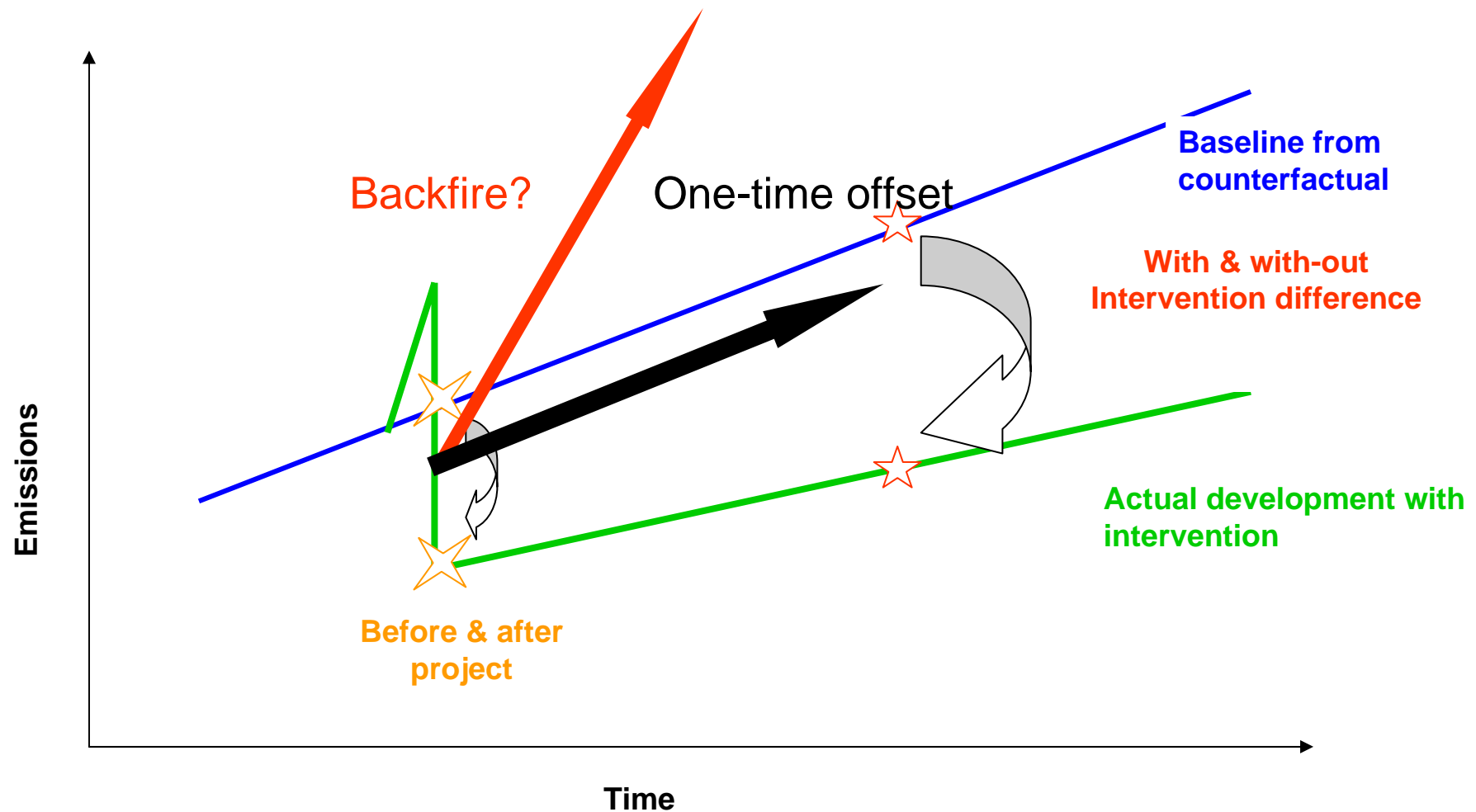


# It's Not Just Before/After It's With/Without Policies



Dynamic Base-line & Project-line over time  
*After J. Rogers, Trafalgar SA, Mexico and M Cordeiro, EMBARQ*

# It's Not Just Before/After Doesn't Always Work Out



Dynamic Base-line & Project-line over time

After J. Rogers, Trafalgar SA, Mexico and M Cordeiro, EMBARQ

# Types of Transport Projects

## Starting Point Is “Good Transport”

- **Fuels and Vehicles- Mitigation**

- Fuel switch and hybridization
- Switch to larger vehicles and better running (BRT)
- Engine retrofits

**Transport**

- **Traffic Improvements and Modal Shift -Co- Benefits**

- One-way streets and signal synchronization
- Transit upgrades (e.g.: BRT system)
- Cycle paths

**Mobility**

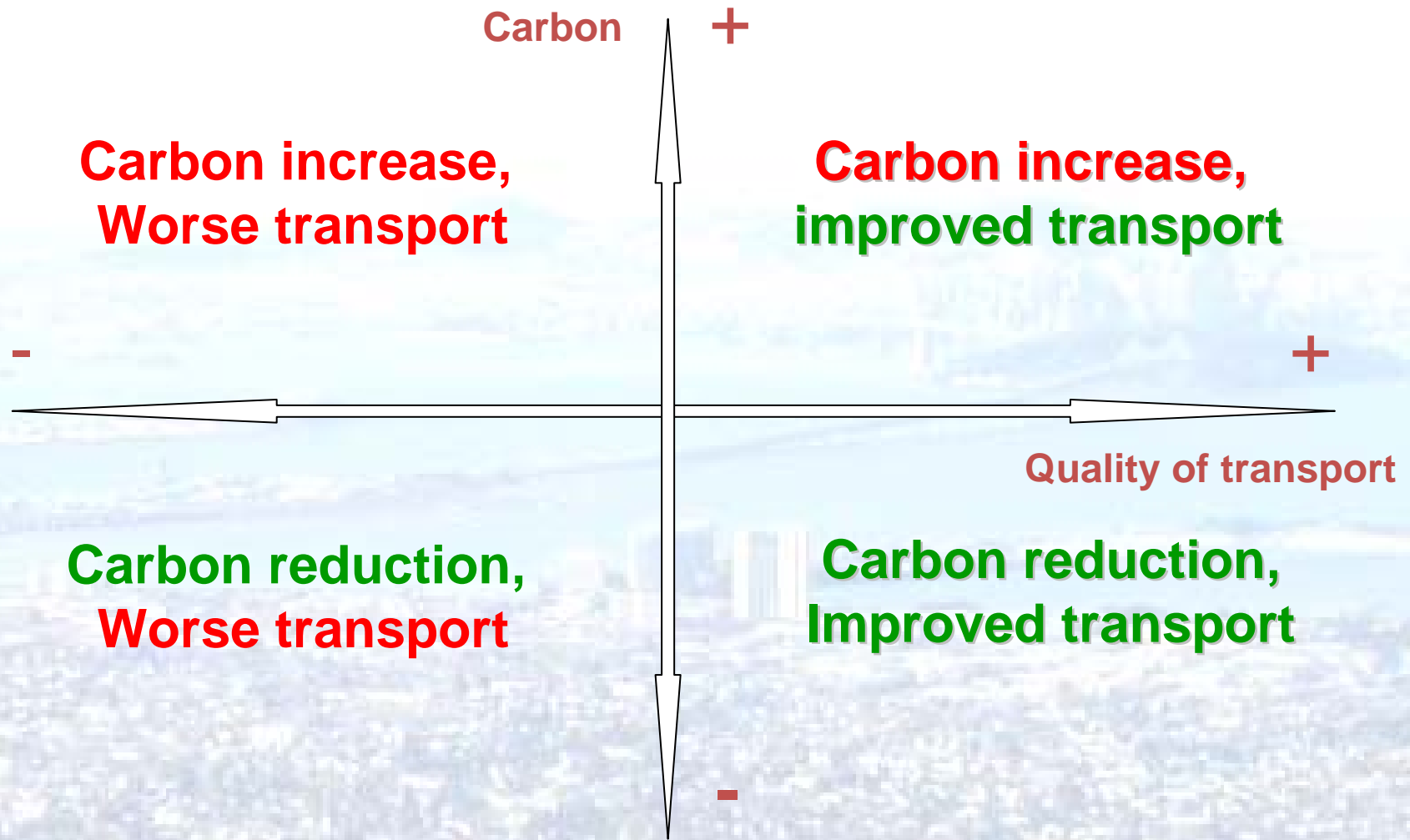
- **Land Use and Urban Planning - Avoidance**

- Transit Oriented Development
- Pedestrian zones
- Portland Ore. -style growth boundary

**Accessibility**

# Transport project outcomes:

Not always less carbon, hopefully better transport





# Saving Emissions From Transport – It Rarely Comes Down Just to Technology

- Traditional Technology – 40-60 MPG or 2.5-4 l/100km?
  - Less power, lighter materials, lower drag, CVT, cold cylinders
  - Gasoline or clean diesel hybrids
  - End to the power and weight chase?
- Other Approaches - Cost, Time to Deploy
  - City cars vs. long distance cars?
  - Plug in hybrids – most driving is for local, short trips
  - Fuel cells? Many cost, feedstock, materials challenges
- Alternative or Bio-Fuels – What are They Worth?
  - US Corn ethanol a dead end, other biofuels increasingly uncertain
  - True low carbon fuels not here, won't arrive under present policies
  - Non-oil always possible, but always expensive and higher CO<sub>2</sub>



*Should the Government Pick Winners like Today  
Or Declare Losers (Oil, CO<sub>2</sub> Tax)?*

# Diesels Close to 50% of New Car Market in Europe: Yet Savings of CO2 from Diesel Small or Absent

- **Nine Countries Show Little Savings (Counting emissions, not gallons!)**
  - On road diesel fleet emissions (gm/km) slightly (<5%) lower than gasoline
  - New vehicle test diesel emissions slightly (<5%) lower than gasoline
  - Diesel cars driven 50-100% more per year than gasoline cars
- **Huh?**
  - Cheaper diesel in Europe raises use, backfires on diesel policies
  - Diesels more powerful than gasoline equivalent, buyers choose bigger cars
  - Liter of diesel has 12% more energy, 18% more CO2 than gasoline
- **But Diesel Drivers Are Different -- That's the Point**
  - Long distance drivers buy more expensive diesels with lower fuel costs
  - Increased switching to diesel stimulated by price – switchers drive more
  - Diesel SUVs increase attractiveness of SUVs (“Gelaendewagen”)

*Drive Down Costs and Drive up Emissions:  
Much of Asia Has Same Issue With Cheap Fuel*

# Low Carbon Fuels?

## Still Waiting for a Breakthrough

- **India and China**

- Experiments abound, but small scale
- Land, water key scarce resources
- Fuel markets badly distorted by subsidies

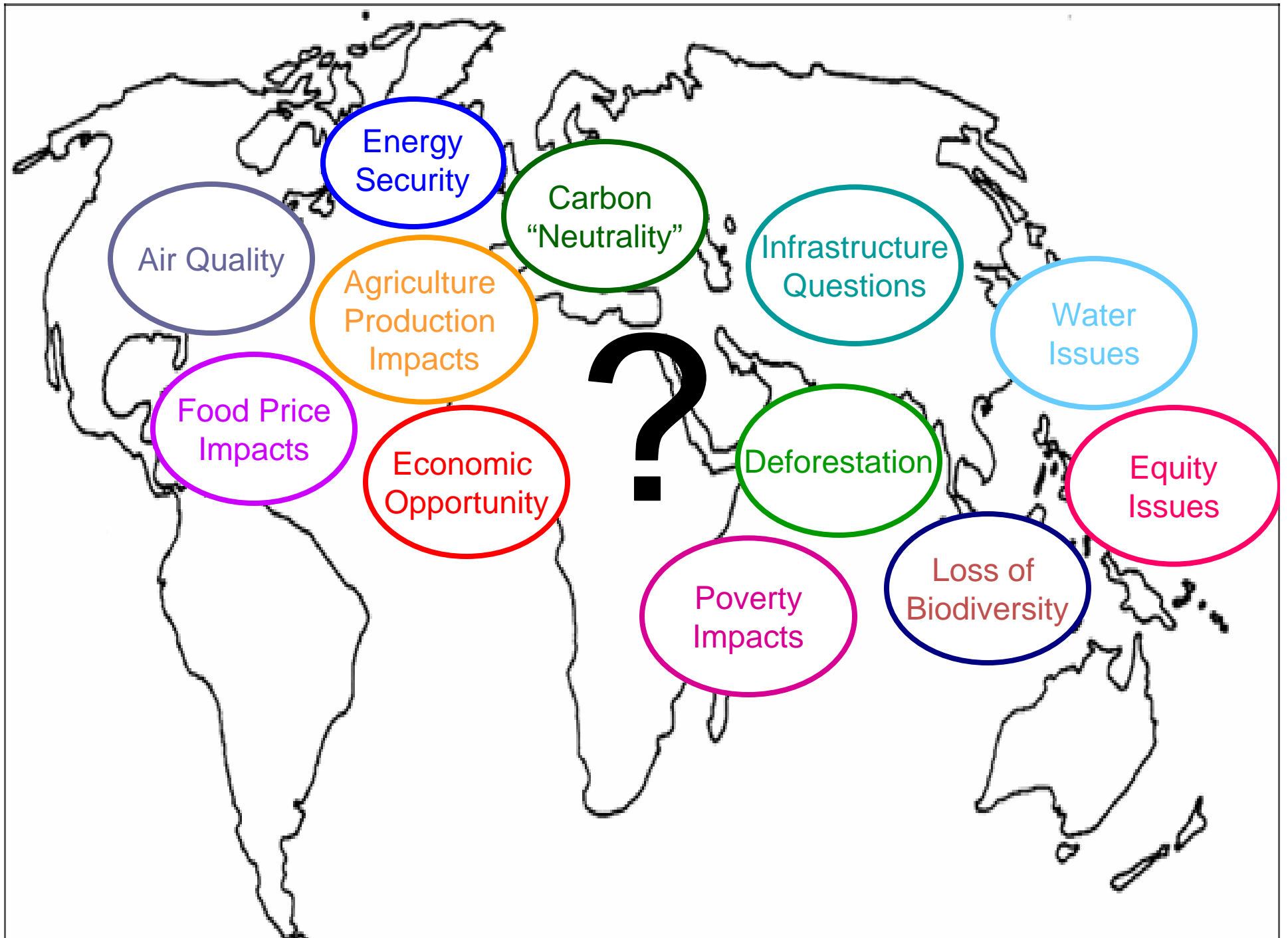
- **Other Asia, Latin America: Don't ask, Don't tell Biodiesel?**

- Brazil hitting roof on ethanol, struggling with biodiesel
- Environmental threats from rapid expansion of palm and other oils or soy beans?
- Social issues as grazing or pastoral land converted to plantations

- **Key Issues**

- Competition for land with food and other uses
- Industrial-scale “manufacturing” runs into CO2 issues
- Tillage, indirect land use impacts may offset CO2 gains

*Only Cheap Biofuels Today are True Wastes  
Land Use Issues May Limit Real Impacts*





# Opportunities in Other Modes

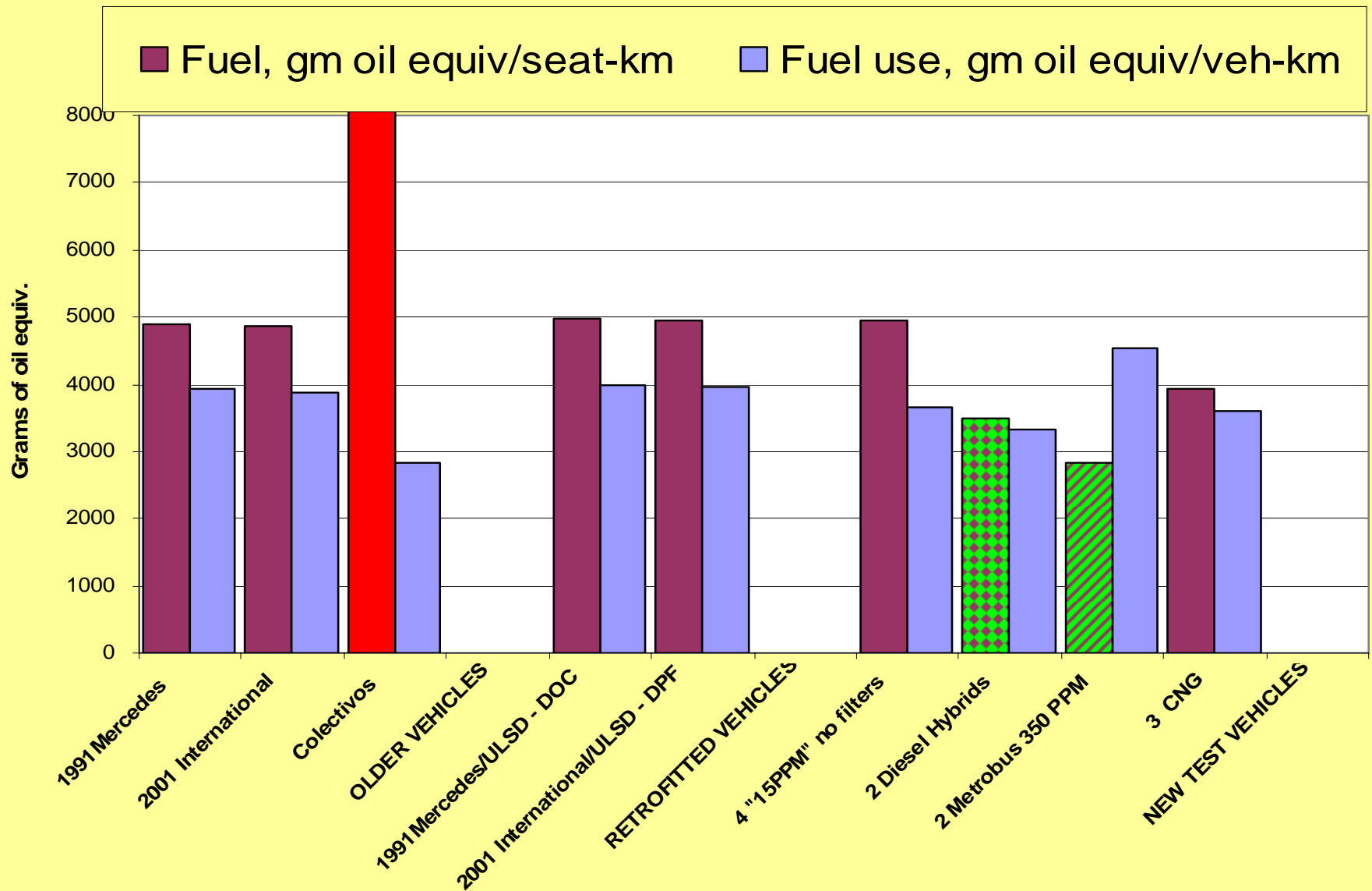


- Urban Buses – High Speed, Low Emissions
  - Articulated buses running in dedicated BRT lines
  - Parallel hybrid drive trains using diesel propulsion
  - End to the power and weight chase?
- Trucking
  - Improving efficiency of trucks - important in Asia
  - Improve freight logistics
  - Reduce growth in vkt run, particularly empty running
- Rail?
  - Building or strengthening freight networks - uncertain
  - Consider low-cost, medium speed intercity rail (tilt trains)
  - Improve intermodal access around rail facilities to boost usage

***Opportunities Are Great, but mostly from  
Transport System Improvements, not Technology***<sup>21</sup>

# Fuel Use in Buses in Mexico City

## The Advantage of Size and Technology



# Key Issue for Transport Planners: Should CO2 Dominate Transport Decisions?

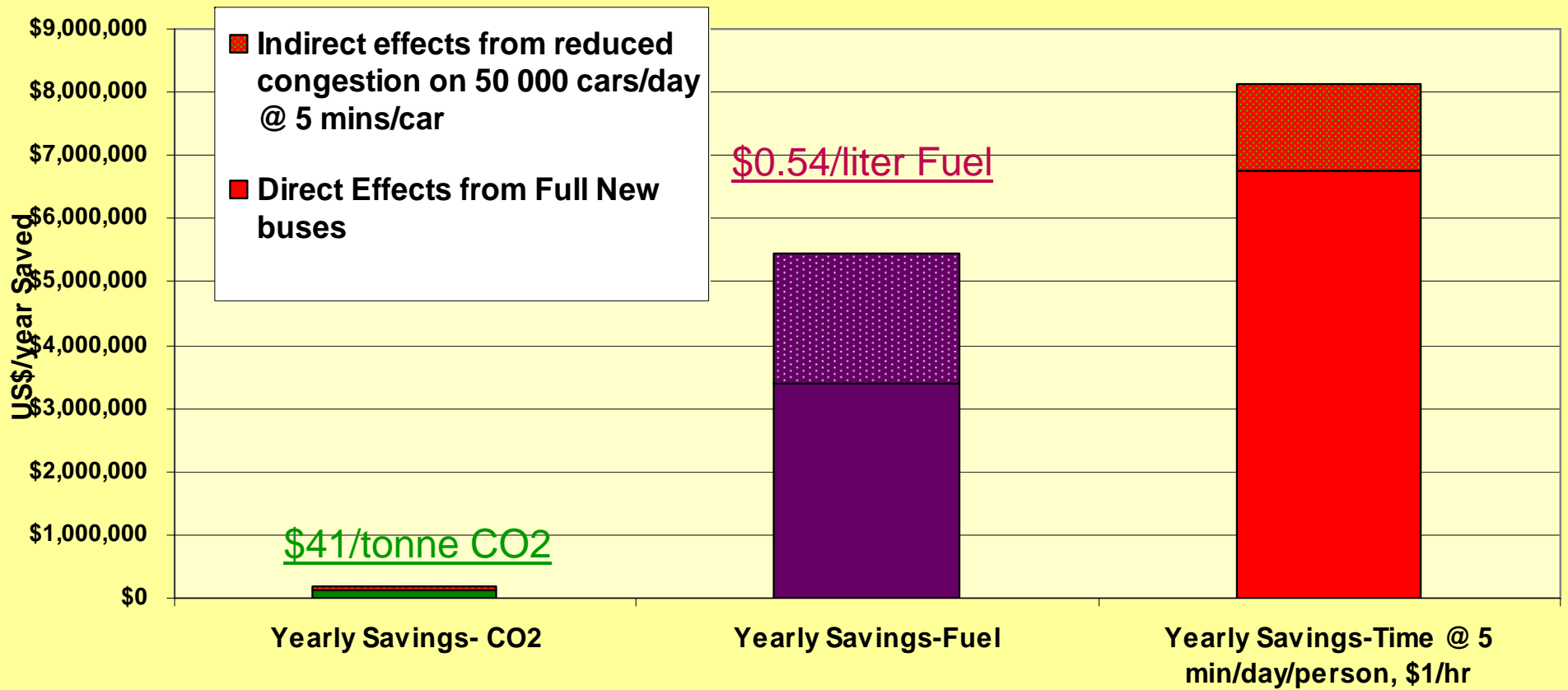
- **Present Fuel Costs Putting Pressure on Transport Systems**
  - At European prices (1.5-2 EU/liter) fuel costs biting
  - Fuel costs >> present carbon taxes or market prices
  - Much of Asia suffers from subsidized or adulterated fuel
- **Transport Decisions Still Involve Many other Costs, Benefits**
  - Infrastructure for freight, rail, metro, even BRT still more than fuel
  - Land use changes involve huge sums in real estate, fixed structures
  - Dealing with individual vehicles still the challenge
- **'Good Urban Transport' Gives CO2 Savings as Co Benefit**
  - Collective over individual transport boosts speeds, load factors
  - Security and protection for low income, NMT implies lower car use
  - Healthy planning and regulatory functions also boost non-car shares

*First Steps to Master CO2 Focus on Good  
Transport in All Modes*

# GHG, Fuel, Time (\$1/hour) Savings

## Does CO2 now make/break the project?

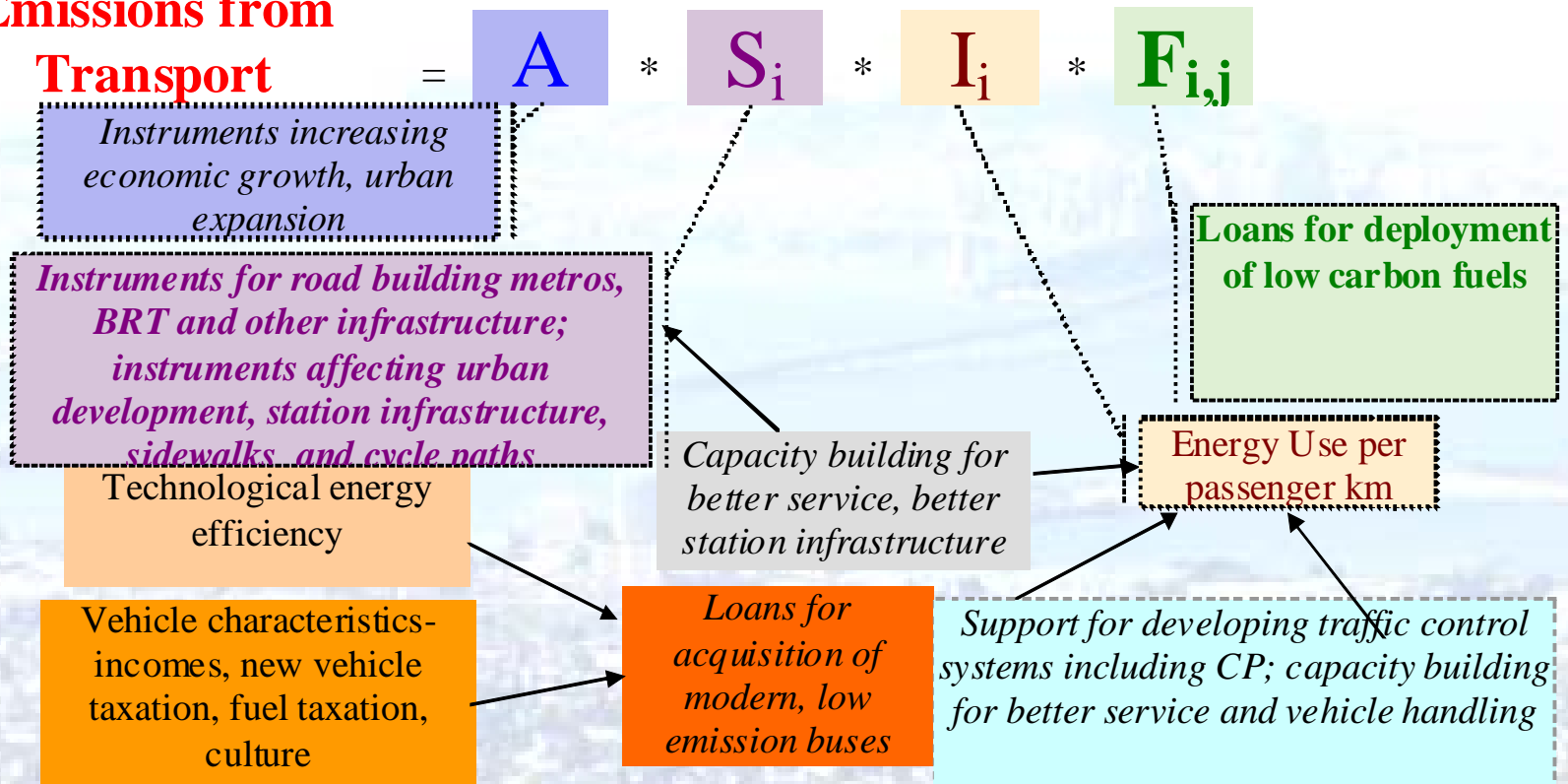
Higher CO2 (\$41/tonne) and Fuel (\$US 0.54/liter) Values



# Changes in Transport Emissions

## Where Does ADB and Others Step In?

**Fuel Use and Emissions from Transport**



*Many Ways for to Intervene:*

*Key Is to Change The Way Development and Transport Evolve*

# Important Lessons for Transport Week

## Integrate CO2 into Transport Planning, not vice versa

- Many Opportunities to De-Carb
  - Emissions savings technology important, but deceptively so
  - Behavior and choice of technology, economics crucial
  - Transport and land use – CO2 avoided – the key
- Start With Good Transport from Options Analysis
  - Real priority for low impact modes for the masses
  - Each mode pays its true cost
  - Balanced system and good governance in the sector essential
- Larger issues and Caveats
  - Don't let CO2 alone drive good transport decisions
  - Weigh transport plan choices against CO2, local emissions changes
  - Do verify that CO2 is “less than otherwise” because of a project

*Bring Down the Analysis and Policy Silos  
Cooperation Essential Here*



Thanks

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