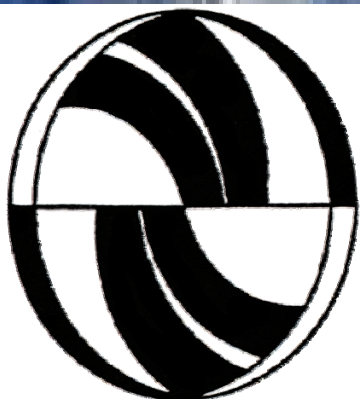


Counting “DeCarbs”: The Way Forward Means Finding the Right Track

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Alex Farrell 1962-2008

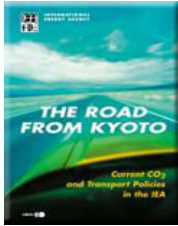


Counting De-Carbs

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***



“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)

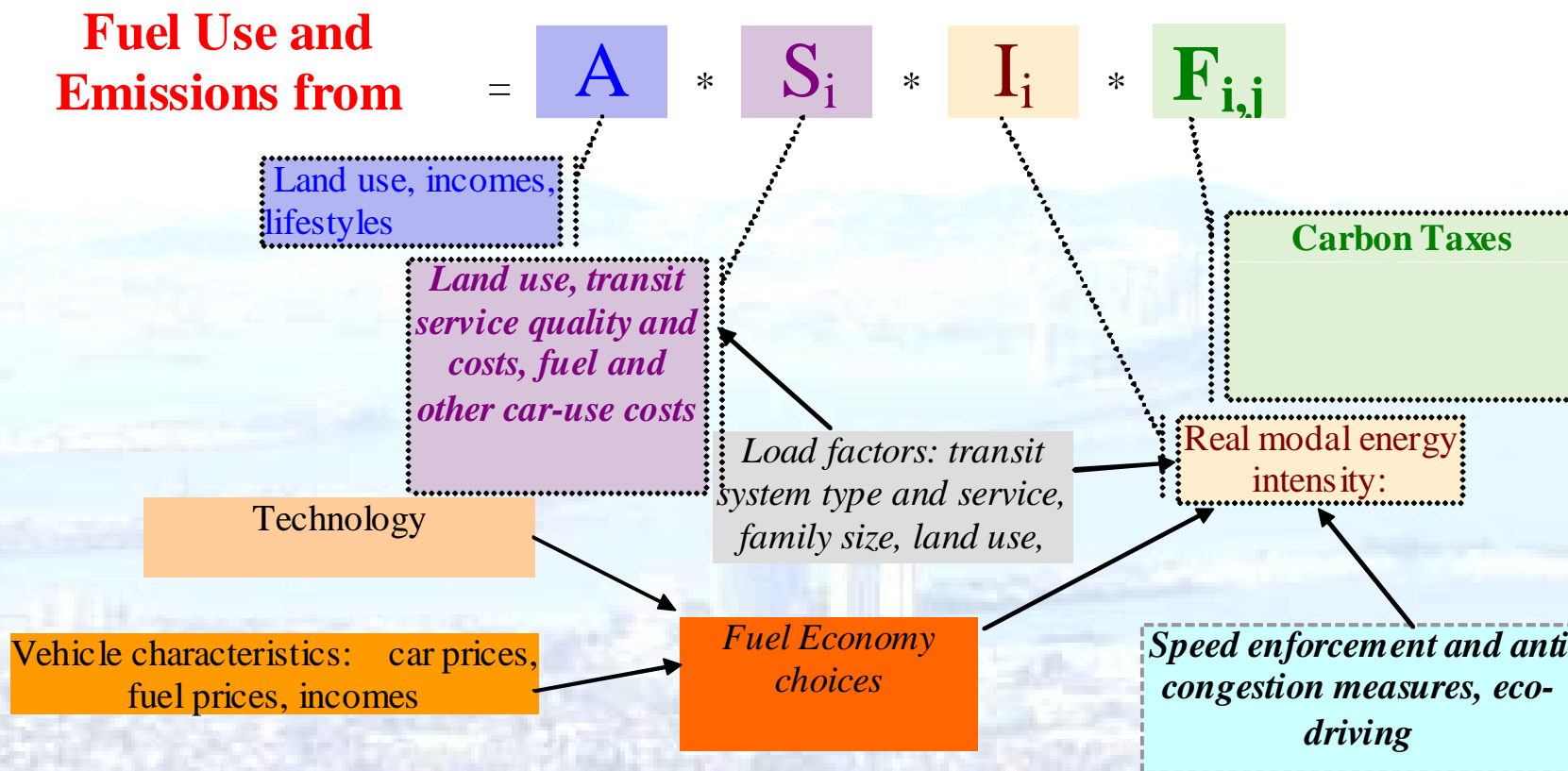
Oil and CO2 more important in 2008 than before: What are the next steps?

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 2nd 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***

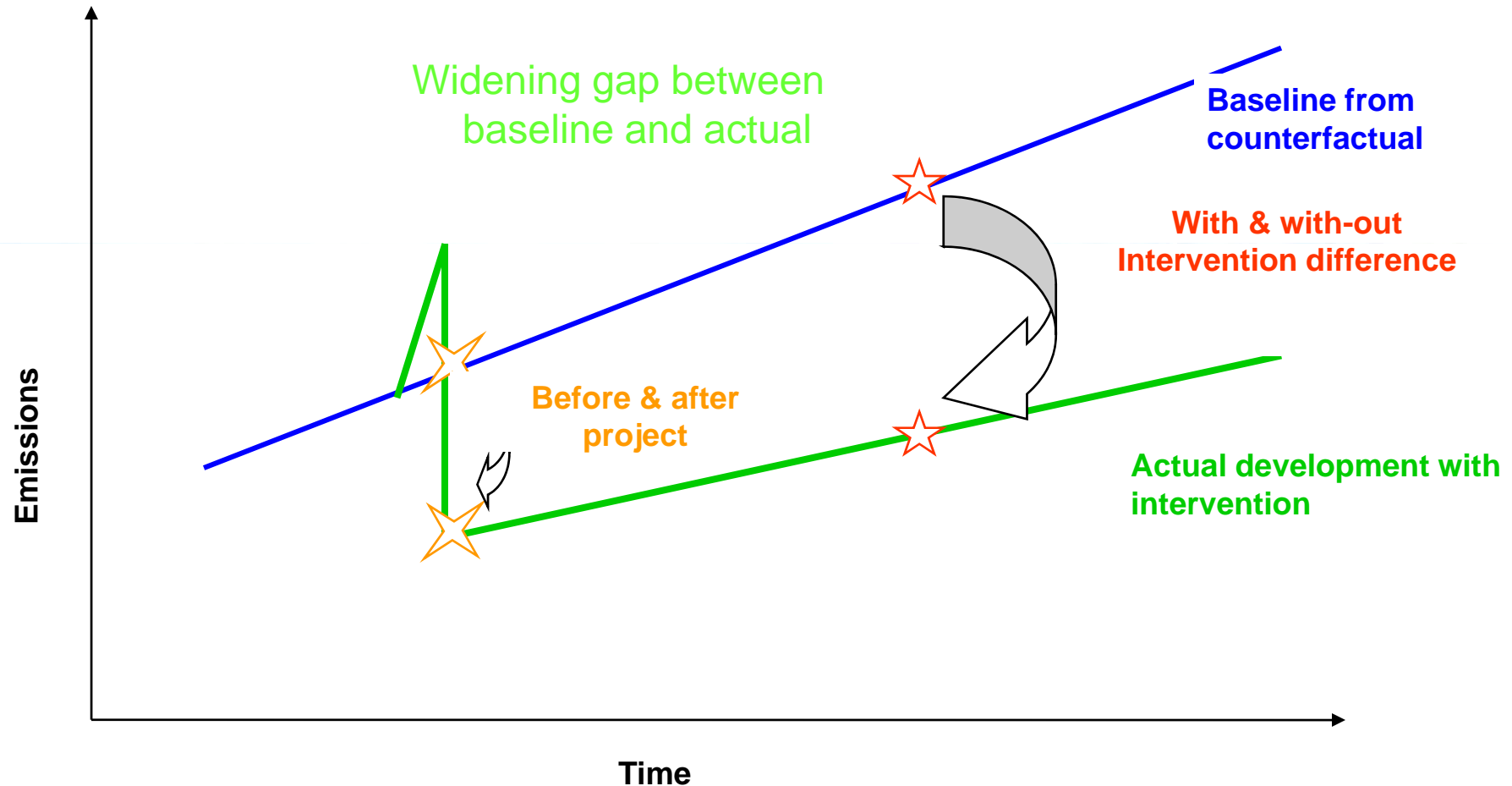
Saving Carbon

How Would You Know?

- **Avoidance – Carbon is a 2nd 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***

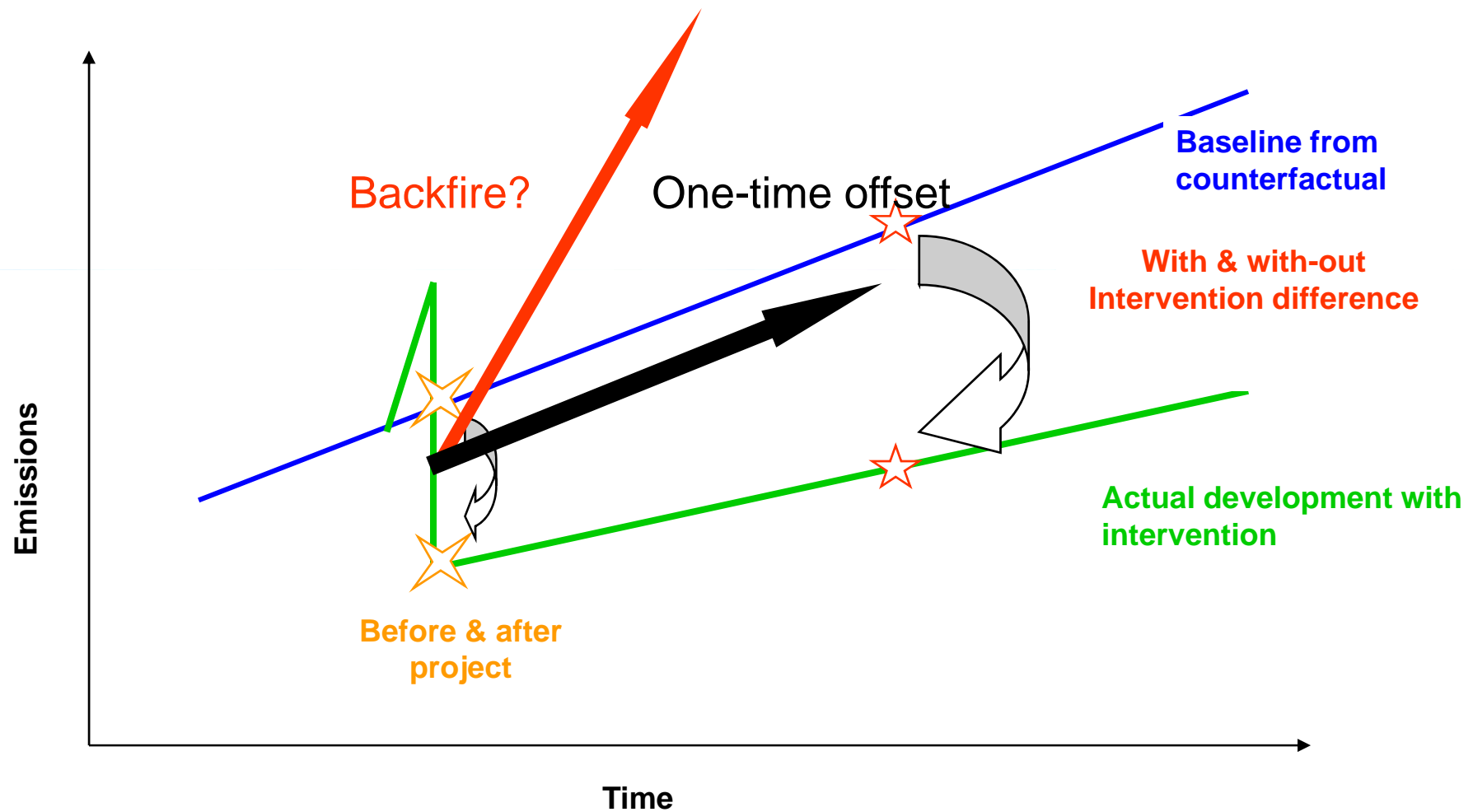
It's Not Just Before/After It's With/Without Policies



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

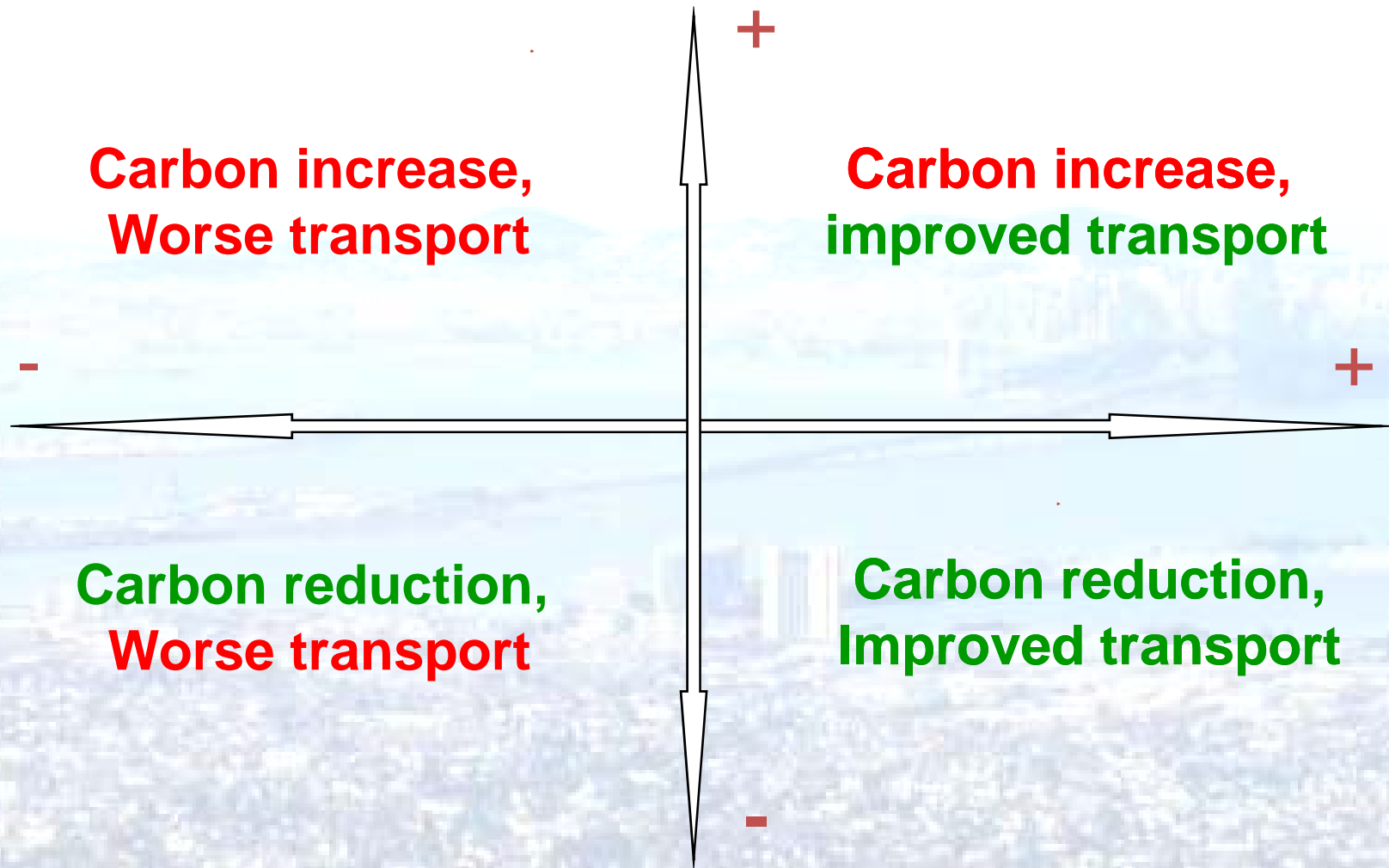


Dynamic Base-line & Project-line over time

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

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 CO2



Technology Options Exist for All Countries

Money is not the Issue

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

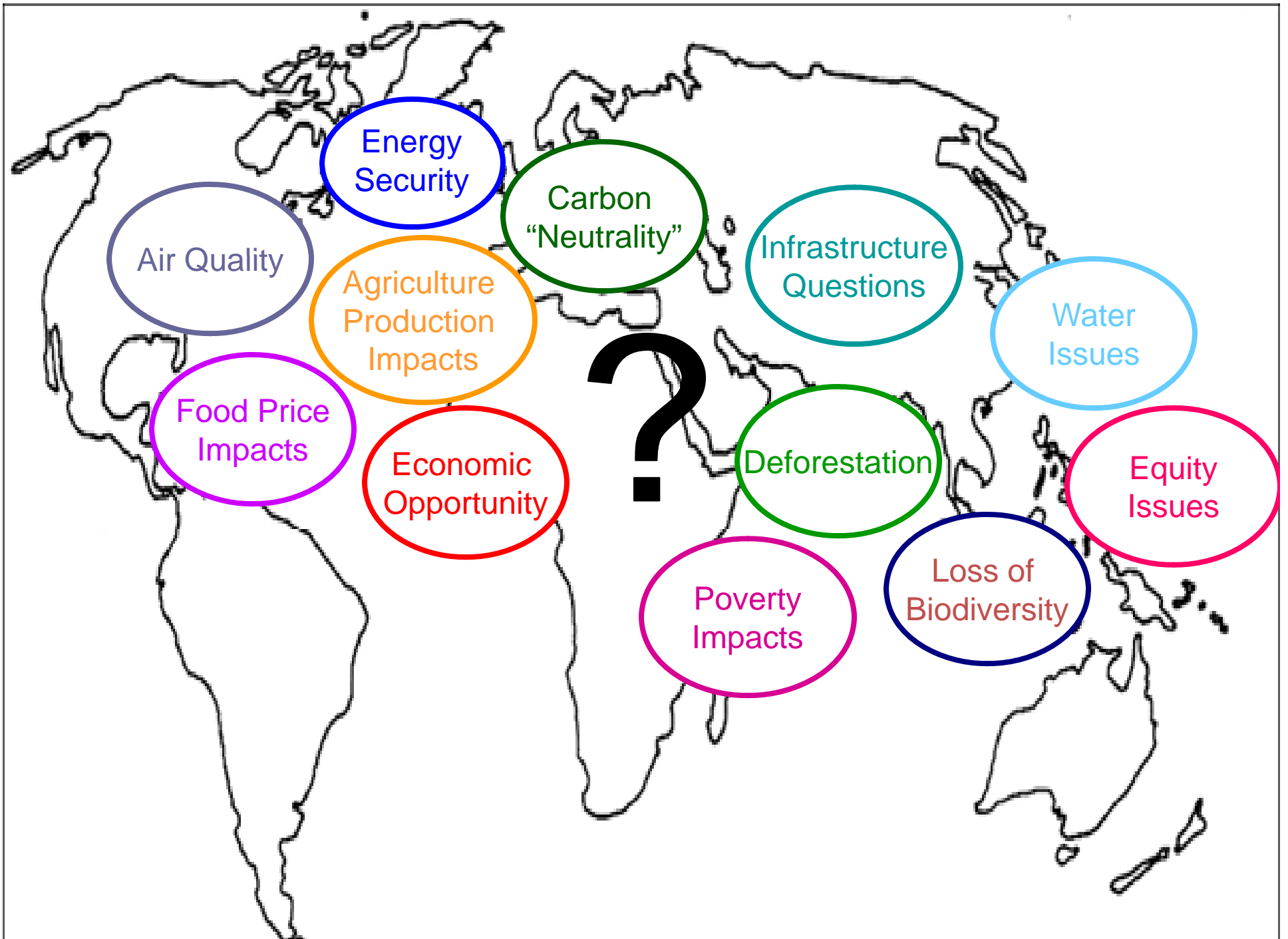
- **Other Asia, Latin America: Don't ask, Don't tell Biodiesel?**

- 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*



Air Quality

Energy Security

Carbon "Neutrality"

Infrastructure Questions

Water Issues

Agriculture Production Impacts

Deforestation

Equity Issues

Food Price Impacts

Economic Opportunity

Poverty Impacts

Loss of Biodiversity

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***¹⁷

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

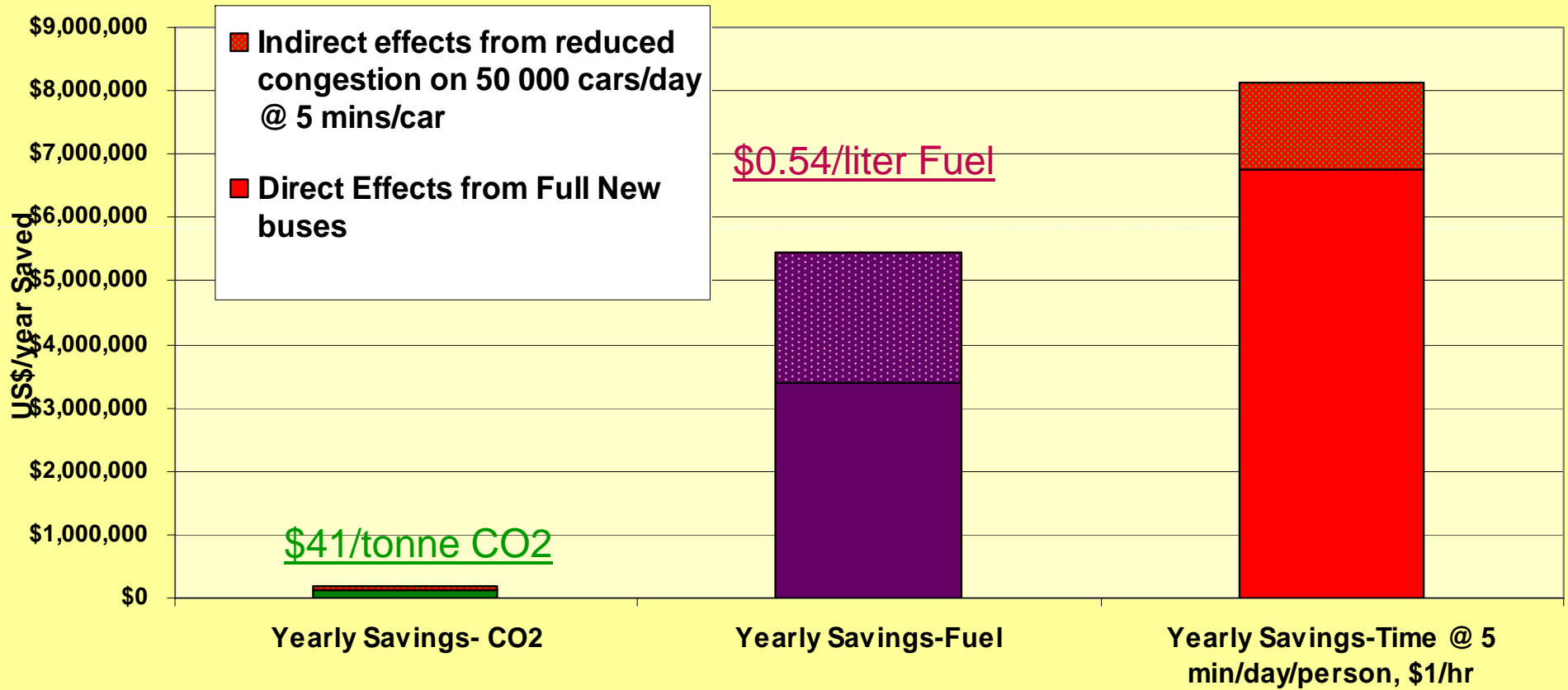
- **Present Fuel Costs Putting Pressure on Transport Systems**
 - At European prices (1.5-2 EU/liter) fuel costs biting
 - Fuel costs >> present carbon taxes or market prices
 - Much of Asia suffers from subsidized or adulterated fuel
- **Transport Decisions Still Involve Many other Costs, Benefits**
 - 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



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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