

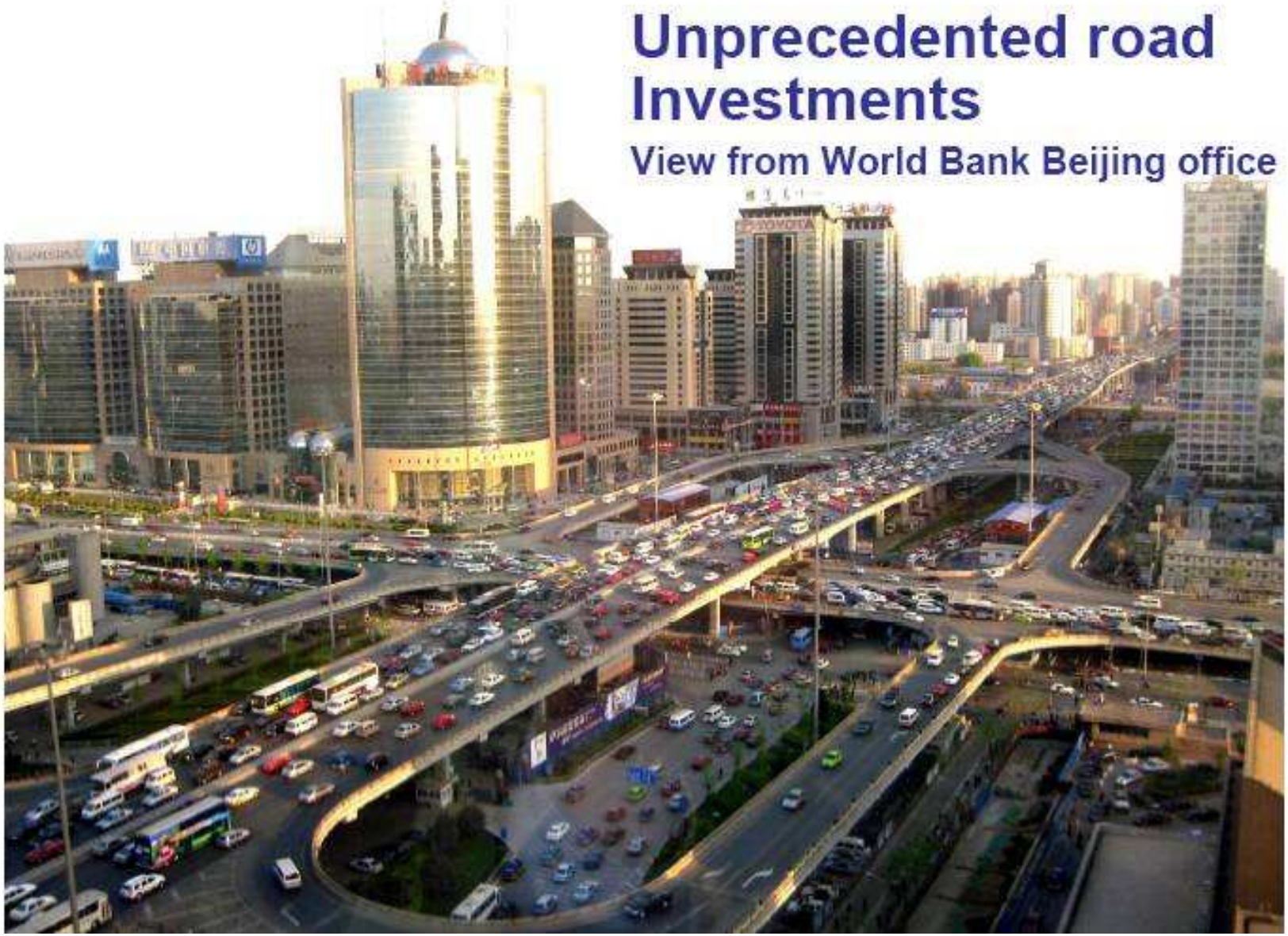


Towards less carbon intensive urban transport

Manfred Breithaupt
GTZ – Water, Energy and Transport

Unprecedented road Investments

View from World Bank Beijing office



gtz Transport Policy Advisory Services

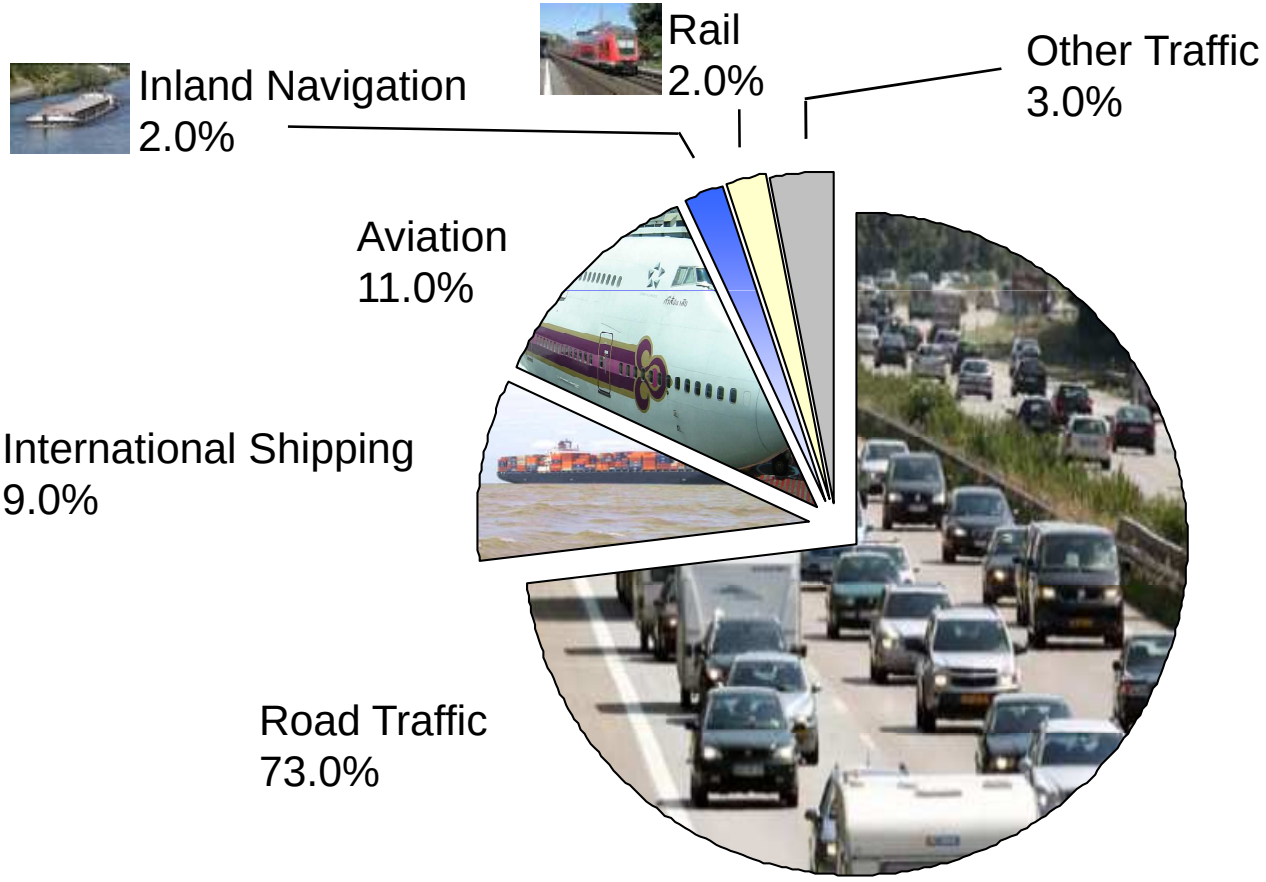
The transport paradox

Transport is unique as being the only development sector that worsens as incomes rise. While sanitation, health, education and employment tend to improve through economic development, traffic congestion tends to worsen.

Transport and CO_2 emissions

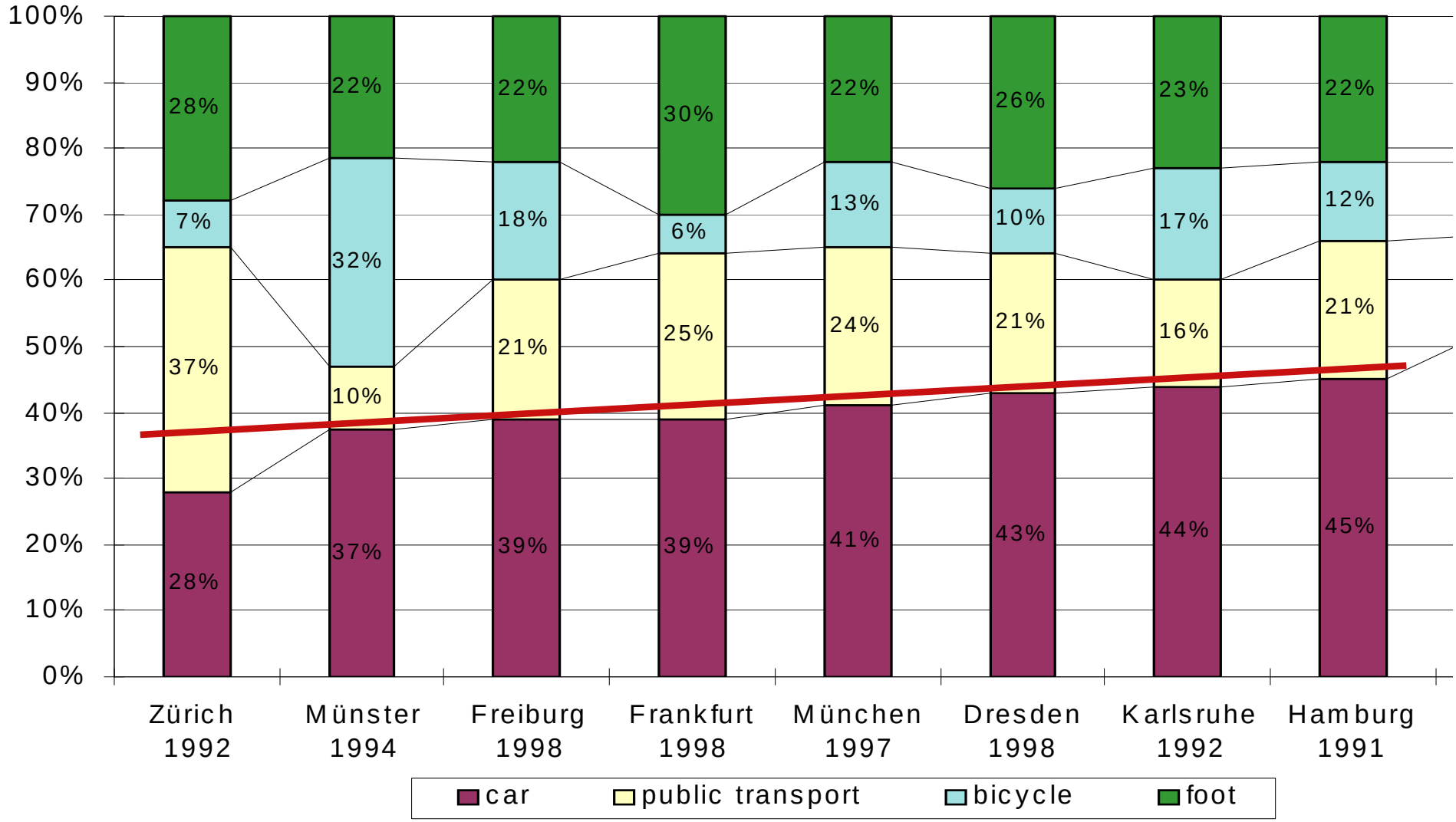
Transport CO_2-Emissions by mode (2005)

Within the transport sector, road traffic is responsible for the largest share of emissions:



Source: ITF/IEA

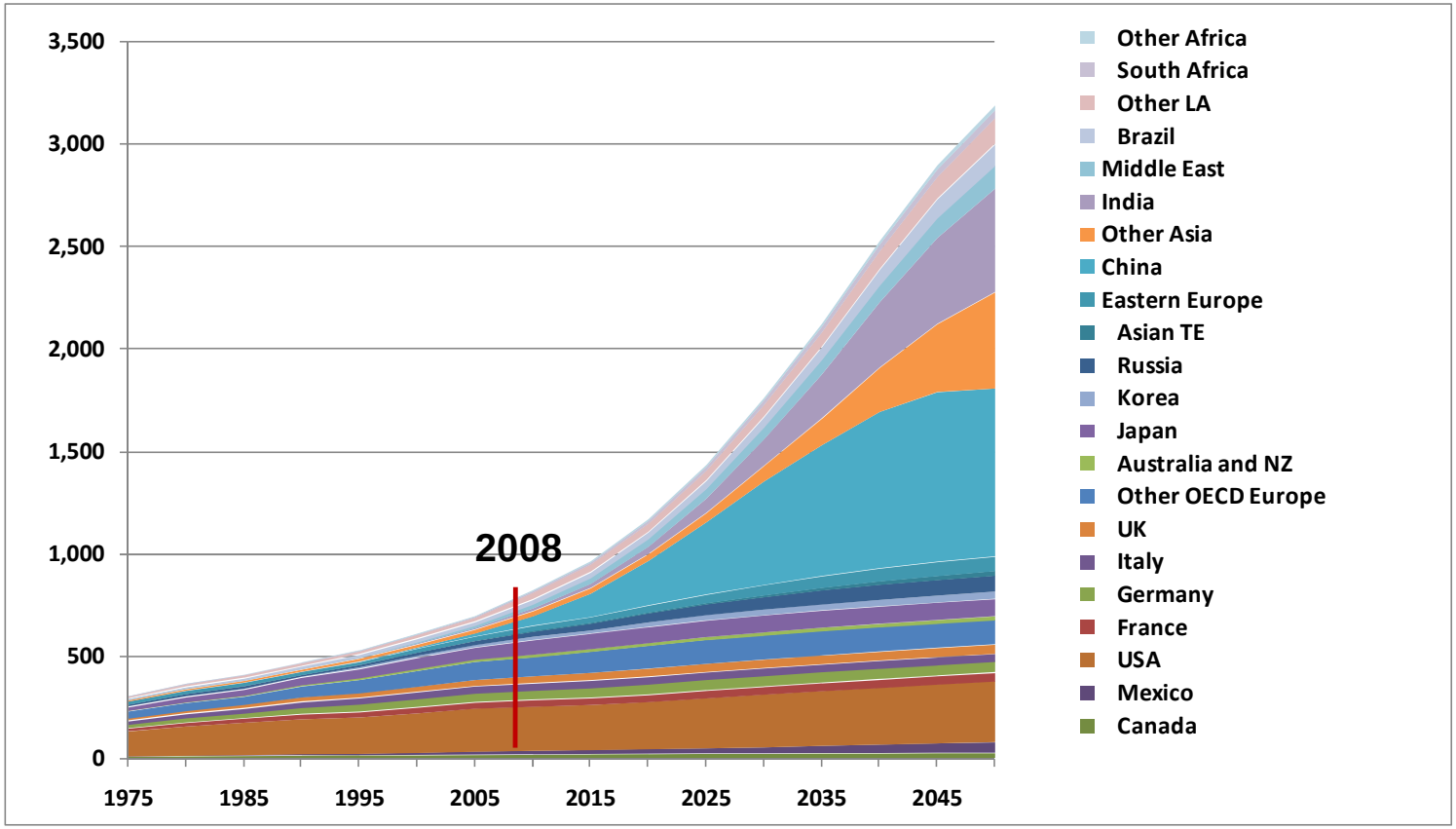
Getting the perspective right



…but the majority of trips is still by walking, cycling and public transport…

Source: Socialdata

Vehicle ownership projections

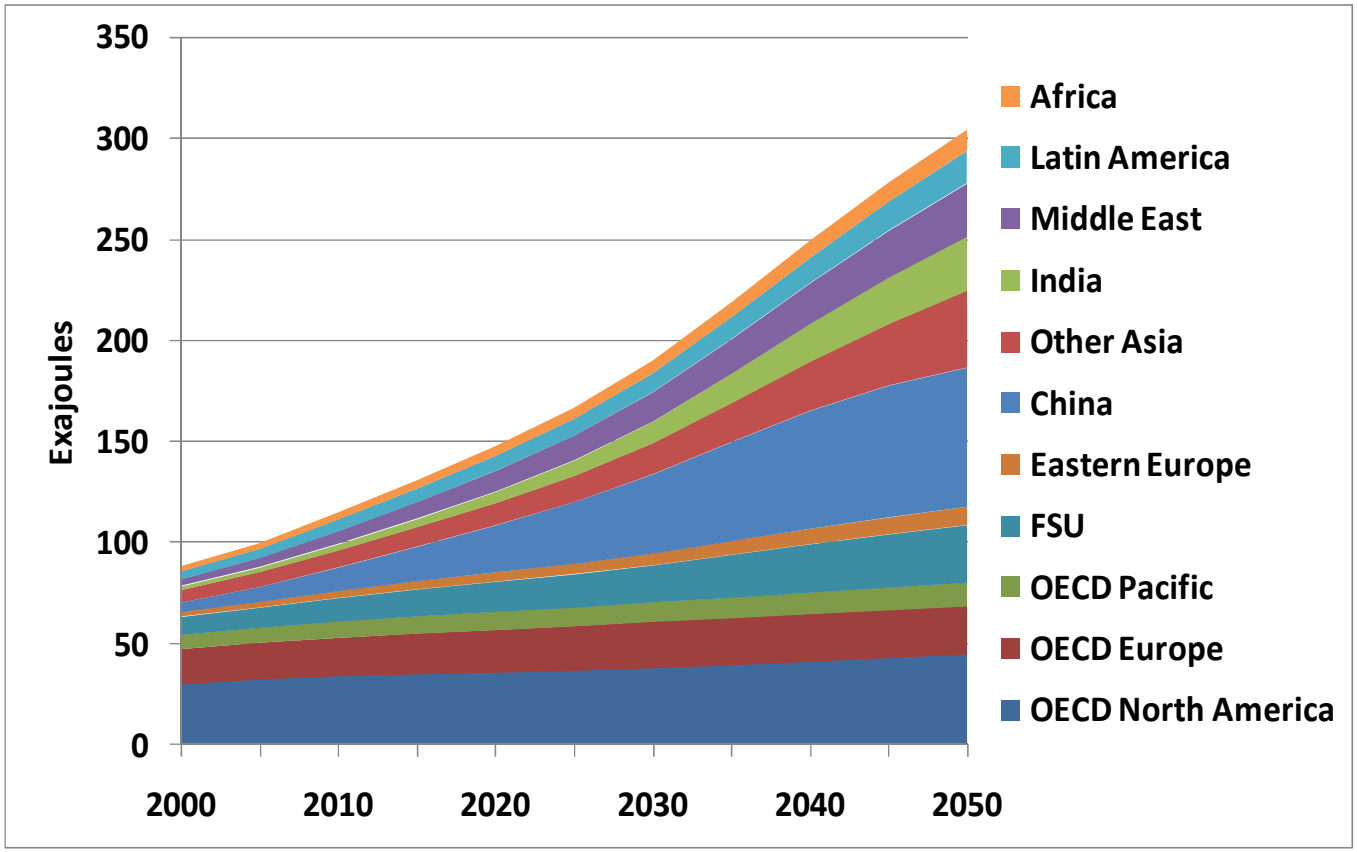


Total car stocks by region

2050: five times more vehicles…

Source: IEA ETP 2008

Transport Energy Demand Projection



2005-2050: About to triple world-wide …

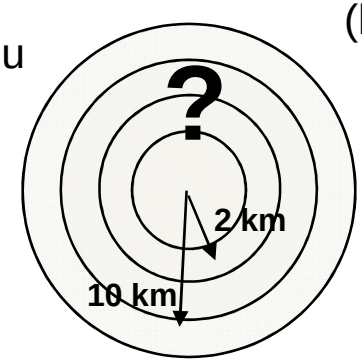
Source: IEA ETP 2008

Traffic generation & Carbon emissions: What aspects should we concentrate on?

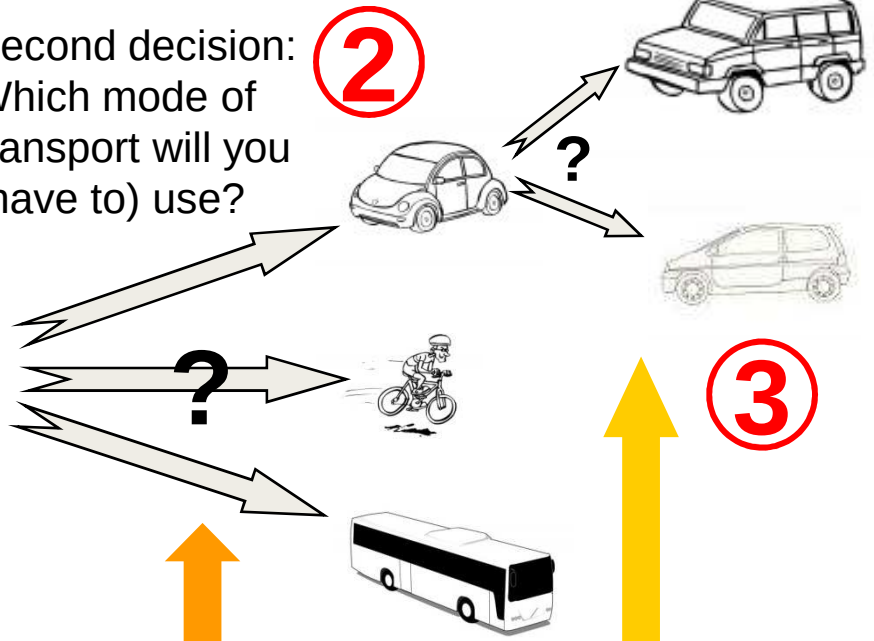
- Example: Shopping

Starting point:
A household requires a wide range of goods, with varying frequency.

First decision:
How far do you have to go?



Second decision:
Which mode of transport will you (have to) use?



Third decision:
Which type of vehicle + use?

3

Smart infrastructure planning: Reduces need for travelling!

AVOID / REDUCE

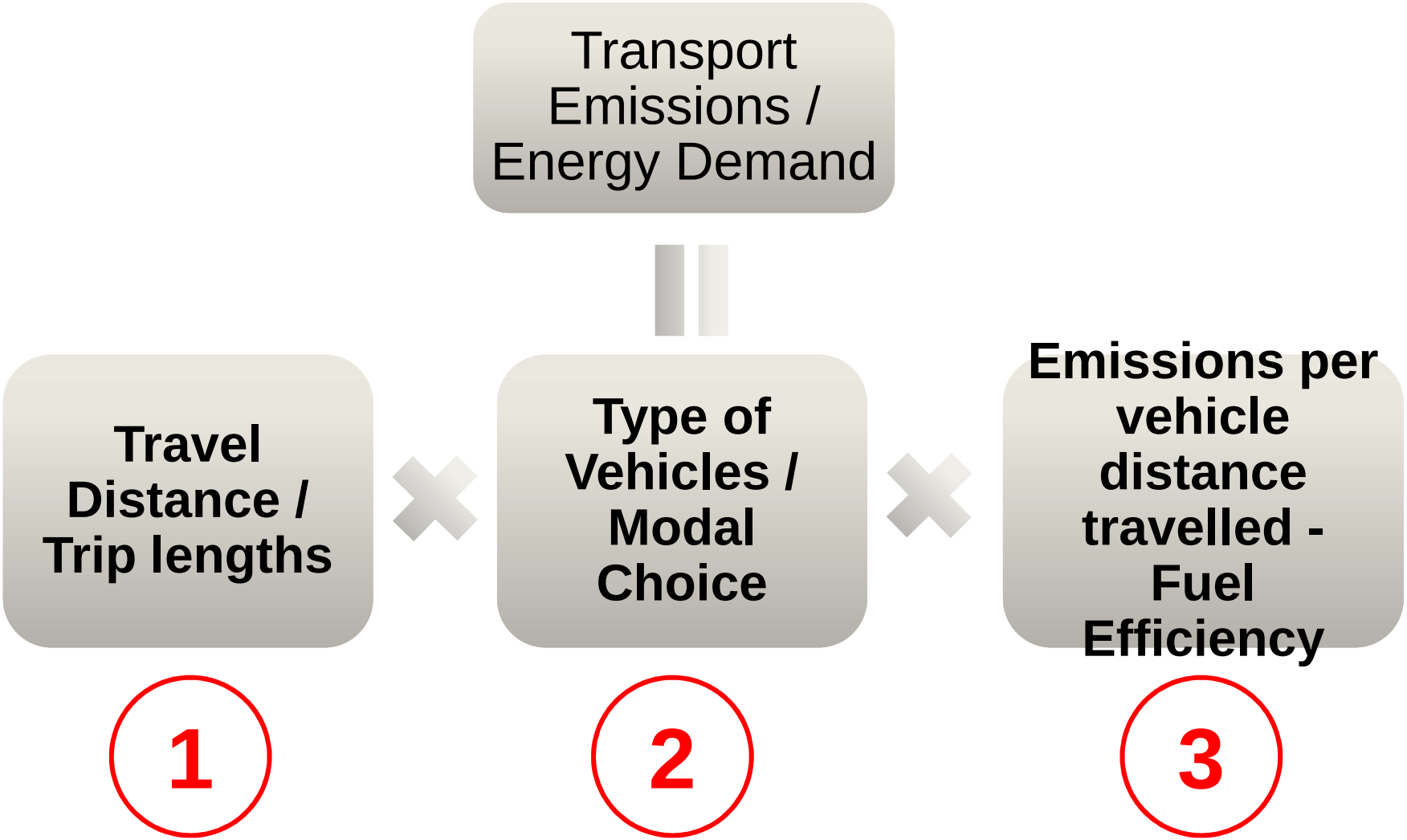
Encourage use of non-motorized and public transport!

SHIFT

Reduce car size and consider using alternative fuels!

IMPROVE

Factors affecting transport emissions/energy demand

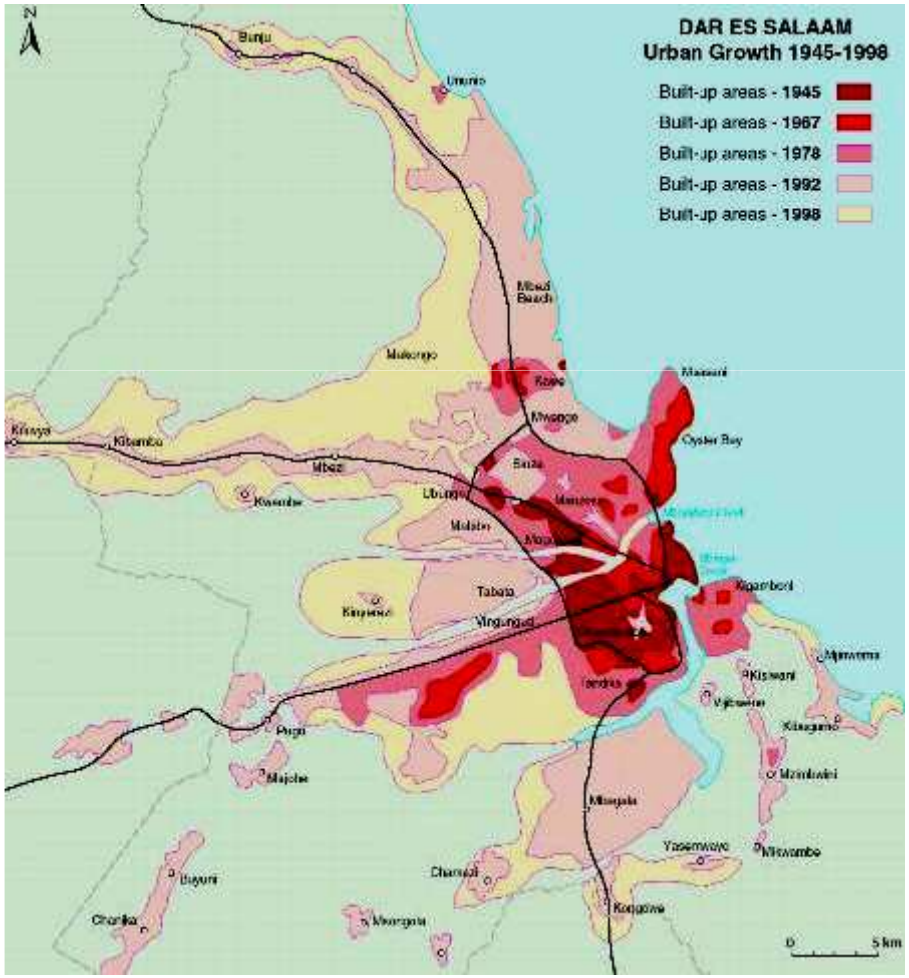


The three basic routes to improve energy efficiency

AVOID / REDUCE	SHIFT	IMPROVE
Reduce or avoid travel or the need to travel	**Shift to more environmentally friendly modes**	**Improve the energy efficiency of transport modes and vehicle technology**
• Integration of transport and land-use planning • Smart logistics concepts • …	• Transport Demand Management • Mode shift to Non-Motorized Transport • Mode shift to Public Transport • …	• Low-friction lubricants • Optimal tire pressure • Low Rolling Resistance Tires • Speed limits Eco-Driving (Raising Awareness) • Shift to alternative fuels • …
1	2	3

Example AVOID/REDUCE: Integrated land use planning

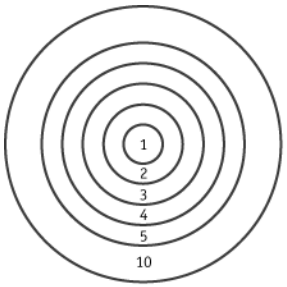
1



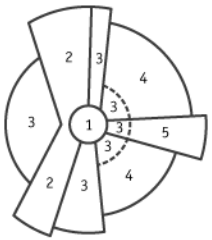
Source: GTZ Sourcebook Module “Land use planning”

Main problems of urban sprawl

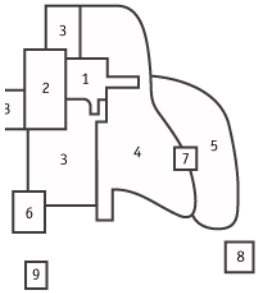
- High average **trip distances** for commuters
- High dependency on **private passenger** car
- **Congestion** on main arteries
- High transport-related **energy consumption**
- **Pollution**, **noise** pollution, traffic **accidents**
- Long trip lengths for **pedestrians** due to multiple barrieres



CONCENTRIC ZONE THEORY

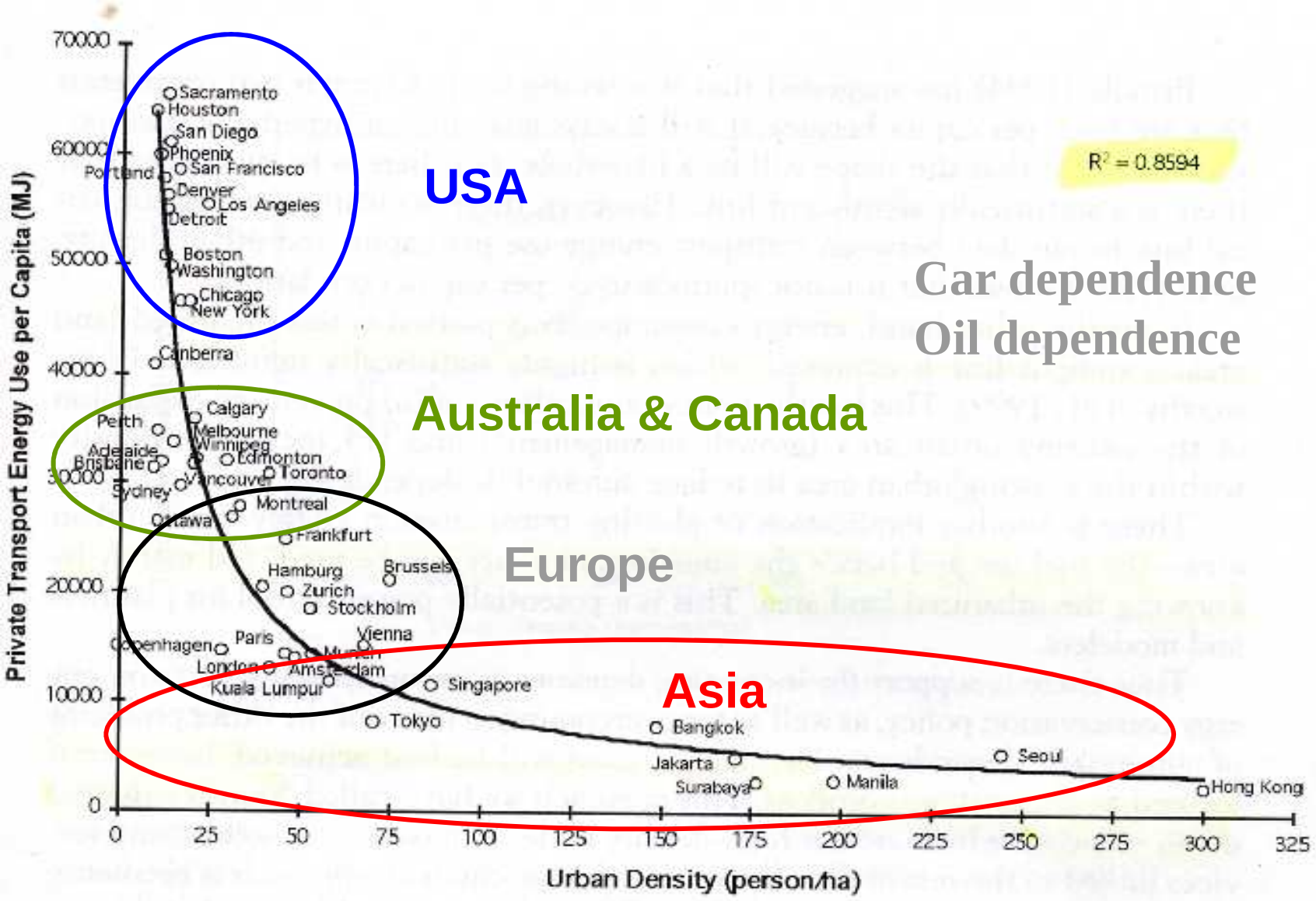


SECTOR THEORY



MULTIPLE NUCLEI

Urban density and energy efficiency



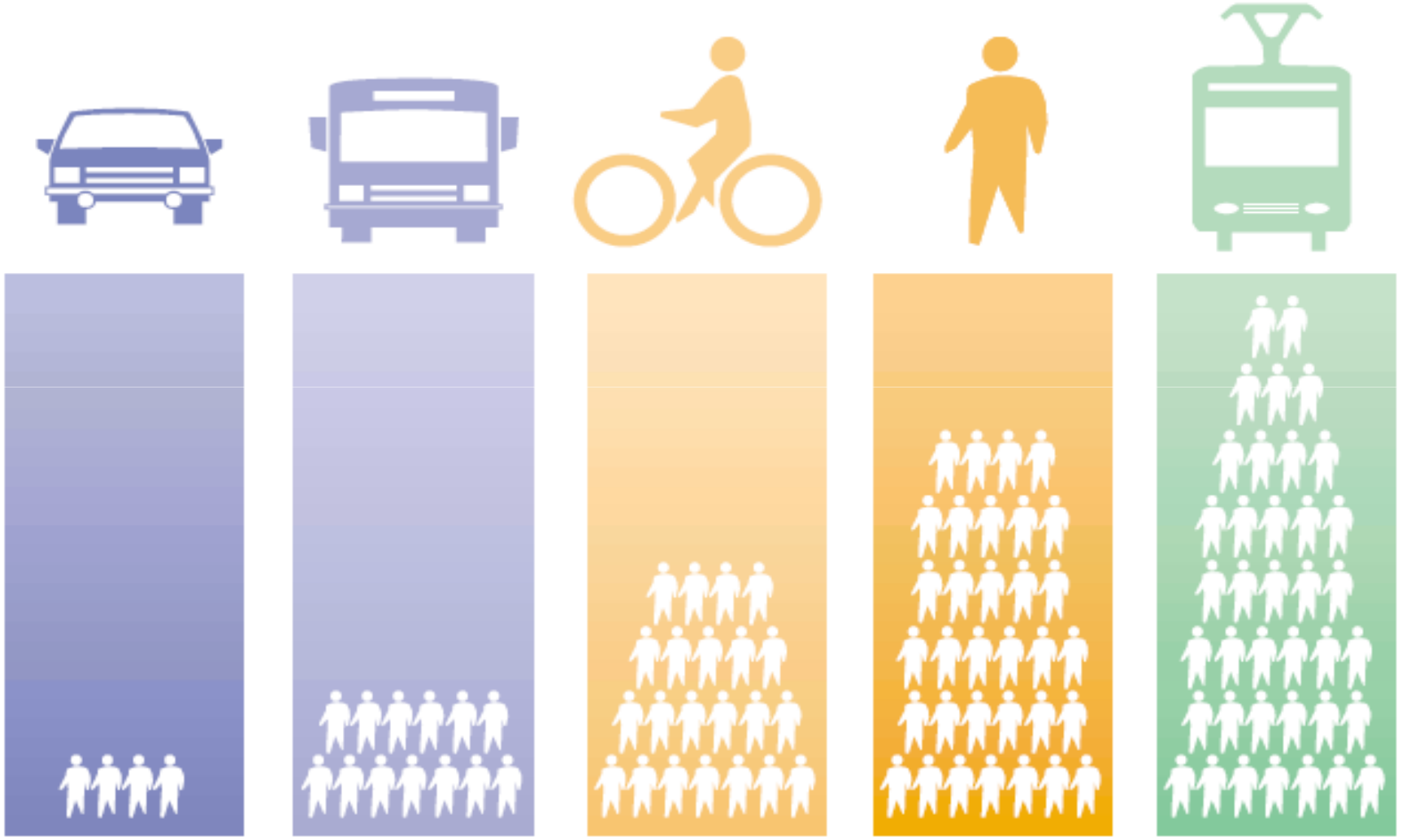
Example SHIFT: Provision of high-quality public transport

2

Key features of BRT

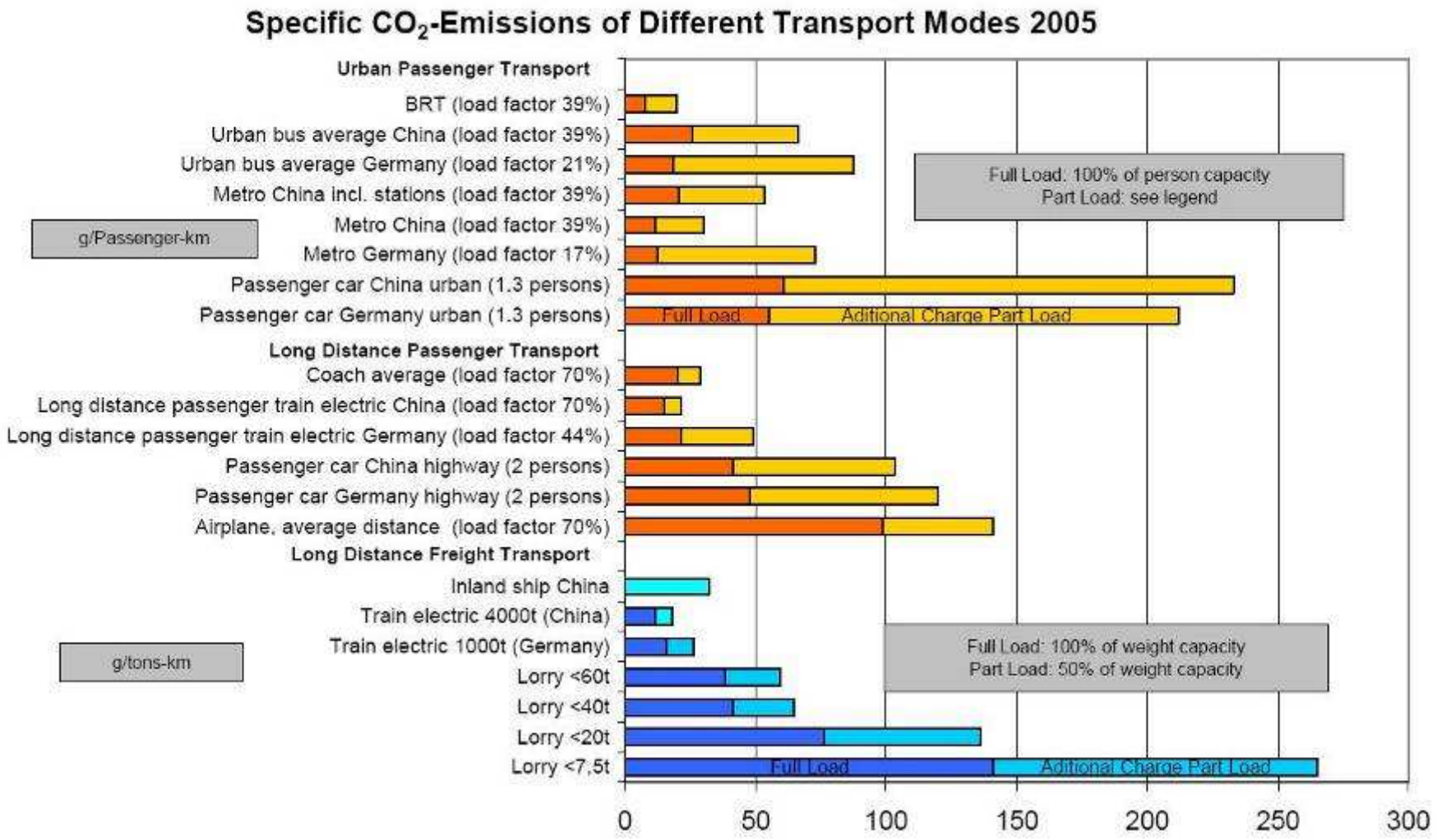
- Segregated busways
- Pre-board fare collection and fare verification
- Restricted operator access (closed system)
- Free transfers between corridors
- Competitively bid concessions
- High frequency service and low station dwell times
- Clean bus technologies
- Modal integration (including timetables / fares)

Road capacity
(people per hour on 3.5 m wide urban road



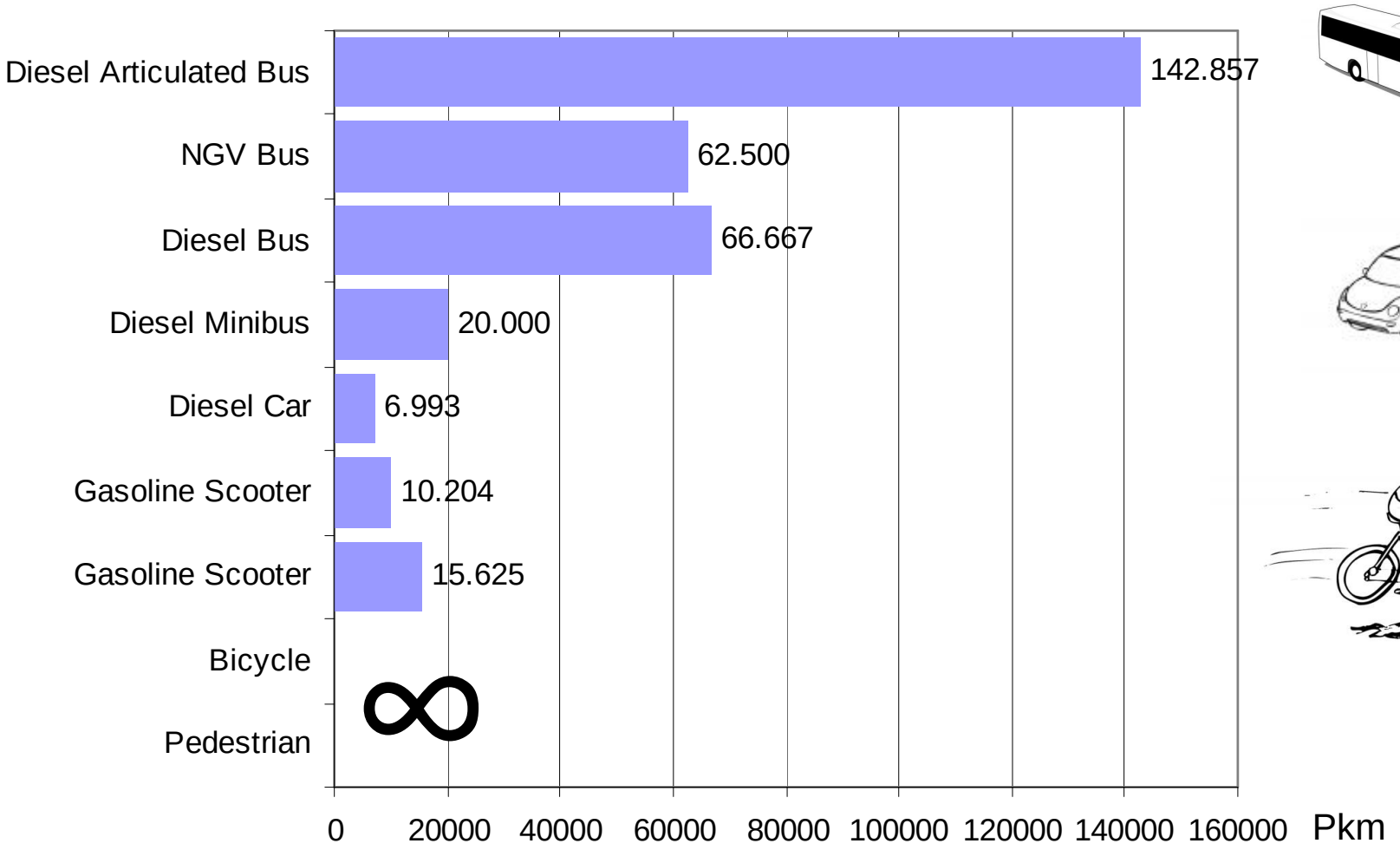
Source: Botma & Papendrecht, TU Delft 1991

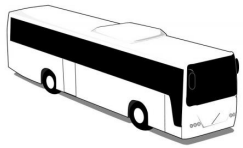
Transport Mode & Energy Efficiency / Carbon Intensity



Sources: 1) KfW: Transport in China: Energy Consumption and Emissions of Different Transport Modes, Final Report, ifeu – Institute for Energy and Environmental Research Heidelberg

How far can I travel on 1 ton CO_2 ? (in Pkm)





Source: GTZ Sourcebook Module “Transport and Climate Change”, 2007, based on Hook / Wright, 2002

What do citizens want?

Public transport should be designed around the customer and not around a technology

- ✓Rapid journey
- ✓ Convenience
- ✓ Comfort
- ✓ Frequent service
- ✓ Safety
- ✓ Security
- ✓ Customer service
- ✓ Low cost
- ✓Have a network

Supporting SHIFT: Transport Demand Management package

Transport demand management measures (including fiscal policies)

- Land use development controls
- Public transport integration
- Parking controls and management
- Regulatory controls such as odd/even systems
- Physical measures such as bus and pedestrian priority
- Pricing & charges through fuels, annual taxes
- Congestion charging

Fiscal policies cannot be implemented as isolated instruments, but – for being successful – have always to be embedded in a comprehensive framework of Transport Demand Management measures.

Car use and fuel prices

The prices changes 2004-2006 brought the US and Canada up to Germany's cost per year, and to Japan's cost per trip

	LDV stock average economy, L/100km	Average travel, vkt / year	Avg. fuel use per year, litres	Taxed gasoline Price / litre, Aug 2006	Avg. fuel cost per year	Avg. fuel cost for a 10km trip
USA	12.0	17,000	2,040	$0.79	$1,614	$0.95
Canada	10.5	16,000	1,680	$0.98	$1,642	$1.03
Germany	8.0	12,000	960	$1.70	$1,634	$1.36
Japan	7.8	10,000	780	$1.24	$969	$0.97

Note: this chart does not reflect likely changes to average fuel economy or travel. It holds these at 2004 levels for comparative purposes.

Source: Lew Fulton, Market Perturbations in the Fossil Fuel Marketplace: Global Perspective

Urban Transport Integration – next Challenge

The reality in most Asian cities:

- **Public transport is underdeveloped, not attractive enough for customers (often 2-4 tickets are required to get to work per direction)**
- **There exist often stand alone systems (Bangkok, Manila, Kuala Lumpur….) without proper physical-, time table- and fare-integration**
- **Fares are collected at vehicles (causing slower services)**
- **Urban transport responsibilities are often fragmented between various ministries, provincial and municipal level**

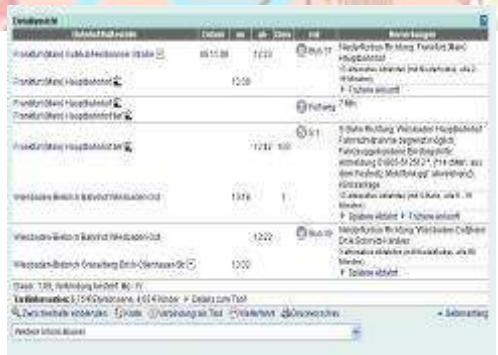
Outlook:

Public transport integration is the challenge during coming years to considerably increase attractiveness of PT!

Fare Integration

How to do...An example:

+



1 fare / 1 ticket

6.75 Euro

Integrated timetable

Advantages of an integrated association

Advantages for the customers

- **free choice of PT mode *(e.g. bus , tram, regional rail)***
- **„one tariff - one ticket“**
- **coordinated timetables *(best connections)***
- **improvement of quality**

Advantages for the association

- synergy effects for marketing, customer information etc.
- unification of distribution *(e.g. ticketing)*
- simple tariff system for all public transport systems
- consistent market presence
- higher demand on public transport

Experience of German transit associations for nearly 40 years (since 1967)

- *increasing demand and increasing fare income*

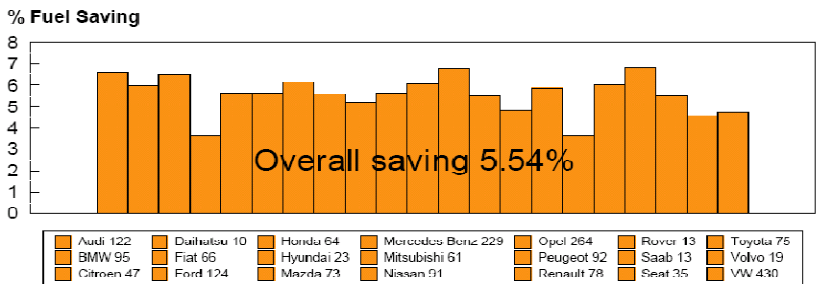
* Adapted from TraffiQ

Example IMPROVE: Low-cost improvements with high impact

- **Tire pressure:**
  - 0.2 bar under-inflated: 1 % increase in fuel consumption
  - 0.4 bar under-inflated: 2 % increase in fuel consumption
  - 0.6 bar under-inflated: 4 % increase in fuel consumption

  Estimation: if all tires had the correct pressure, potential fuel saving in the EU would be 700 million litres of fuel

- **Low friction lubrication oil:**
  - Potential saving: 5 %



- **Eco-Driving:**
  - Early gear change, traffic anticipation, less cold-start short trips, …
  - Potential fuel saving: 5 - 10 %, sometimes even 25 %

Efficiency

engine stop at idling

gearbox with long transmission

gearshift indicator

Light weight seats

Latent- heat storage

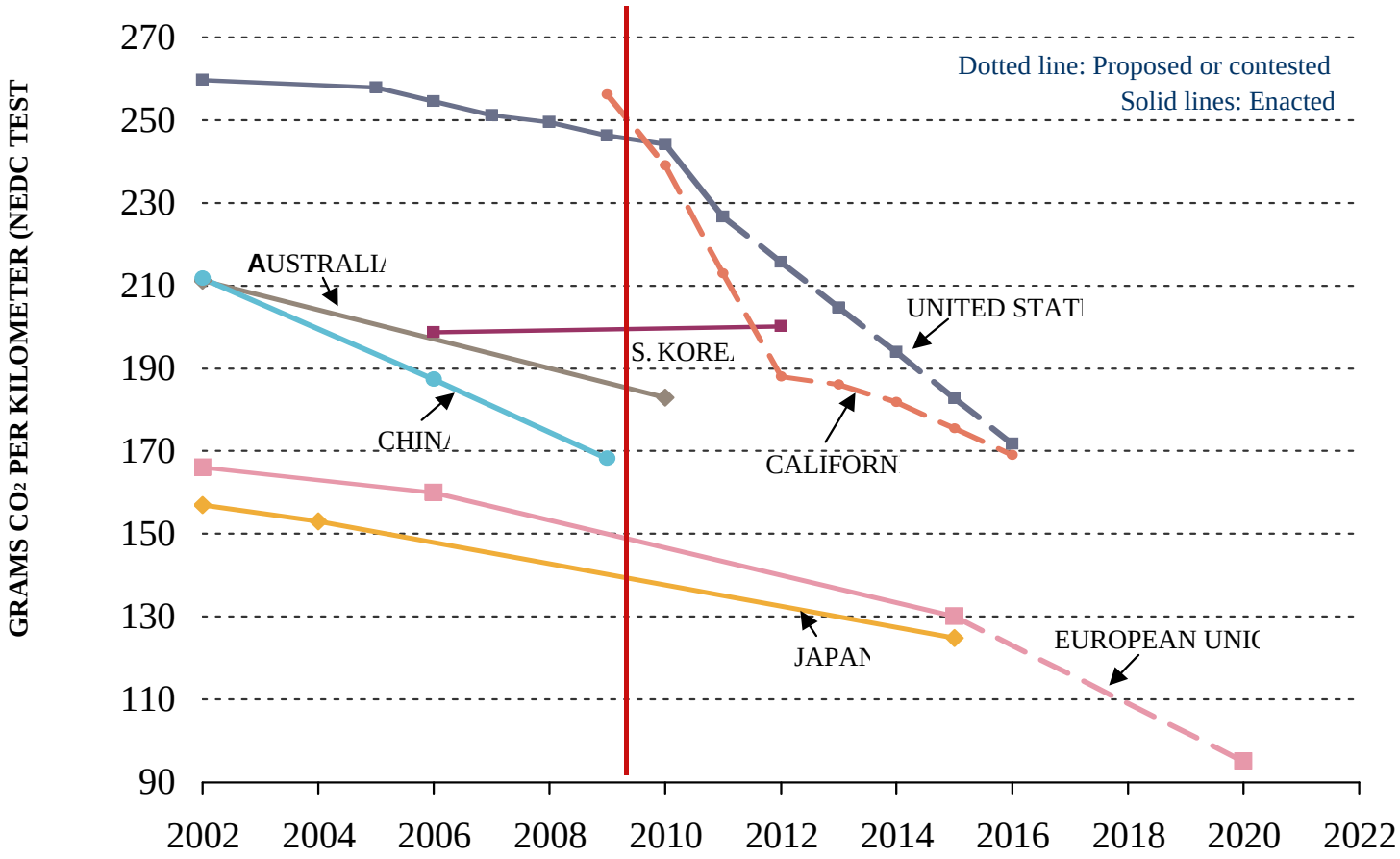
smoth under flow

lower body

smoth covers

narrower low rolling resistance tires

Actual and Projected GHG Emissions for New Passenger Vehicles by Country/Region, 2002-2020



Source: *Passenger Vehicle Greenhouse Gas and Fuel Economy Standards: A Global Update,* ICCT. May 2009 update.

Sustainable solutions

- ✓ Bogotá
- ✓ Curitiba
- ✓ Copenhagen
- ✓ Freiburg
- ✓ Portland
- ✓ Seoul
- ✓ Singapore
- ✓ Hongkong

All of these successes featured an integrated and packaged approach:

1. High-quality public transport
2. Improved conditions for walking and bicycling
3. Effective integration of modes
4. Supportive land-use policies
5. Car-restriction measures

Focus: Sustainable Urban Transport

GTZ SUTP …

Successful Project Implementation

Sustainable Capacity Development

International Networking & Dissemination

…offers expertise and support to municipalities to develop and implement urban transport development plans

…supports policy dialogues that include all relevant stakeholders

…helps municipalities in designing and implementing traffic management policies and measures

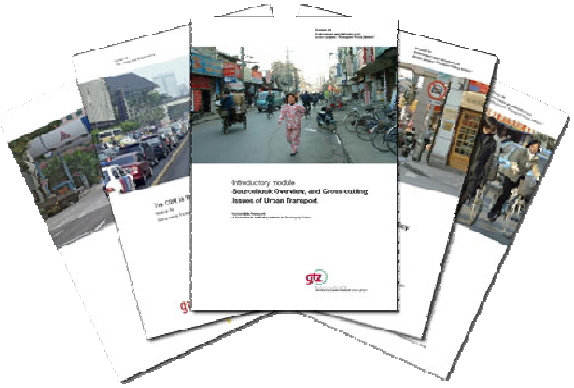
…supports public transport operators and associations in improving management and operation capacities

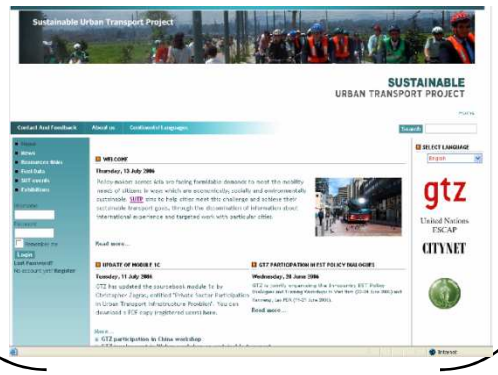
…designs and initiates train-the-trainer approaches for urban transport institutions,

…and provides guidance and expertise for the restructuring of urban transport services

Key activities of SUTP project –www.sutp.org

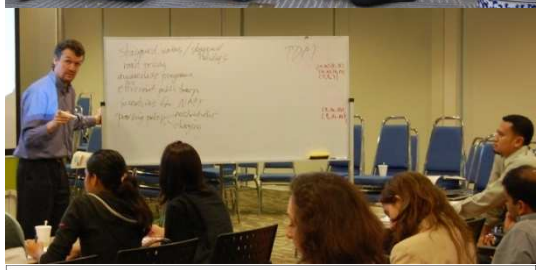
Developing and Disseminating Resources





- Increasing **capacity** of municipal staff

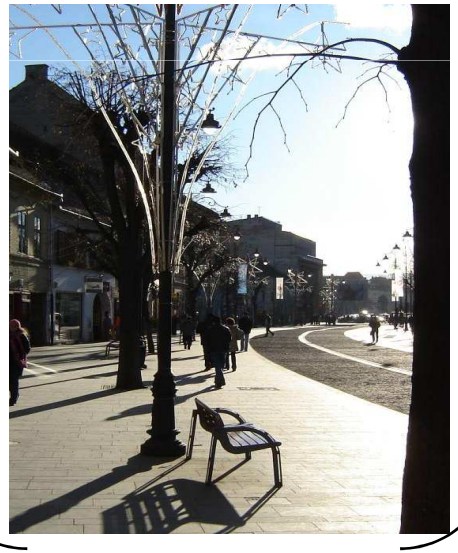
Sharing Experiences and Best Practices



- Changes in urban transport **policy**

Implementing Projects

•World Cup 2010: Bus Rapid Transit System Johannesburg
• Improvement of Transport Conditions in Sibiu / Romania
•Sustainable Urban Transport Improvement Project, Indonesia



- Development of sustainability oriented **projects**

Sustainable Capacity Development

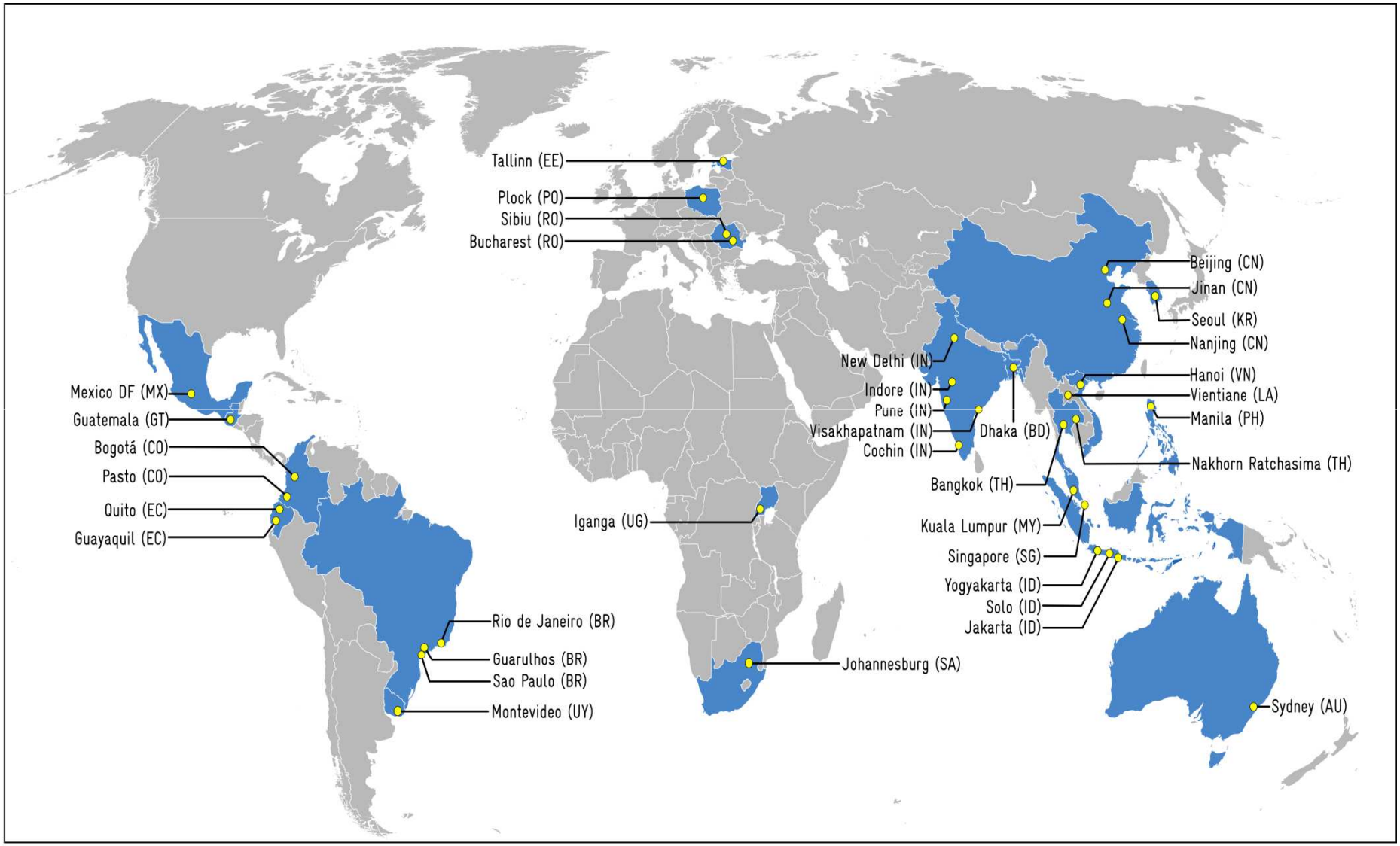
Based on extensive experience on training and large-scale projects in developing cities, GTZ has developed a scheme where peer-to-peer training, direct assessment, site visits, related supporting documentation and professional campaigning and close follow-up are key aspects to capacity building and increased public and political awareness.

Fully Developed Training Courses (at present):

- Sustainable Urban Transport (Overview)
- Bus Rapid Transit
- Non-motorized Transport
- Bus Planning and Regulation
- Public Awareness
- Transport Demand Management

Target Groups: Policymakers, Planners & Engineers and Academia

Sustainable Capacity Development



Training courses conducted by GTZ-SUTP until May 2009

Training Courses on Urban Transport in China

- Beijing (November 2006, November 2007)
- Nanjing (April 2007)
- Jinan, on Bus Rapid Transit (April 2008)
- Each course 40-60 participants
- In cooperation with Tsinghua University, Southeast University, Shandong University
- International and Chinese recognised experts and scholars as trainers

Training with Chinese mayors, 2006 and 2007

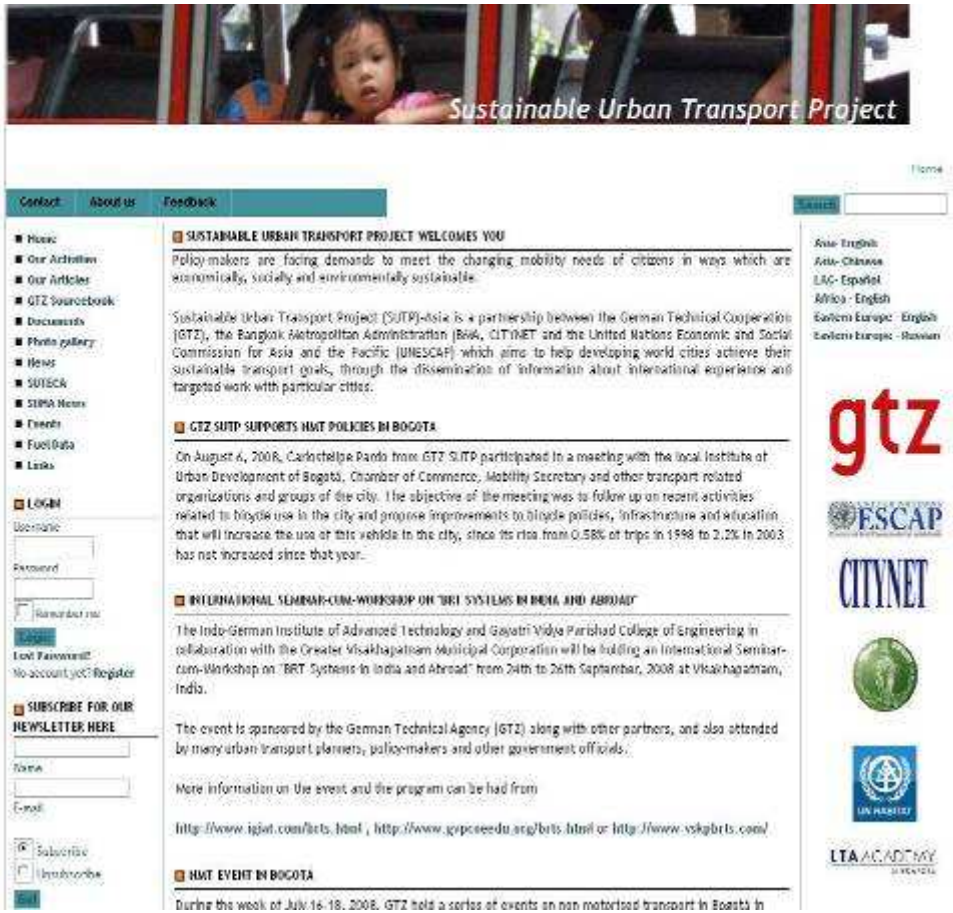
- Half day courses in November 2006, April 2007, November 2007
- Participating mayors from all over China
- In coordination with National Training Center for Mayors of China (NTCM)

International Networking & Dissemination

→ The Sustainable Urban Transport webpage (www.sutp.org) is an internationally recognized source for information and networking on sustainable transport.

→ Monthly, over 15,000 users are visting the page, to retrieve information and to stay updated with international trends in sustainable development.

→ A bi-monthly newsletter shares updates on past and upcoming events, new publications, latest research and background information

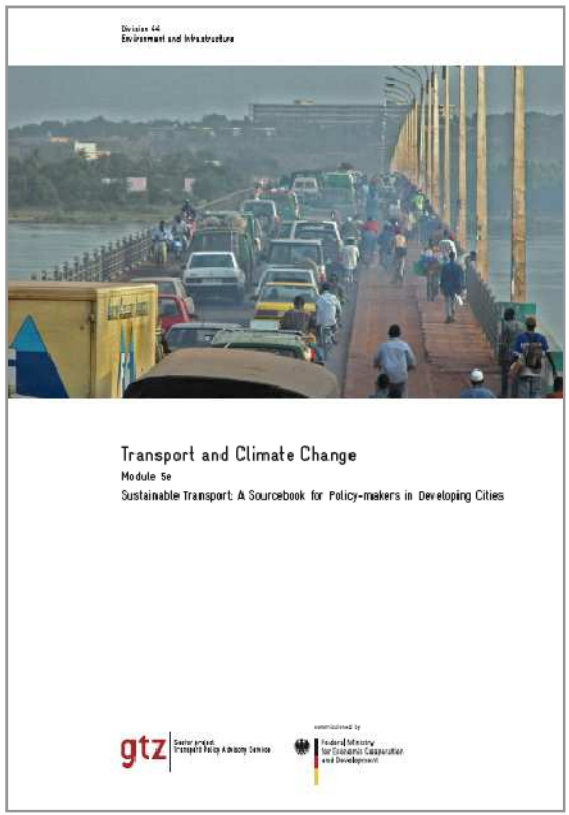


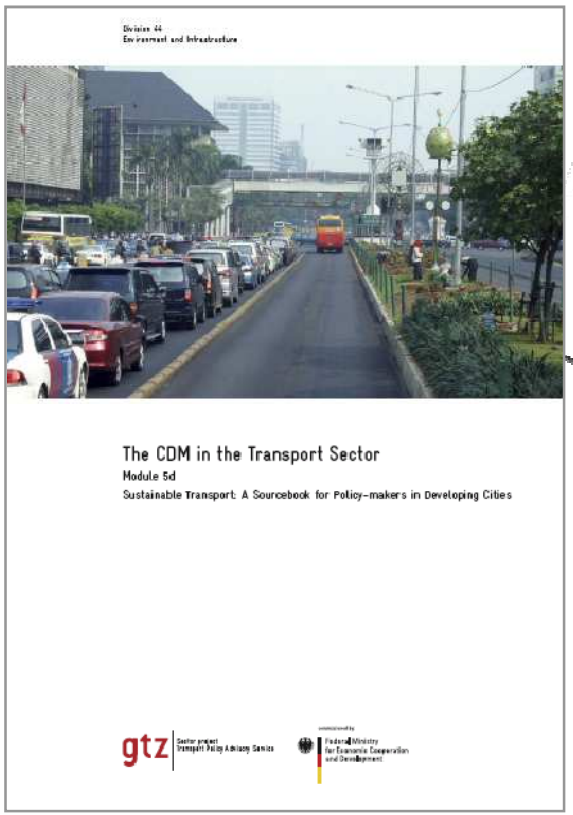
For Chinese users: www.sutp.cn

For more information and documents

www.sutp.org, www.sutp.cn

www.sutp.org/bridging_the_gap/





Material on Sustainable Urban Transport

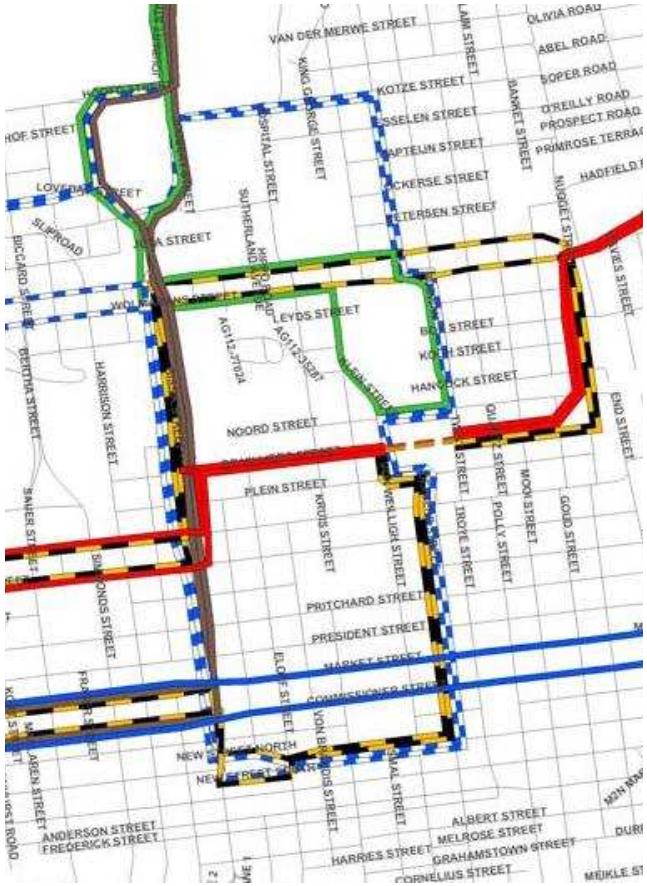
- Sourcebook **(at present 26 modules)**
  - print
  - online version
  - PDF
  - HTML format
  - PowerPoint presentations
- Training material
  - print
  - online version
  - PDF and partially HTML
  - PowerPoint presentations
- Online training courses material
- Photo CDs/DVD
- Videos

Publication on Cycling-inclusive Policy Development: A Handbook

- Developed by GTZ, I-Ce
- Written by 12 authors
- Information on
  - Developing cycling-friendly infrastructure policies
- For policy makers planners, engineers, community leaders

Examples for successful Project Implementation

- **World Cup 2010: Bus Rapid Transit System Johannesburg**
  - GTZ International Services supports the City of Johannesburg with the implementation of the Rea Vaya Bus Rapid Transit System – which is due to be operational prior to the Confederation Cup 2009 (Confed 2009) and the FIFA Soccer Wold Cup 2010 (World Cup 2010).
    - Implementation of defined work packages including Financial Modelling, Operation Design, Operators Business Plan, Fleet specification, Infrastructure Planning, Transport Operators liaison, Marketing and Communication and others
    - Provision of international experts in the field of public transport and more especially BRT, who bring hands on experience with the design and implementation of BRT systems and are capable to provide tailored solutions to the specific context of South Africa. As well assignment of project manager.
  - Duration: 2008 - ongoing
  - Client: City of Johannesburg



Examples for successful Project Implementation

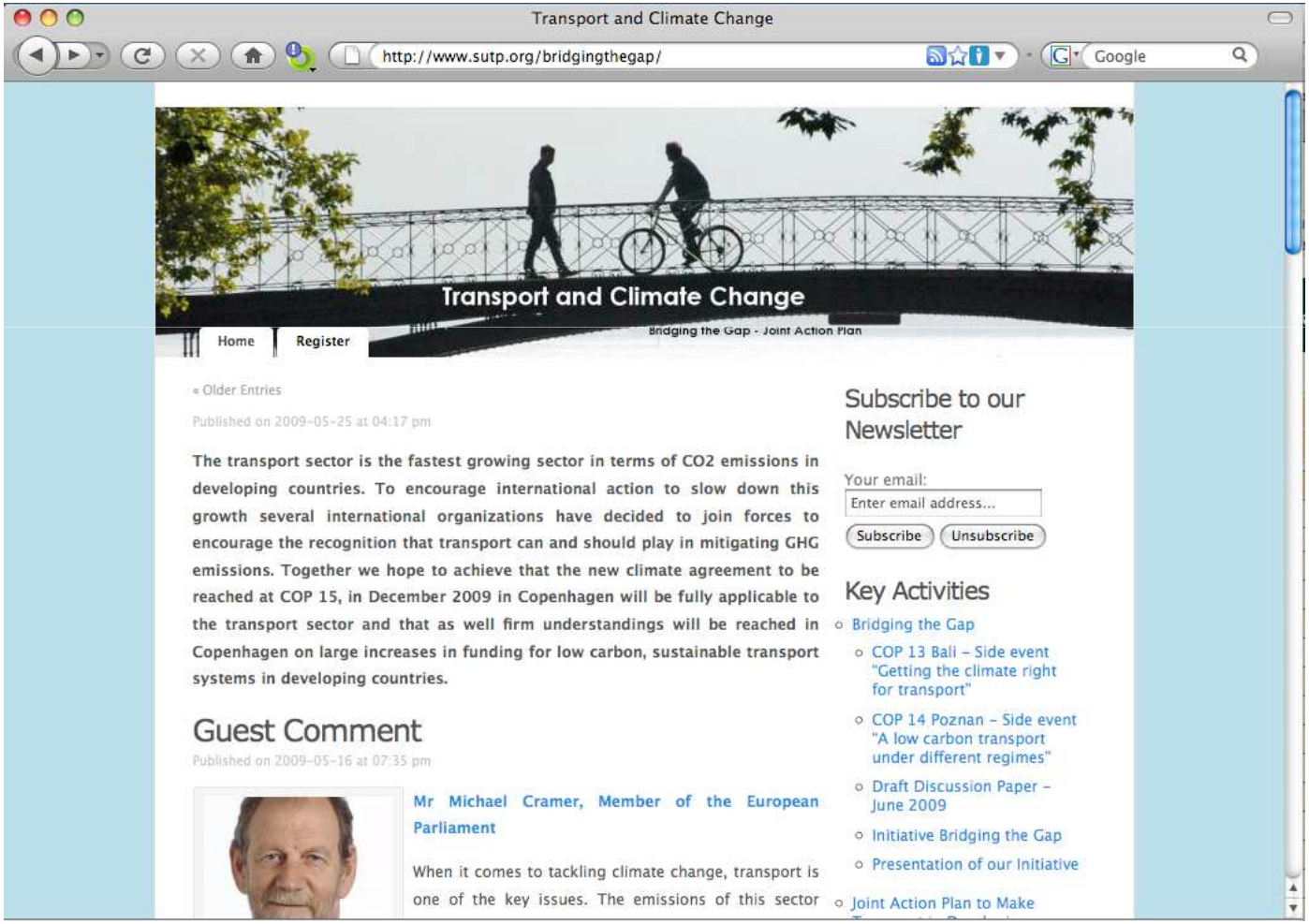
- **Improvement of Transport Conditions in Sibiu / Romania**
  - Assistance to the Municipality of Sibiu in the development of modern planning techniques for the urban transport sector:
    - Identification of weak points in the current transport system, (e.g. unattractive public transport)
    - Identification of future needs and foreseeable criticle developments (e.g. serious bottlenecks and conflicts with road transport specifically in the historical centre)
    - Elaboration of a comprehensive and sound database
    - Development of strategies and action plans, including initiate changes (e.g. traffic calming, pedestrian areas, and parking management in the historical centre)
    - Assistance in the implementation of strategies
    - Introduction of comprehensive planning systems and procedures that also take care for citizens' partizipation
    - Capacity building by training of local staff
  - Duration: 2003 - 2006
  - Client: BMZ- Federal Ministry for Economic Cooperation and Development

SUT Indonesia Project Approach (SUTIP)

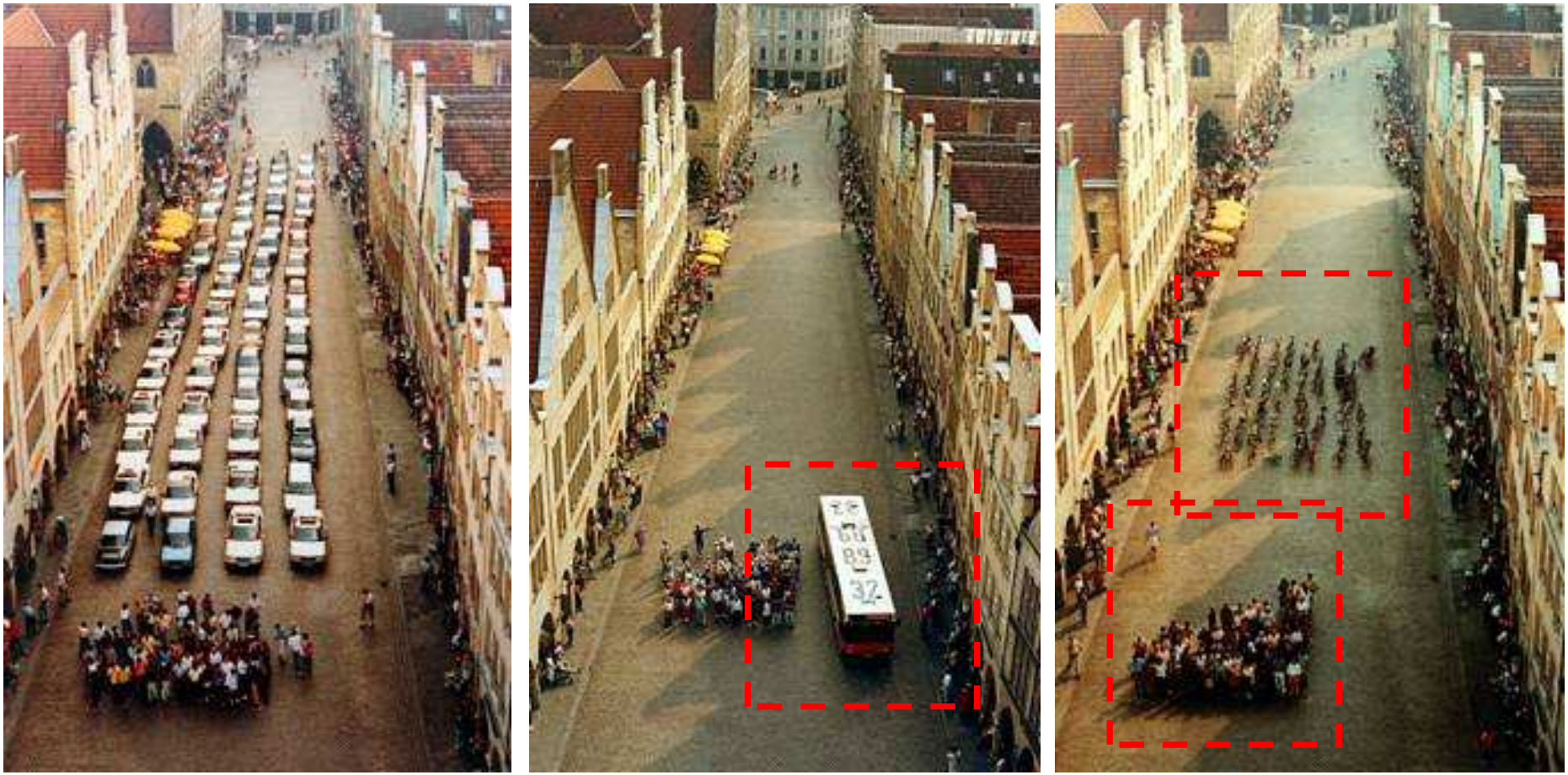
towards the Implementation of Sustainable Urban Transport in selected Indonesian Cities:

- Component I: Support for the **Ministry of Transportation**
  - » Development of National Urban Transport Policies, Standards and Regulatory Framework
- Component II: Direct support to **selected City Government**
  - » Strengthening Institutional Capacities in Transportation Planning and Transport-related Governance
  - » Support in Implementing measures which contribute to more sustainable urban transport systems

http://www.sutp.org/bridging_the_gap



Our Objective/ Our Future



Source: City of Münster