



WORLD  
RESOURCES  
INSTITUTE

THE WRI CENTER FOR TRANSPORT AND THE ENVIRONMENT



# *Seeking a Crystal Ball: Future Automobility, Fuel Use and CO<sub>2</sub> Emissions in China*

Lee Schipper, Ph.D.  
Wei-Shiuen Ng  
*EMBARQ*  
Washington DC  
November 15, 2005

EMBARQ  
JITI  
5 Nov 05





# EMBARQ

---

- A catalyst for socially, financially, and environmentally sound solutions to the problems of urban mobility
- Created in 2002, by the Shell Foundation, at the World Resources Institute, Washington DC
- Work with politically and financially empowered authorities, forming public private partnership and direct engagement with cities.





# EMBARQ Project Locations

---



- Mexico City, Mexico
- Queretaro, Mexico
- Leon de Guanajuato, Mexico
- Lima, Peru
- Sao Paulo, Brazil
- Porto Alegre, Brazil
- Shanghai, China
- Xi'an, China
- Pune, India
- Hanoi, Vietnam
- Istanbul, Turkey



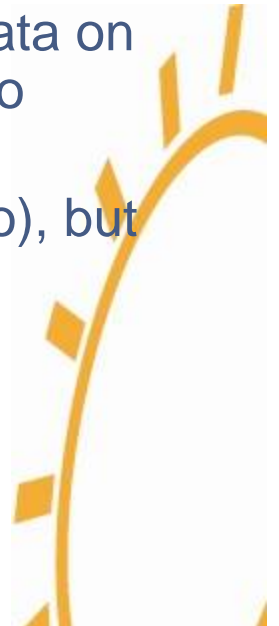


# The Kyoto University Report

## *EMBARQ's* Response

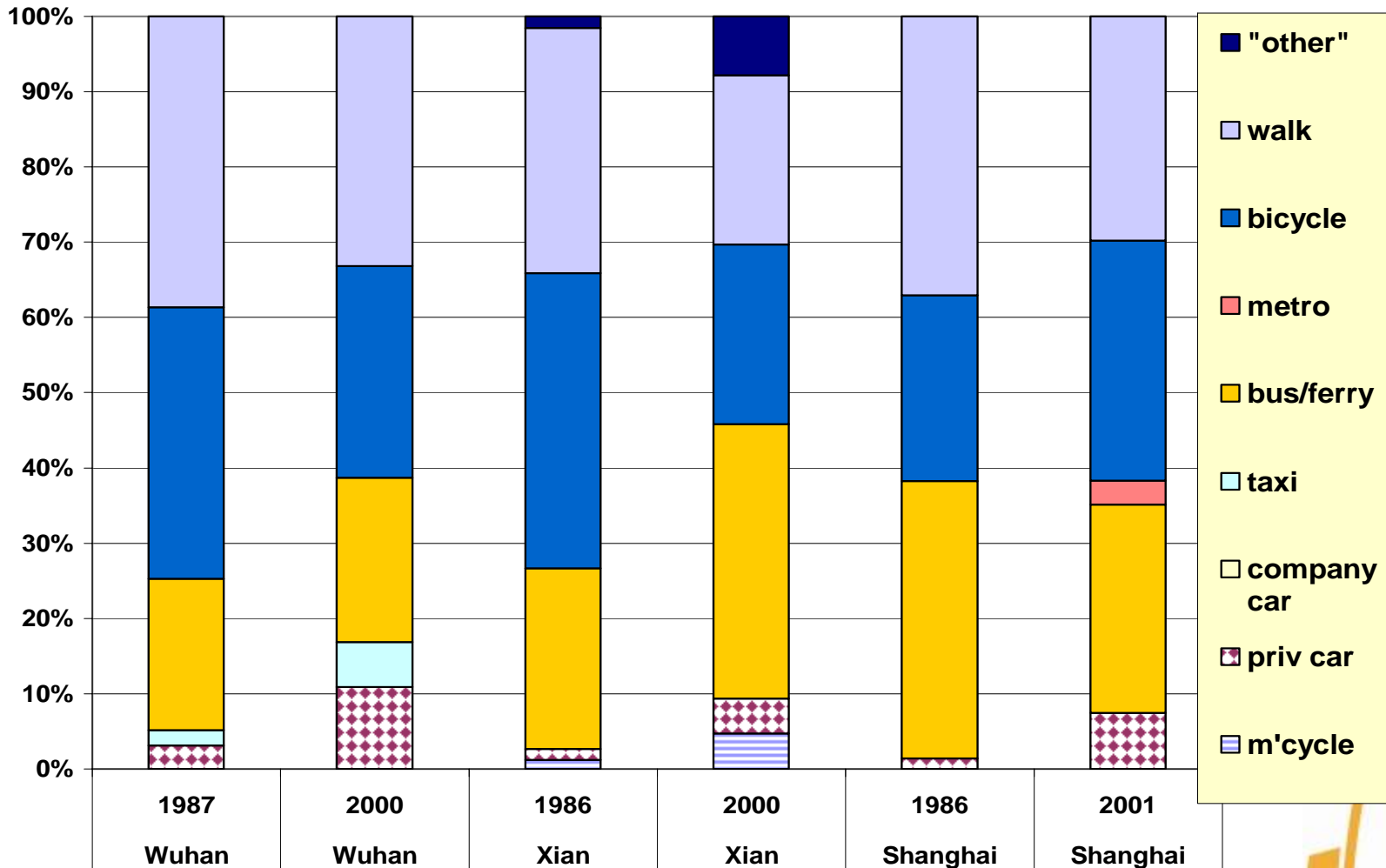
---

- **Data**
  - Key parameters simply unknown – total vehicle use, total passenger and tonne-km
  - Fuel use and intensity by vehicle type, fuel not well described
  - Our alternative: Make reasonable assumptions using attainable data
- **Approach**
  - Econometric approach not possible – no historical data on price responses or consumer demand behavior etc to estimate
  - Japan-Korea analogies good idea (we used them too), but Japanese fuel/km not applicable
  - Need to assume each fuel and vehicle type coupled
- **Results**
  - Hard to judge without bottom-up details





# ACCESS AND CONGESTION: People in China Move (12-14) Km/day





# Cars and Urban Transport in China: Concern before conflicts?

- **Congestion: Cars and Other Traffic**
  - Buses and people stuck in traffic
  - Building more roads makes problem worse
  - Tough policies called for – by whom?
- **Air Pollution: Too Many Vehicles**
  - Enough old smokers to ruin air
  - New fuels, vehicles improving
  - Emissions from cars could offset improvements
- **Traffic Safety: People First**
  - Walkers, cyclists main victims
  - Too many kinds of traffic in same place
  - More cars and speed will kill more people





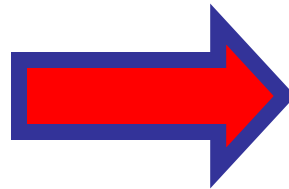
# Rapid Motorization in China

[http://Inweb18.worldbank.org/eap/eap.nsf/Attachments/background+2/\\$File/China\\_Motorization.pdf](http://Inweb18.worldbank.org/eap/eap.nsf/Attachments/background+2/$File/China_Motorization.pdf)

- **The Growth of the Automobile Industry**
  - Pillar of national economy
  - Popularity – increase in demand and foreign investment
  - Low cost and high cost models, imports
- **Historic Trends and Future Projections**
  - Automobile production from 509,000 in 1990 to 4.4 million in 2004
  - China's "car" stock from well under million in 1992 to 12 million in 2003
  - Increasing contributor to air pollution, congestion, traffic fatalities
- **New Reality**
  - New "Car" Fuel Economy Standards ~ 30 MPG (US effectively 24 MPG)
  - Emission and fuel quality standards catching up to US, Europe



1970s rural vehicle



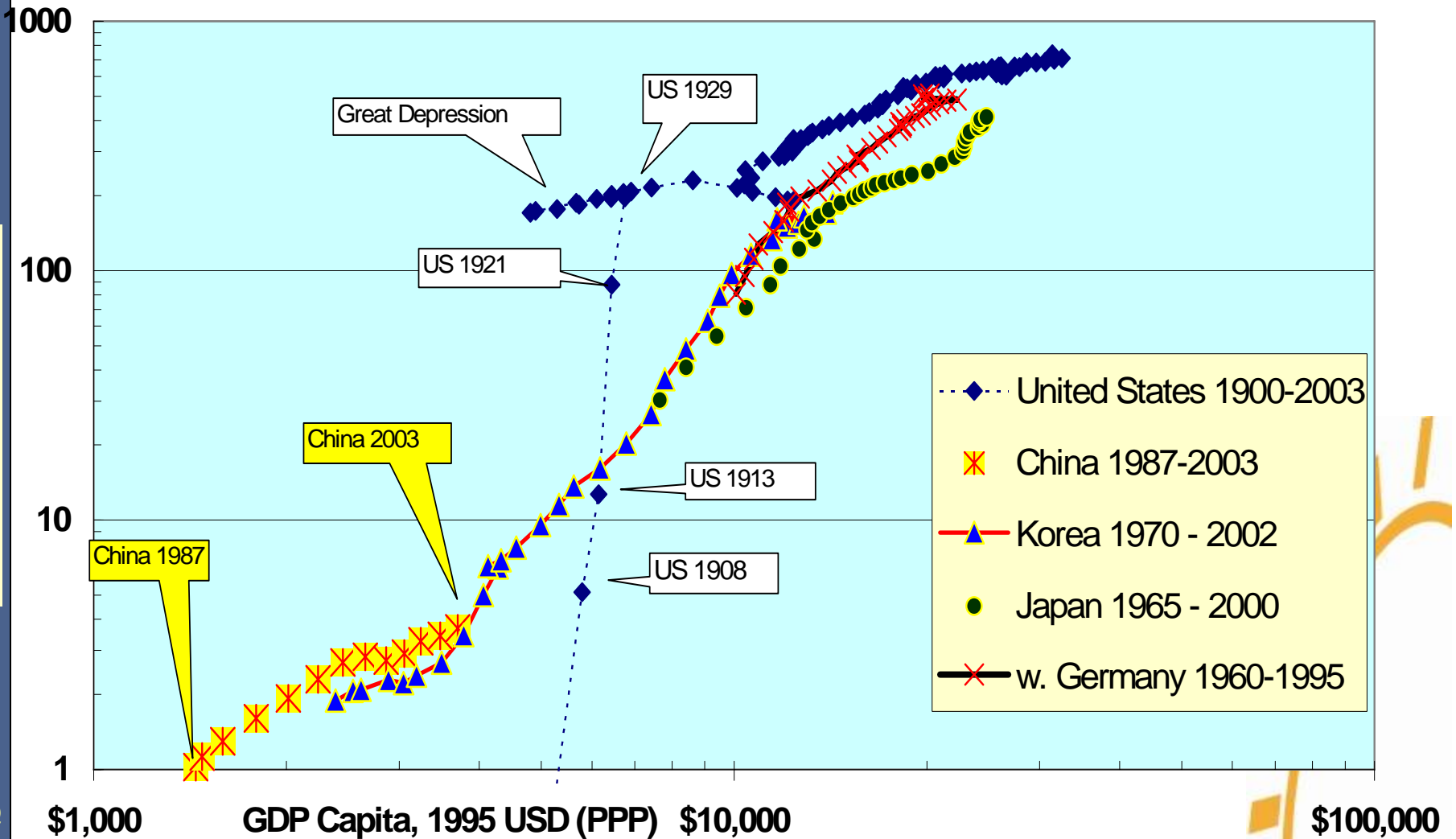
2002 Buick Van





# China's Car Ownership per person today = USA in 1913: Is China On a Collision Course with Itself?

Cars, SUVs/ 1000 people





# EMBARQ's Scenarios for COP-11

## "For all the cars in China"

### Base Case – China has Korean car/GDP ratio in 2020

- 120-160 mn cars, 10 000-12 000 km/car
- 8-8.5 l/100 km if no new measures (avg. new car 1500 kg!)
- Closer to 3 mn bbl/day oil in 2020



### Oil Saving Scenario – 40% as much oil, some CNG

- 110-130 mn cars
- Take into account fuel economy standards, some hybrids and CNG
- Lower driving/car

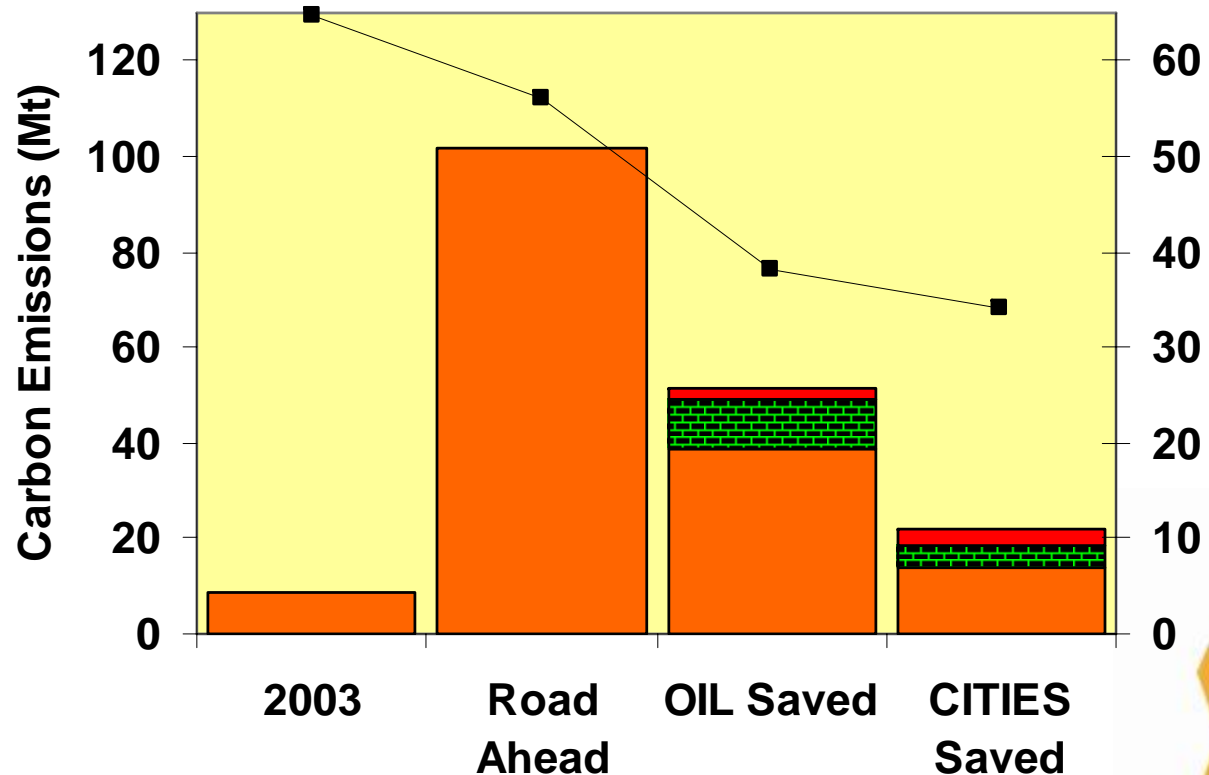
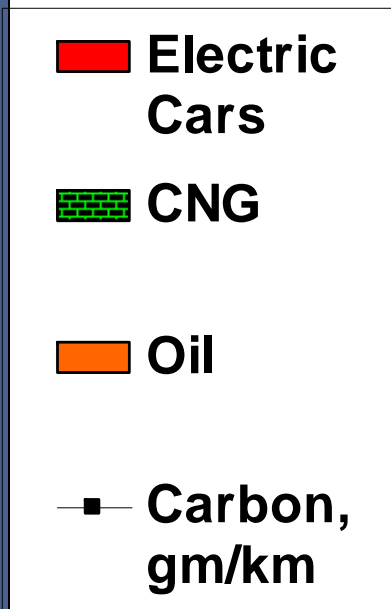
### Integrated Transport - Focus on livable cities with good transport

- Much lower car use (12,948km/car/year in 2010)– avoiding the plague
- Very small cars (incl. slow electrics, hybrids) to avoid the space and congestion in cities
- More energy efficient vehicles, hybrids, CNG, to avoid oil import and security risks





# The Sustainability Challenge: Cars and CO<sub>2</sub> Emissions in 2020

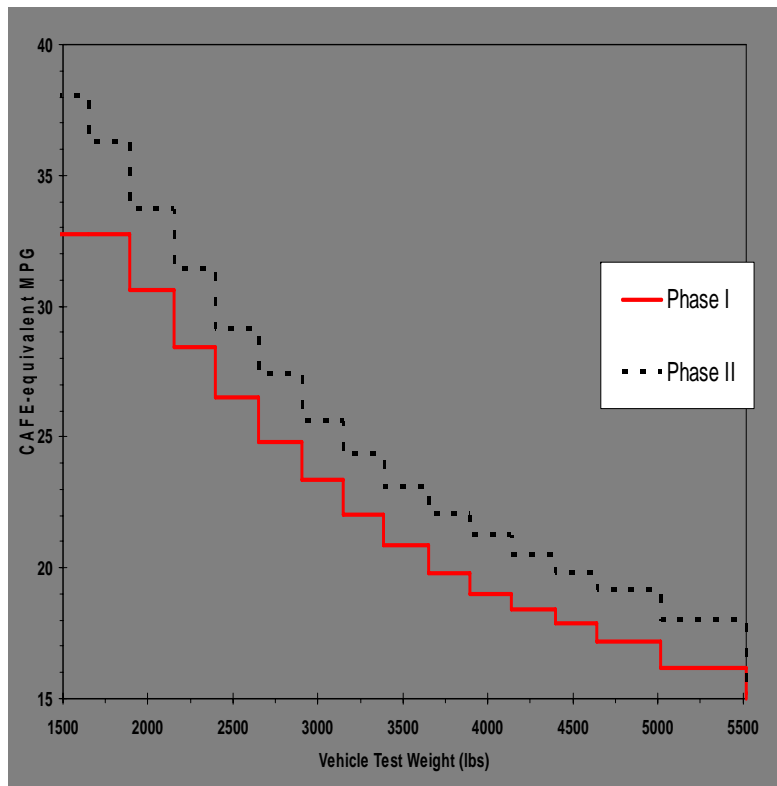


***“Cities Saved” has only 25% the Cars of Base line,  
50% the VKT/car as well***



# China's New-Car Fuel Economy Standards

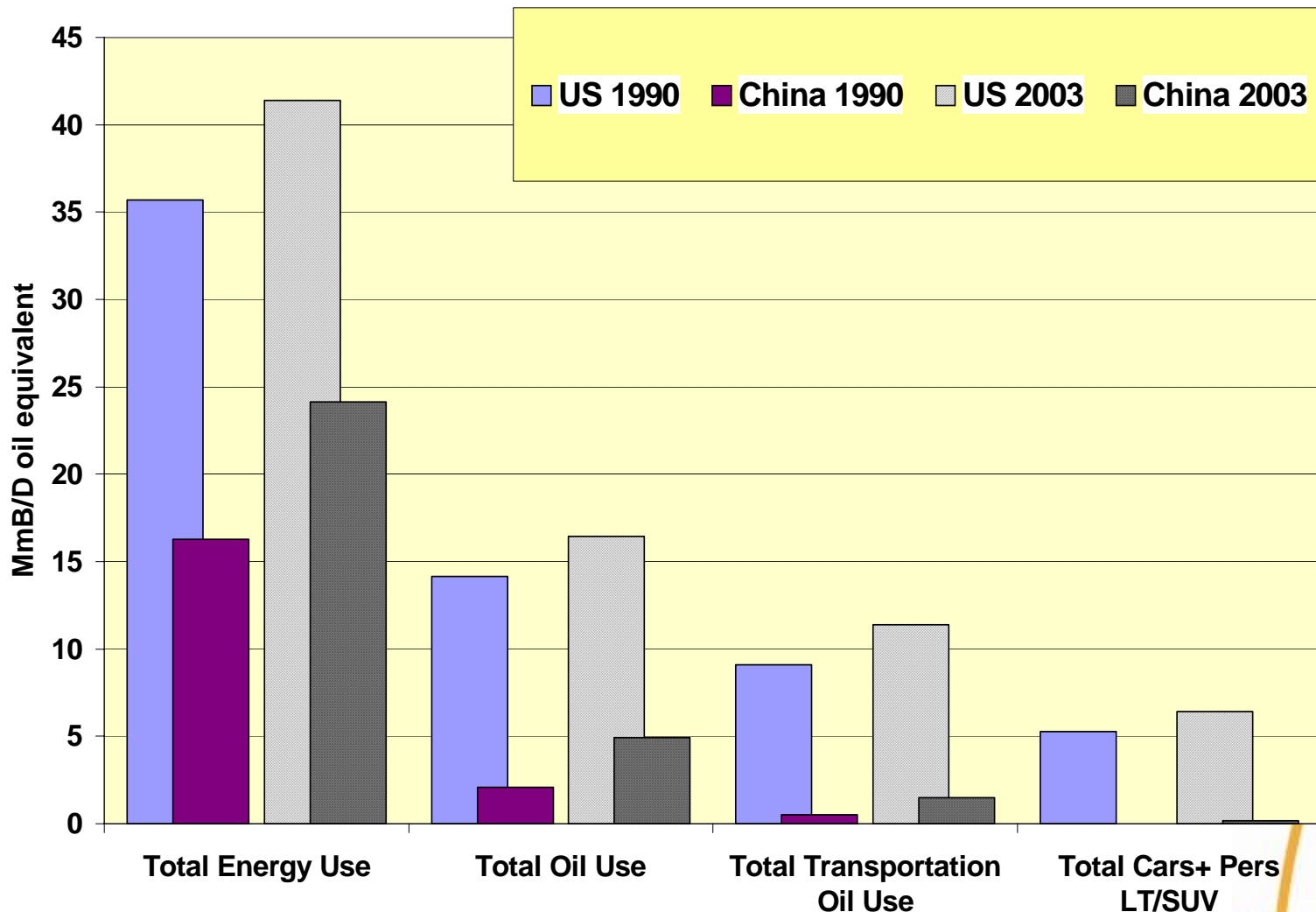
- **Weight-class based**
  - Car of given weight cannot use more than a given fuel use/km by tests
  - Will probably impact SUVs significantly
- **Overall Impact Uncertain**
  - 20-30% impact in each class
  - Will keep cars from becoming guzzlers
  - Will not prevent larger market shares of heavy, fuel intensive cars
- **Strong Message: Don't become another US!**





# FOR ALL THE CARS IN CHINA?

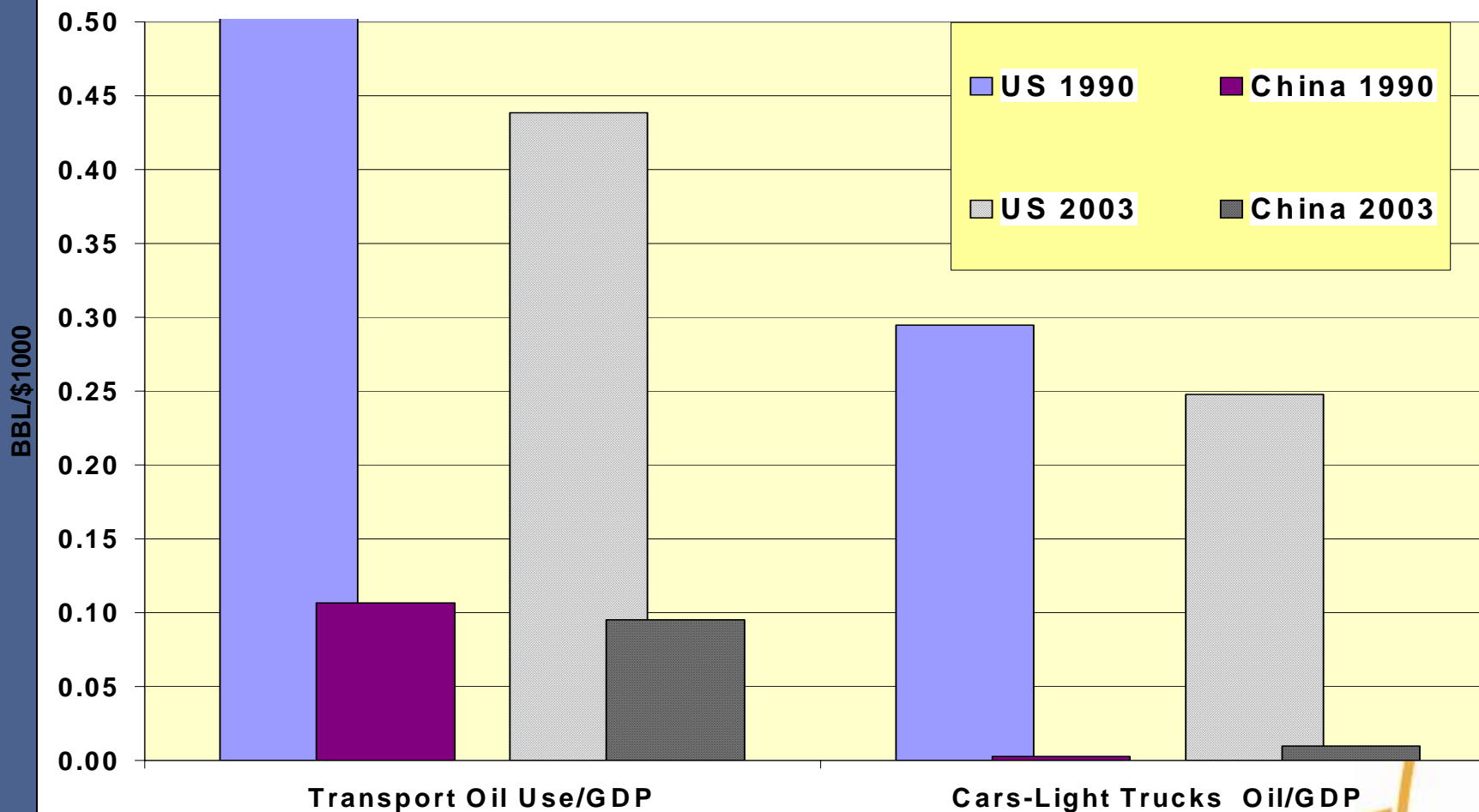
Growth in Car Use in China is Forcing up Oil Prices?



***The Approx U.S. increment 2002-2003 was half of the TOTAL China Use 2003***



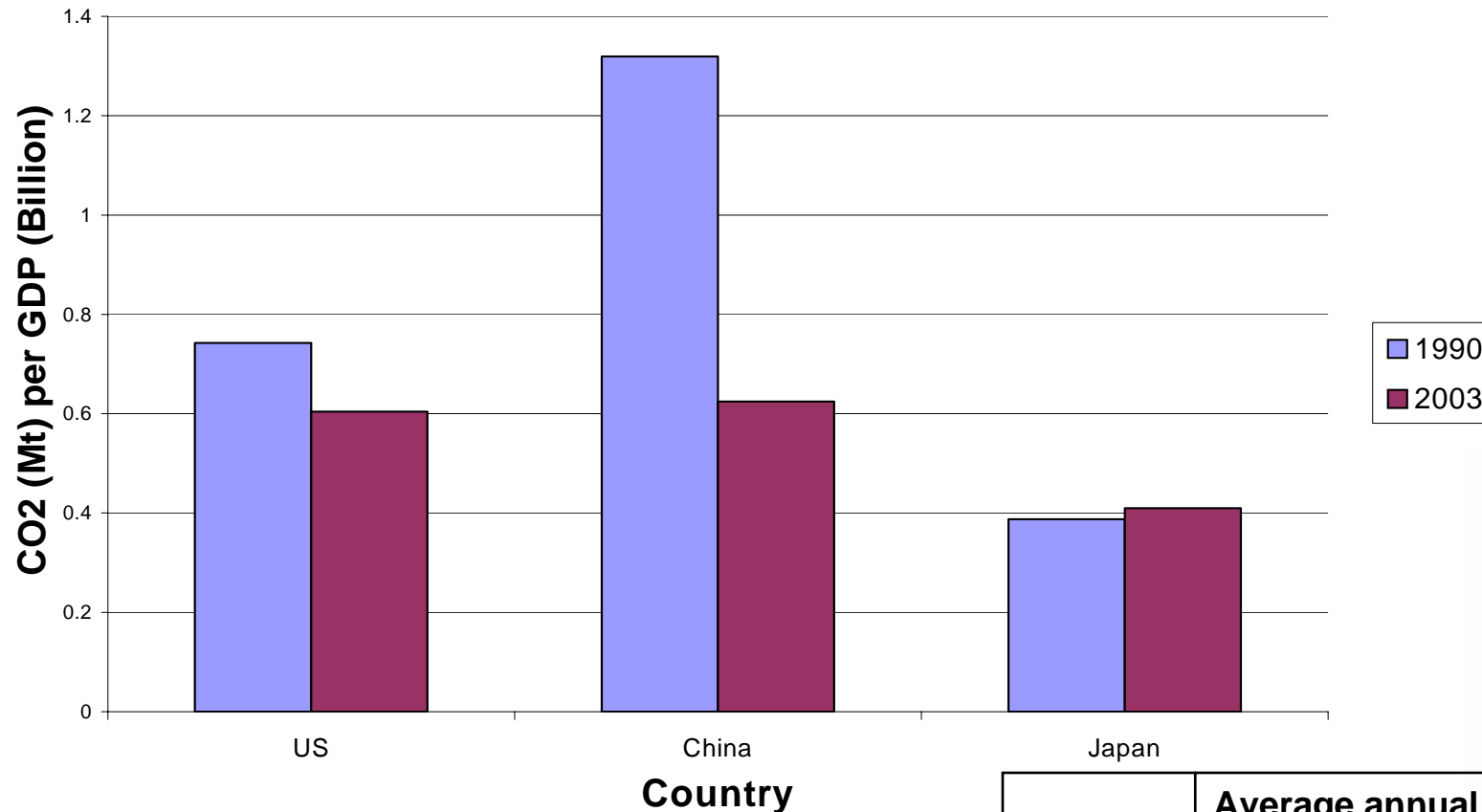
# OIL USE PER UNIT OF GDP FOR TRANSPORT, CARS/PERS LIGHT TRUCKS





# GROWTH IN CARBON EMISSIONS TRANSPORT AND OTHER GROWTH RATES

## CO2 Emissions Per GDP in 1990 and 2003



Country	Average annual rate of change (%) (1990-2003)
US	-1.60
China	-5.98
Japan	0.41



# Conclusions

---

## 1. Modelling China's future fuel use for transport

- Effort should expand, including working with Chinese experts to update and improve the approach of national data collection and increase THEIR interests
- Uncertainties can be modeled
- Results stimulate good discussion and trigger urgency of the problem

## 2. Regardless of modelling uncertainties, China has many options

- A more city friendly world will simply have fewer large cars
- A less car oriented future will have more sustainable cities
- Fuel economy technology will help, but the basic constraint is space (and speed)

## 3. Internationatinally, China is doing its part for oil and CO2

- China is beginning to raise oil product prices, fuel and vehicle taxes to encourage smaller and more energy efficient vehicles
- China is diversifying its oil supplies
- China now has a better fuel economy standard and CO2 "performance" than the US

***Washington spectators worried about China's oil demand, but should focus on US demand instead - that's where the real action is!***





WORLD  
RESOURCES  
INSTITUTE



THE WRI CENTER FOR TRANSPORT AND THE ENVIRONMENT

谢谢  
ありがとうございます  
(Arigatou gozaimasu)  
Thank you !

Wei-Shiuen Ng  
[wng@wri.org](mailto:wng@wri.org)  
Lee Schipper  
[schipper@wri.org](mailto:schipper@wri.org)

<http://embarq.wri.org/>

