

ENVIRONMENTAL IMPACTS OF MOBILITY EVOLUTION IN BRAZIL



Gabriel Murgel Branco
Fábio Cardinale Branco



Eduardo A. Vasconcellos



André Luis Ferreira



Deutsche Umwelthilfe

The International Council on Clean Transportation (ICCT)
The William and Flora Hewlett Foundation and
Deutsche Umwelthilfe e.V. (DUH)

Cordially invite you to the

Symposium on
**Future Challenges of Transport
and Environment**



June 24 and 25, 2008
Berlin
Presse- und Besucherzentrum

TRENDS ON TRANSPORTATION

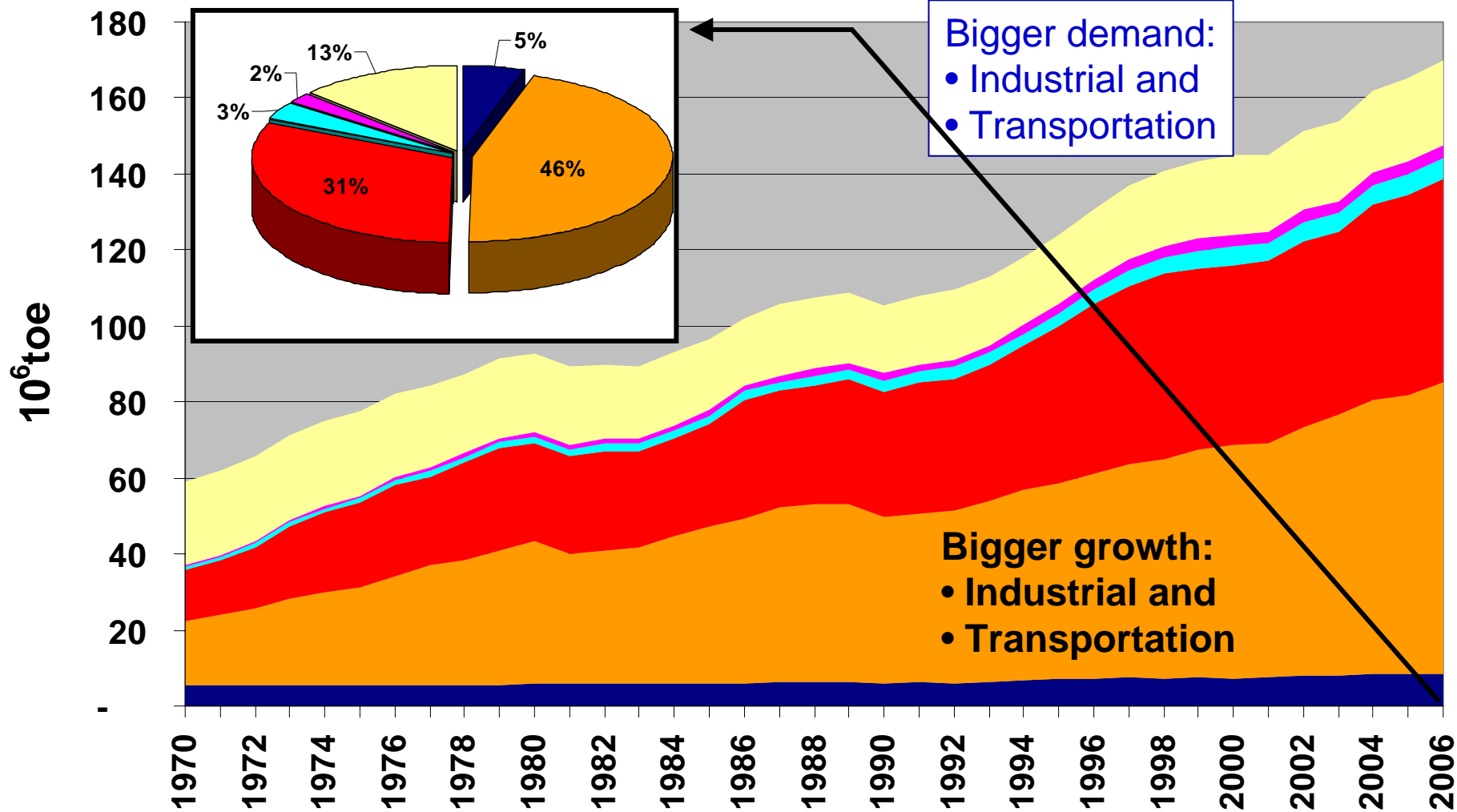
This presentation is a summary combination of studies from three different sources that proved to be consistent:

- trends of Brazilian Energy Balance;
- mobility trends in cities with more than 60, 100, 250, 500 and 1000 thousands inhabitants;
- mobile sources emission inventory – national trends from 1980 to 2030;

Its target is to show the emission and energy impacts from the urban transportation and a PRELIMINARY DIAGNOSTIC for possible public strategies to be developed towards the minimization of these impacts.

TOTAL ENERGY CONSUMPTION IN BRAZIL

Evolution of the sectorial energy consumption - Brazil



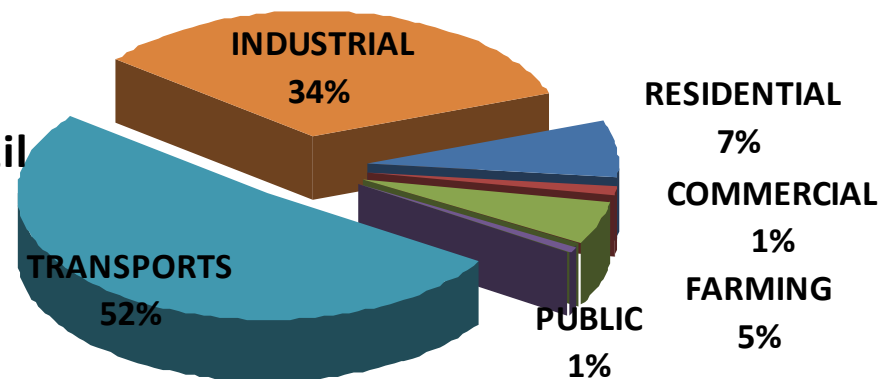
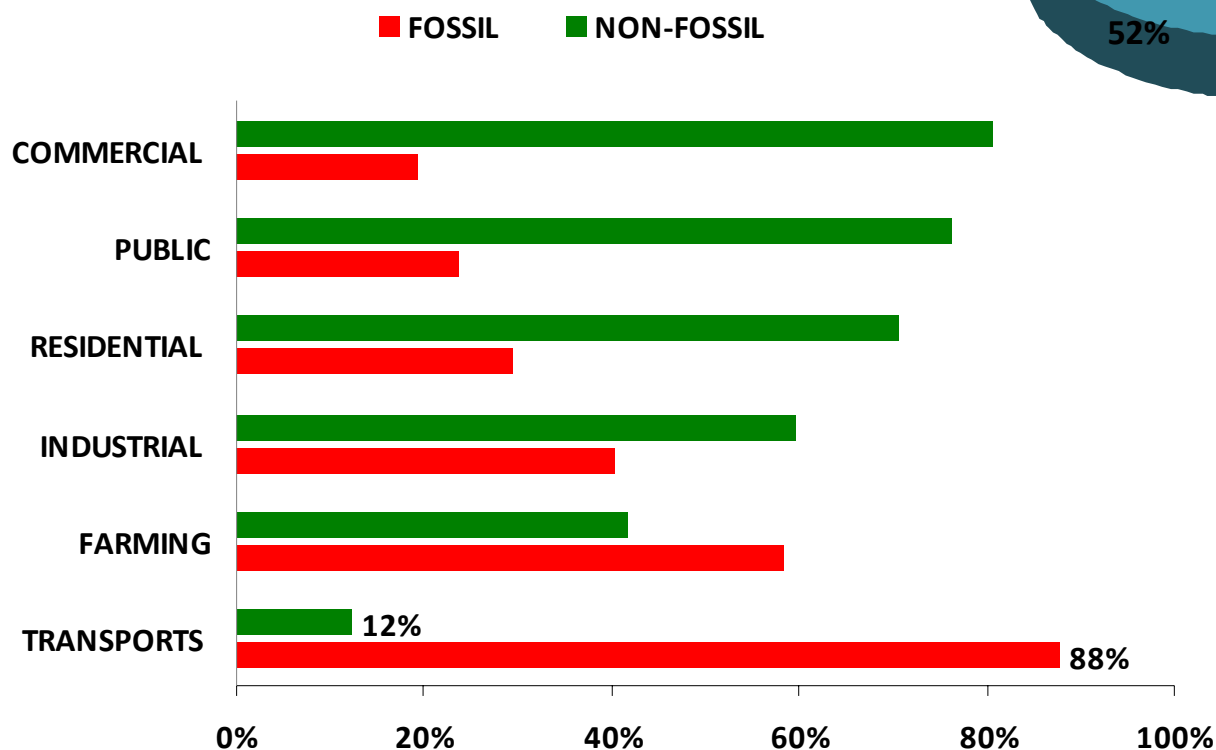
■ FARMING
 ■ INDUSTRIAL
 ■ TRANSPORTS
 ■ COMMERCIAL
 ■ OTHER
 ■ RESIDENTIAL

FOSSIL ENERGY SHARE (% TOE)

Sectorial participation in the fossil fuel consumption - 2006 (%)

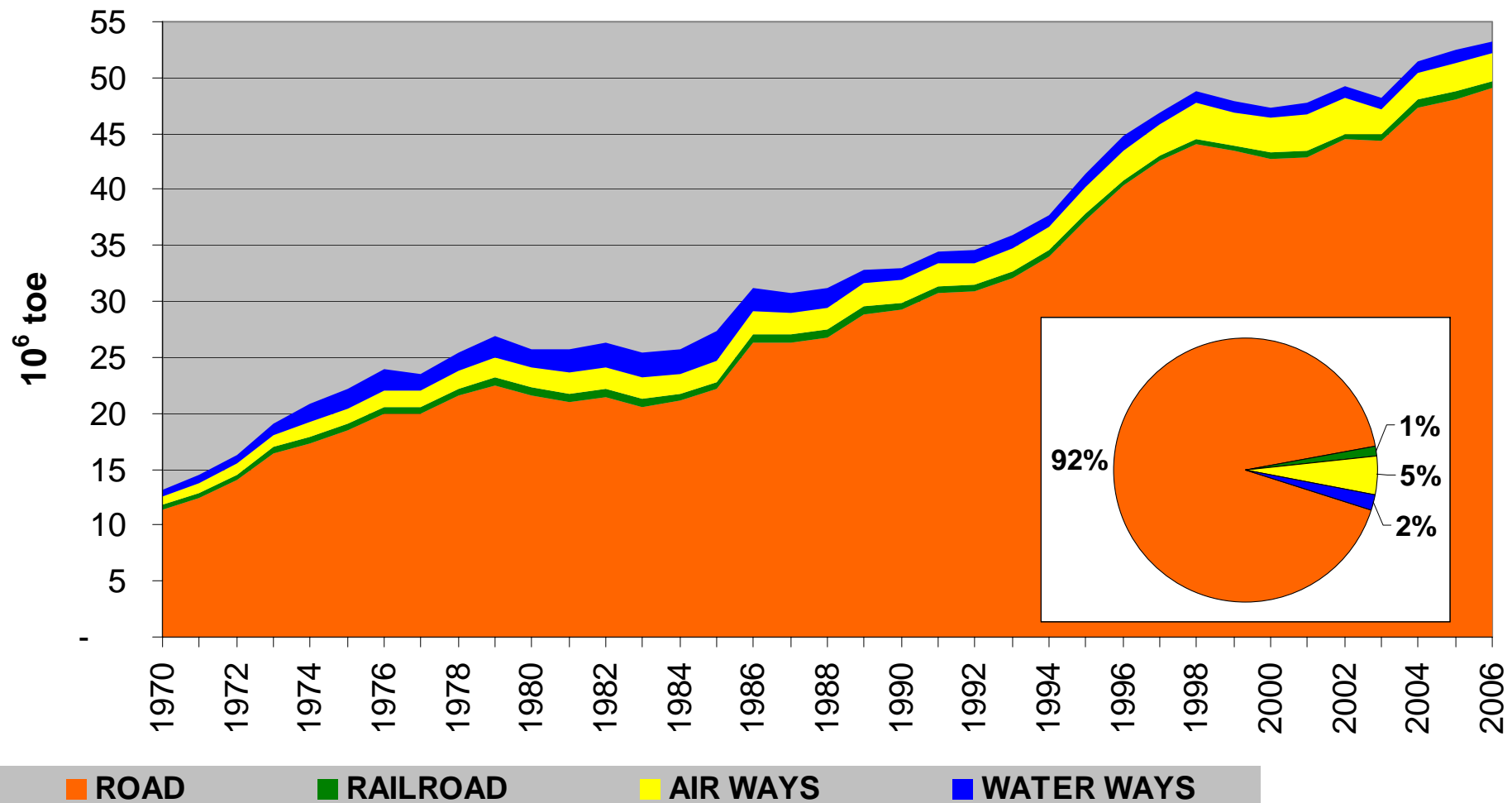
Diesel (fossil) is dominant in road transportation

Sectorial Dependence of Fossil Fuels, Brazil 2006 (%)

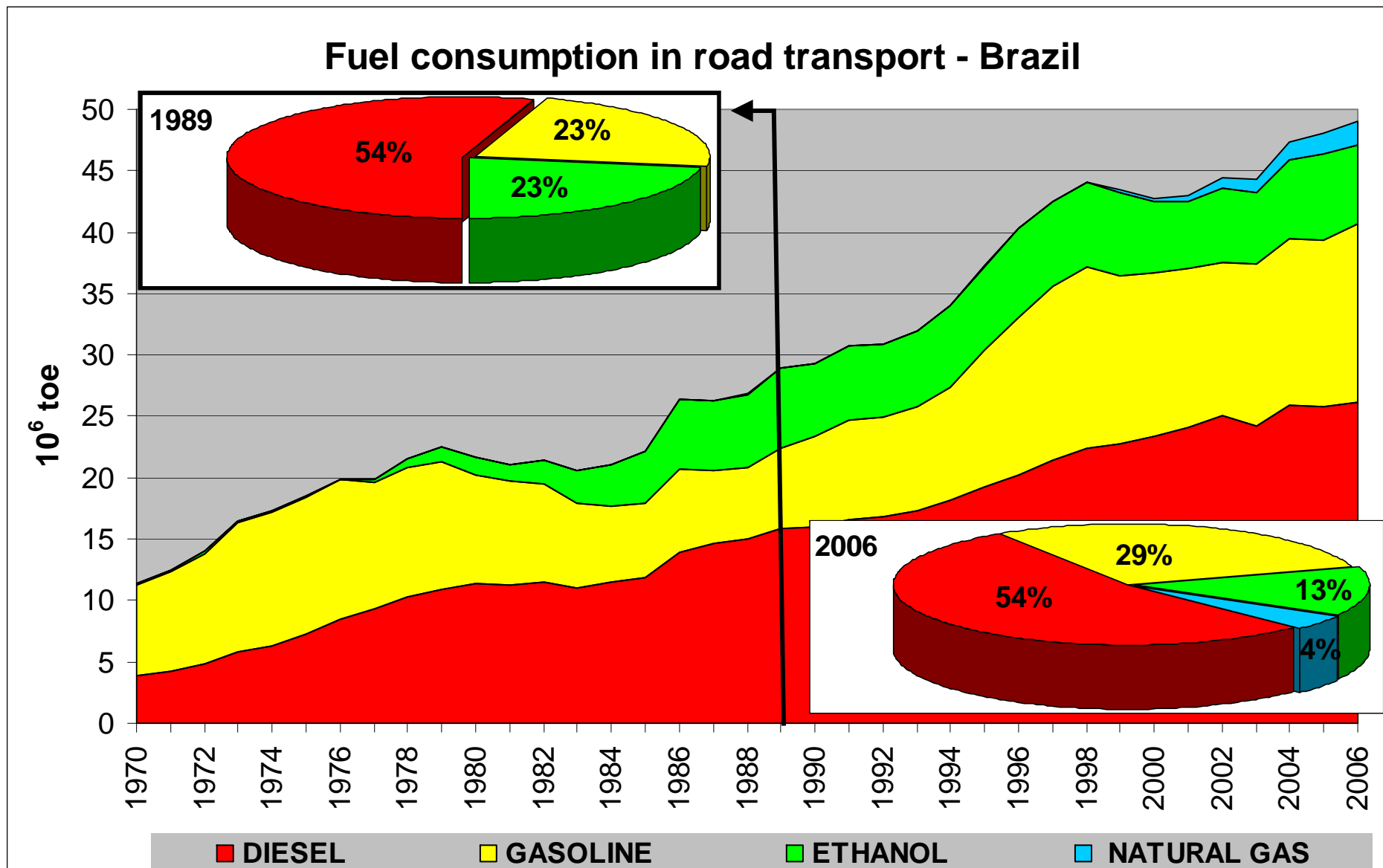


TRANSPORT ENERGY CONSUMPTION

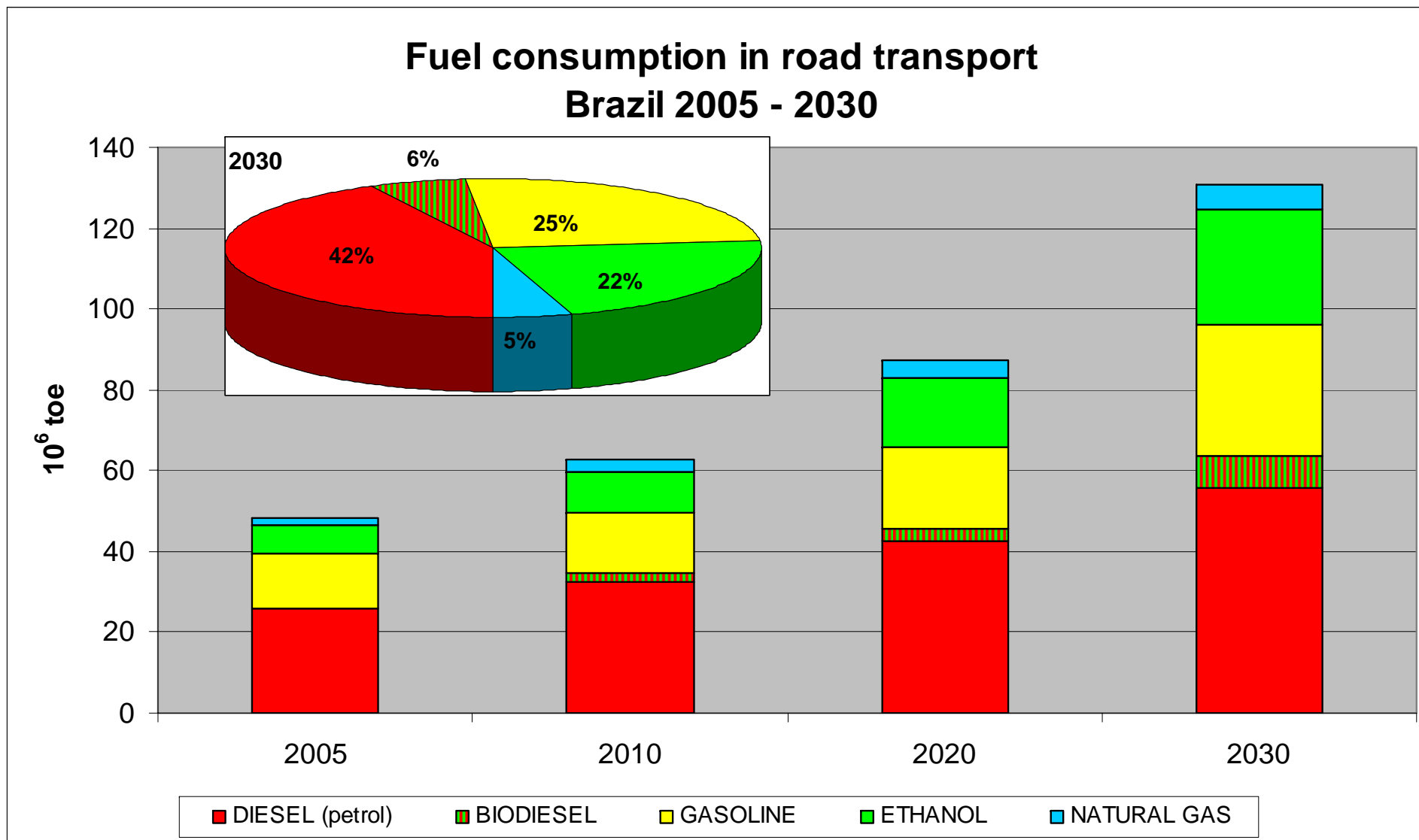
Energy consumption in transport sectors - Brazil



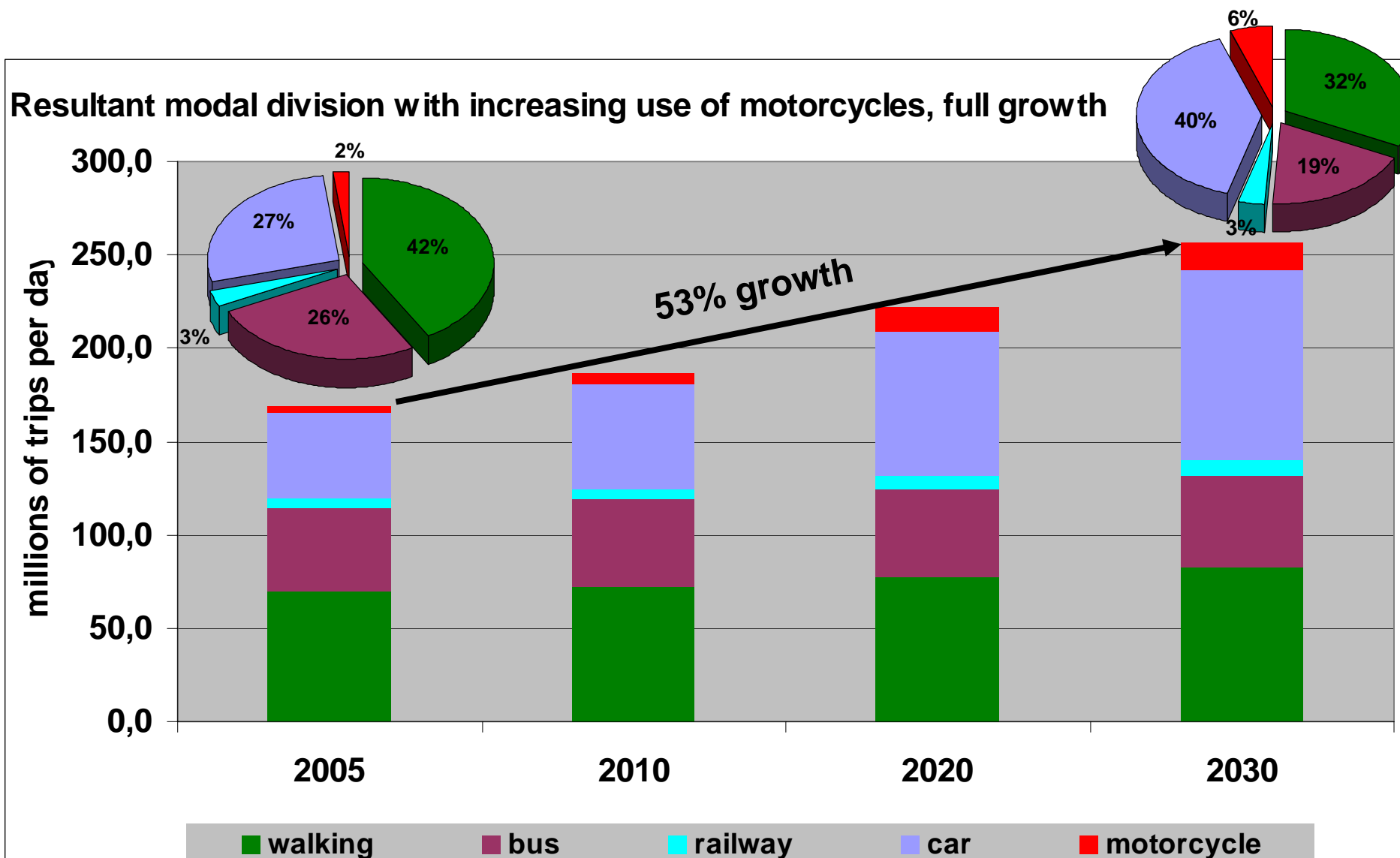
FUEL CONSUMPTION IN ROAD TRANSPORT



PROJECTION OF ROAD FUEL CONSUMPTION



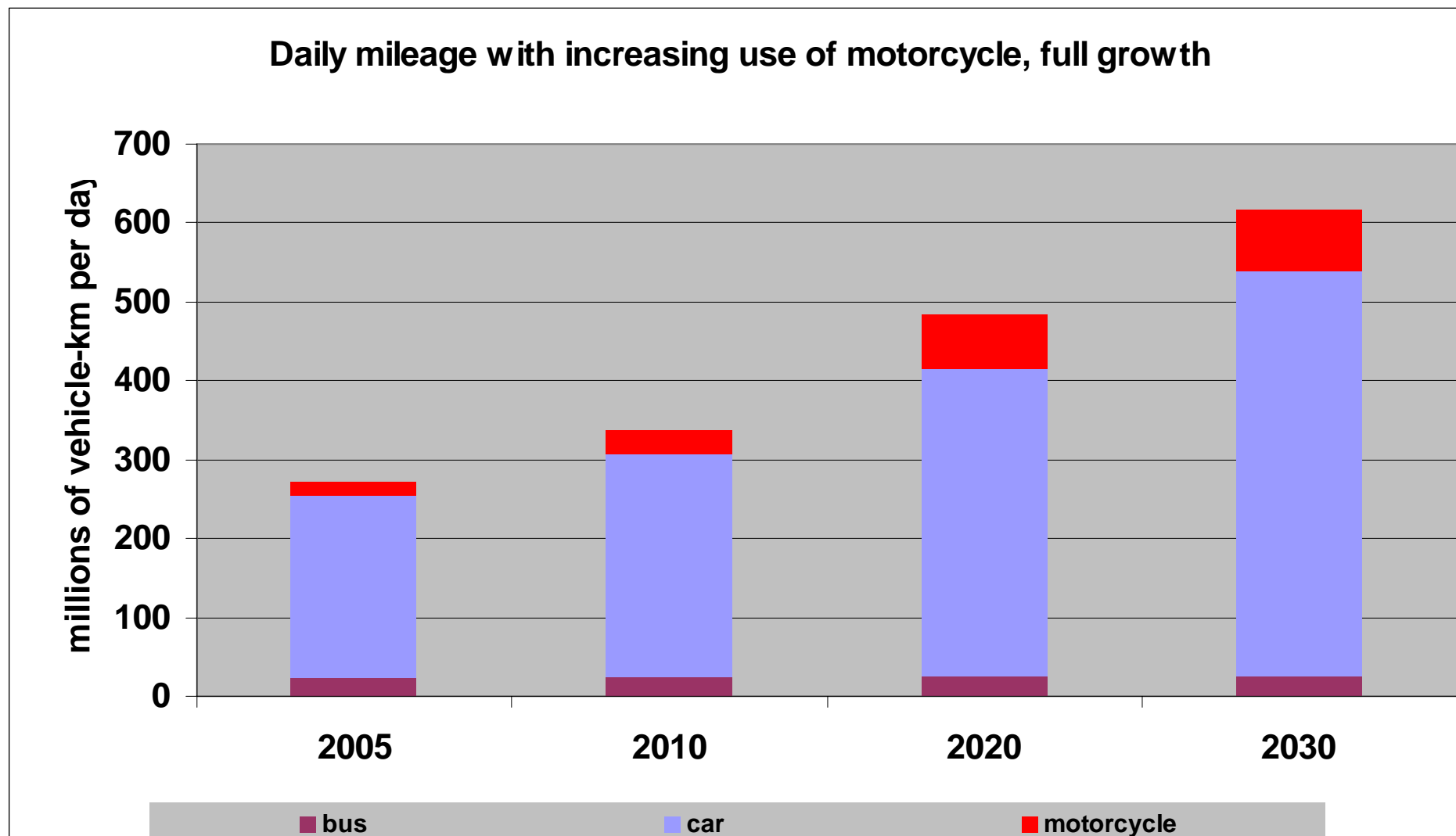
MODAL URBAN PASSENGER TRANSPORT



Net economic development - 3%

457 cities greater than 60,000 inhabitants
 ~ 72% Brazilian urban population

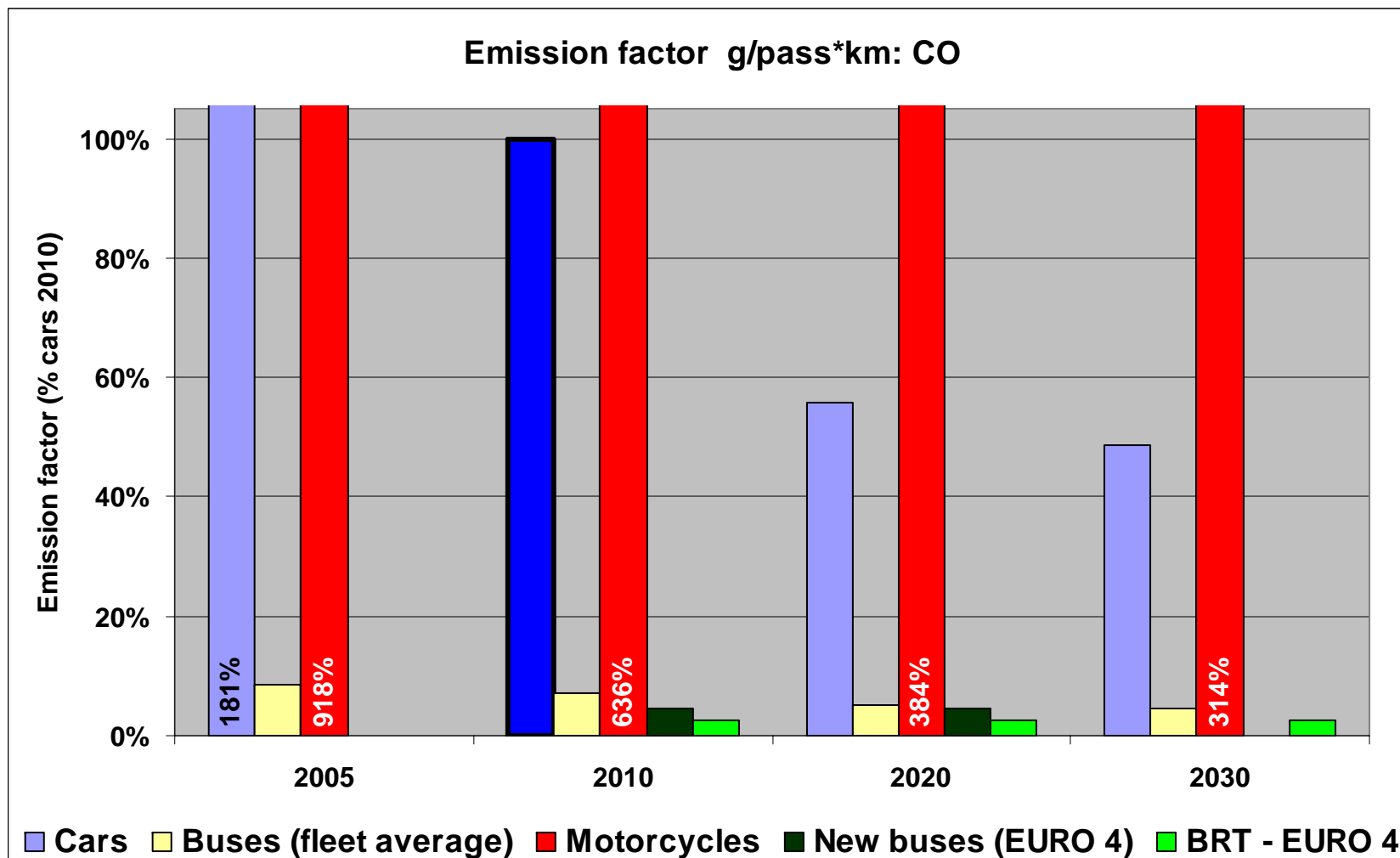
DAILY MILEAGE DEMAND



Net economic development - 3%

457 cities greater than 60,000 inhabitants
~ 72% Brazilian urban population

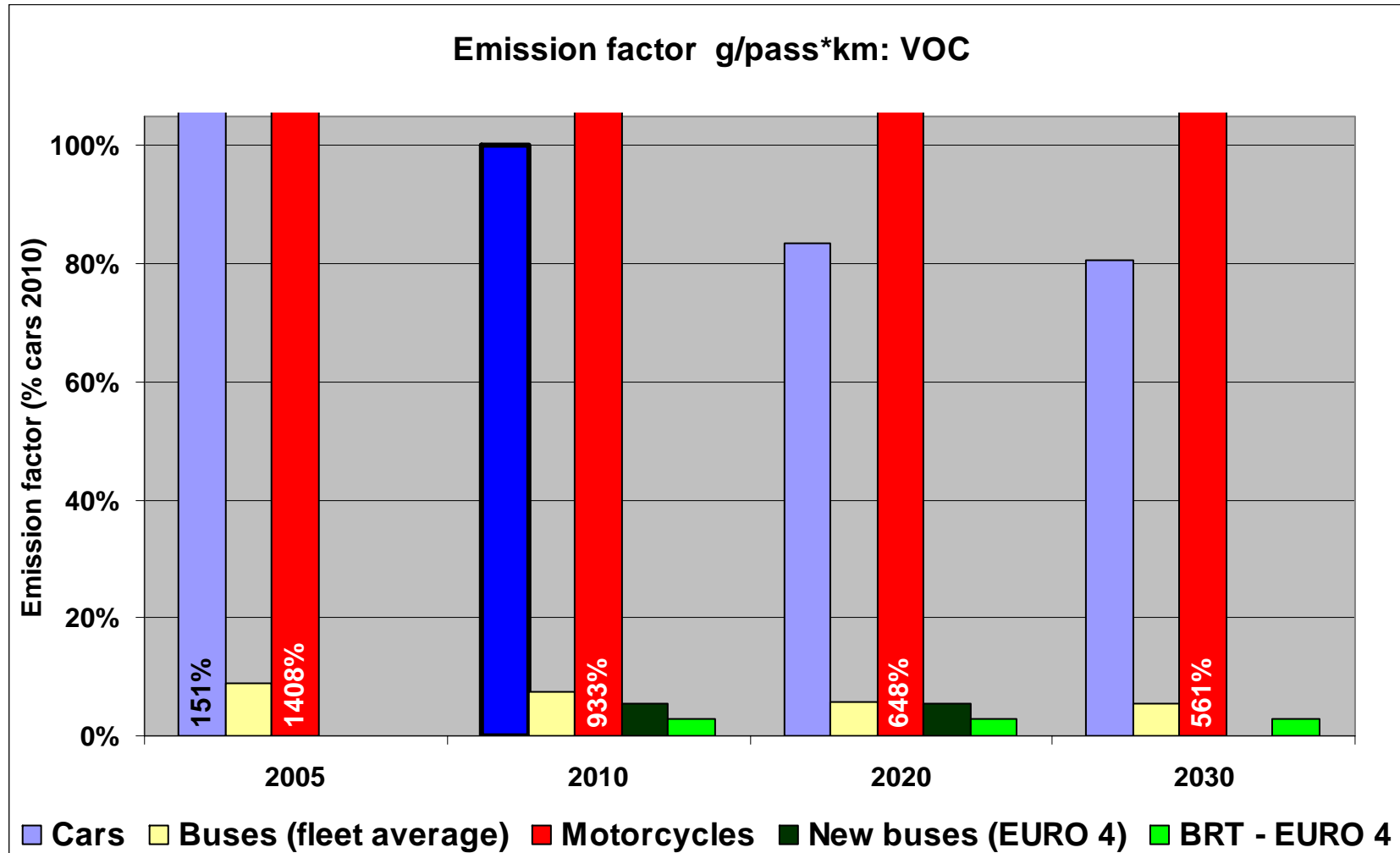
AVERAGE EMISSION FACTORS



average vehicle occupation:
 1,4 passenger per car
 44 passengers per bus
 1,1 passenger per motorcycle

Emission program targets (in 2009):
 Cars and LDV's – US tier 2;
 Buses and trucks – EURO 4
 Motorcycles – EURO 3

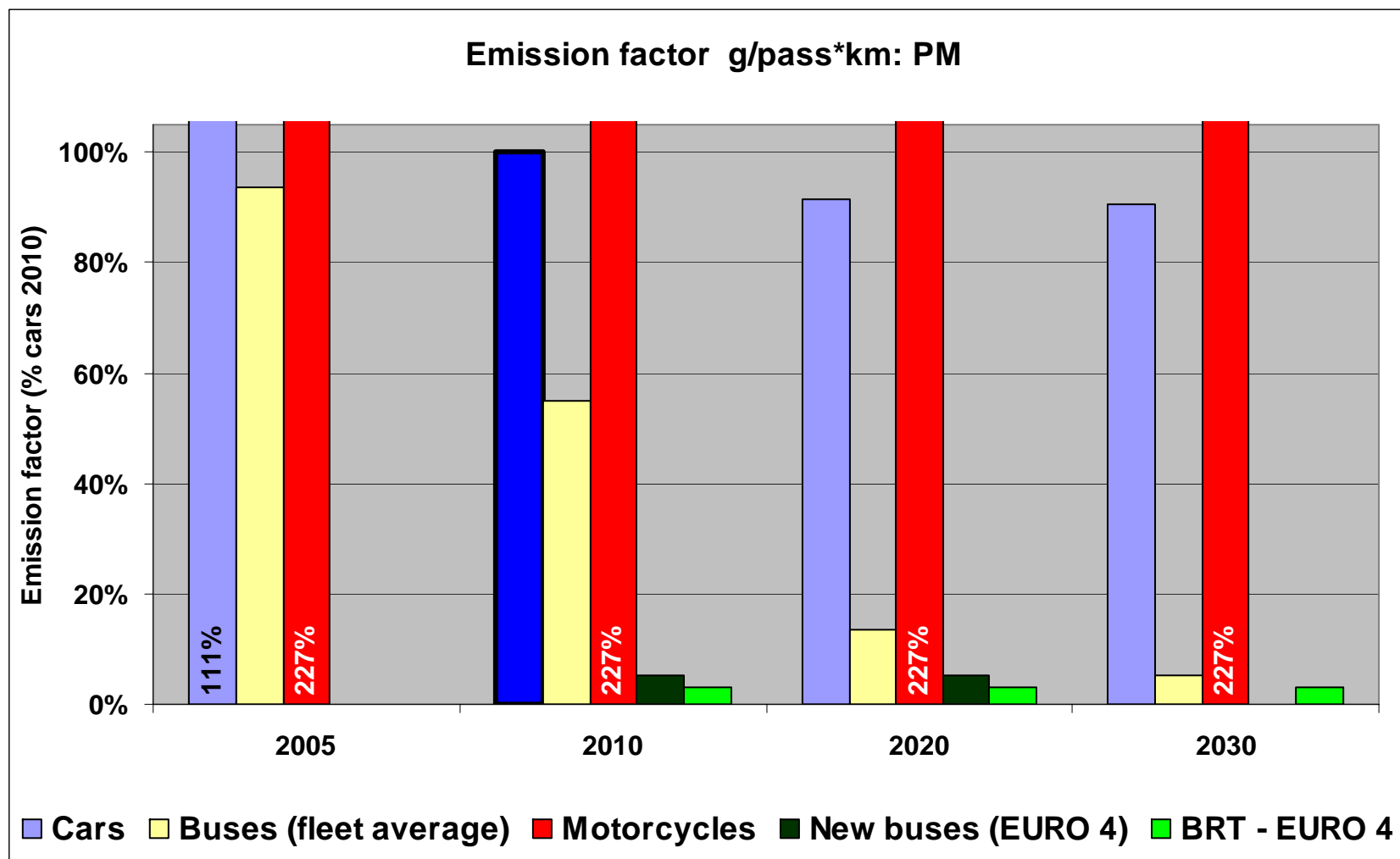
AVERAGE EMISSION FACTORS



average vehicle occupation:
 1,4 passenger per car
 44 passengers per bus
 1,1 passenger per motorcycle

Emission program targets (in 2009):
 Cars and LDV's – US tier 2;
 Buses and trucks – EURO 4
 Motorcycles – EURO 3

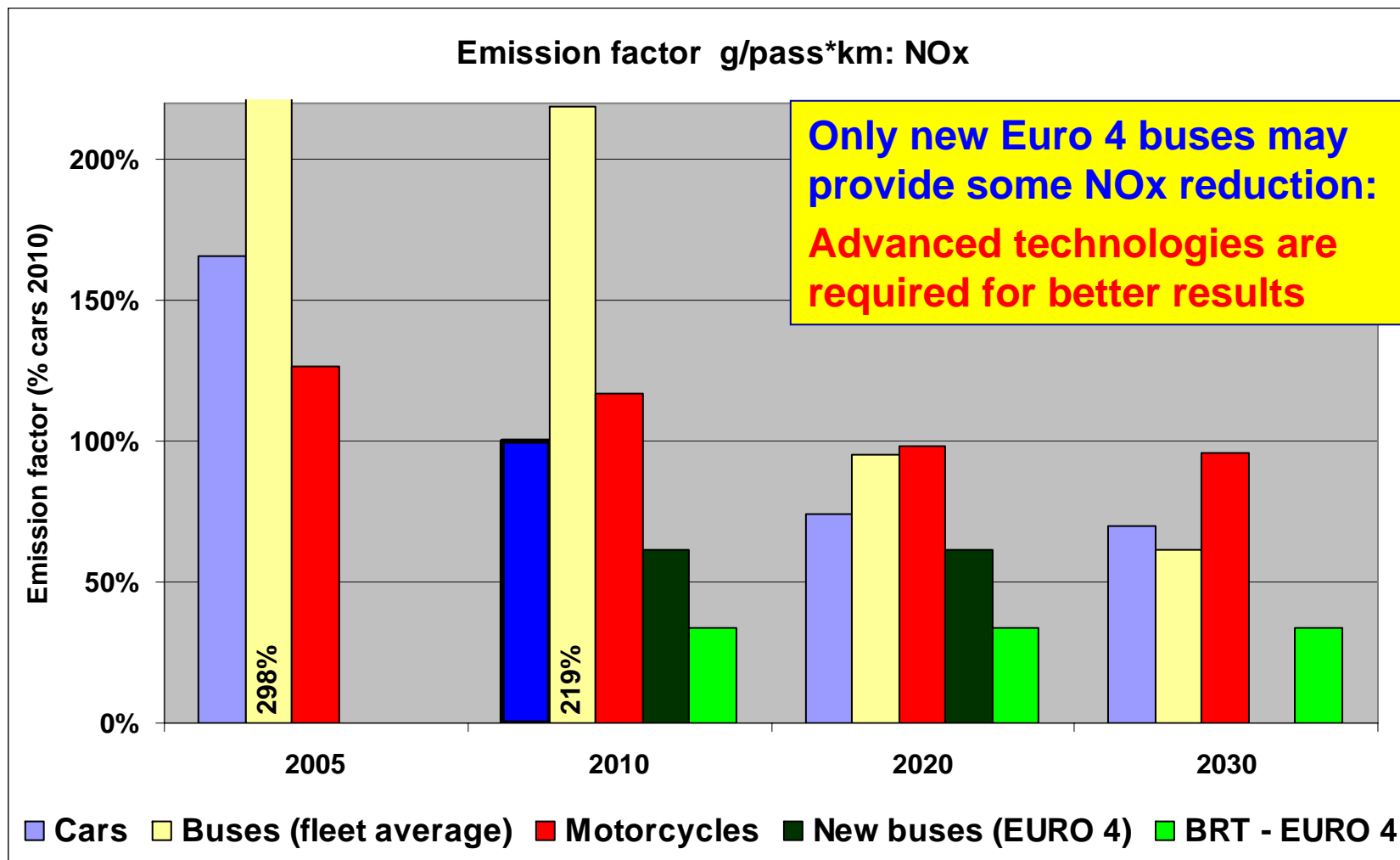
AVERAGE EMISSION FACTORS



average vehicle occupation:
 1,4 passenger per car
 44 passengers per bus
 1,1 passenger per motorcycle

Emission program targets (in 2009):
 Cars and LDV's – US tier 2;
 Buses and trucks – EURO 4
 Motorcycles – EURO 3

AVERAGE EMISSION FACTORS

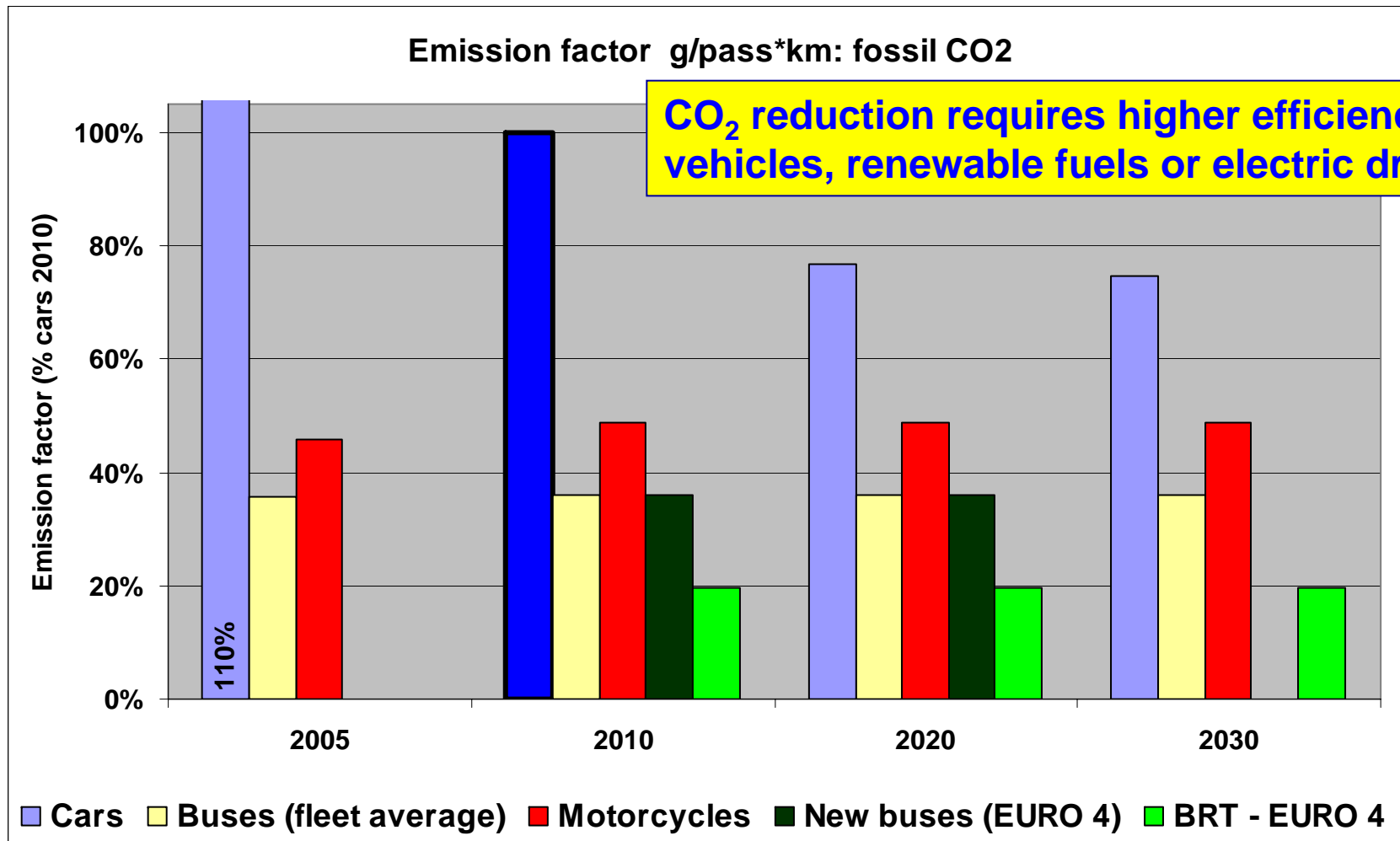


Only new Euro 4 buses may provide some NOx reduction:
Advanced technologies are required for better results

average vehicle occupation:
 1,4 passenger per car
 44 passengers per bus
 1,1 passenger per motorcycle

Emission program targets (in 2009):
 Cars and LDV's – US tier 2;
 Buses and trucks – EURO 4
 Motorcycles – EURO 3

AVERAGE EMISSION FACTORS



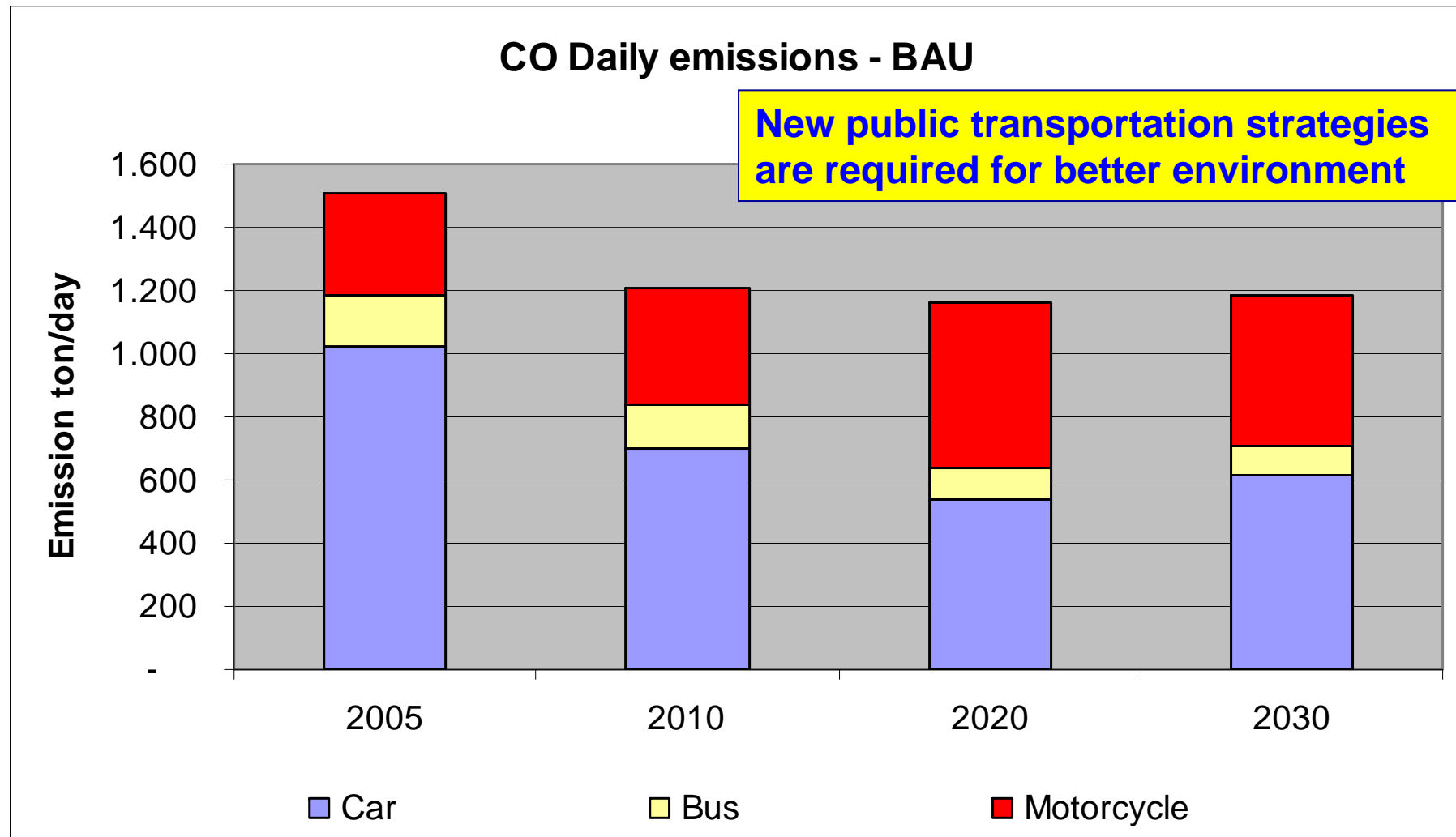
average vehicle occupation:

1,4 passenger per car

44 passengers per bus

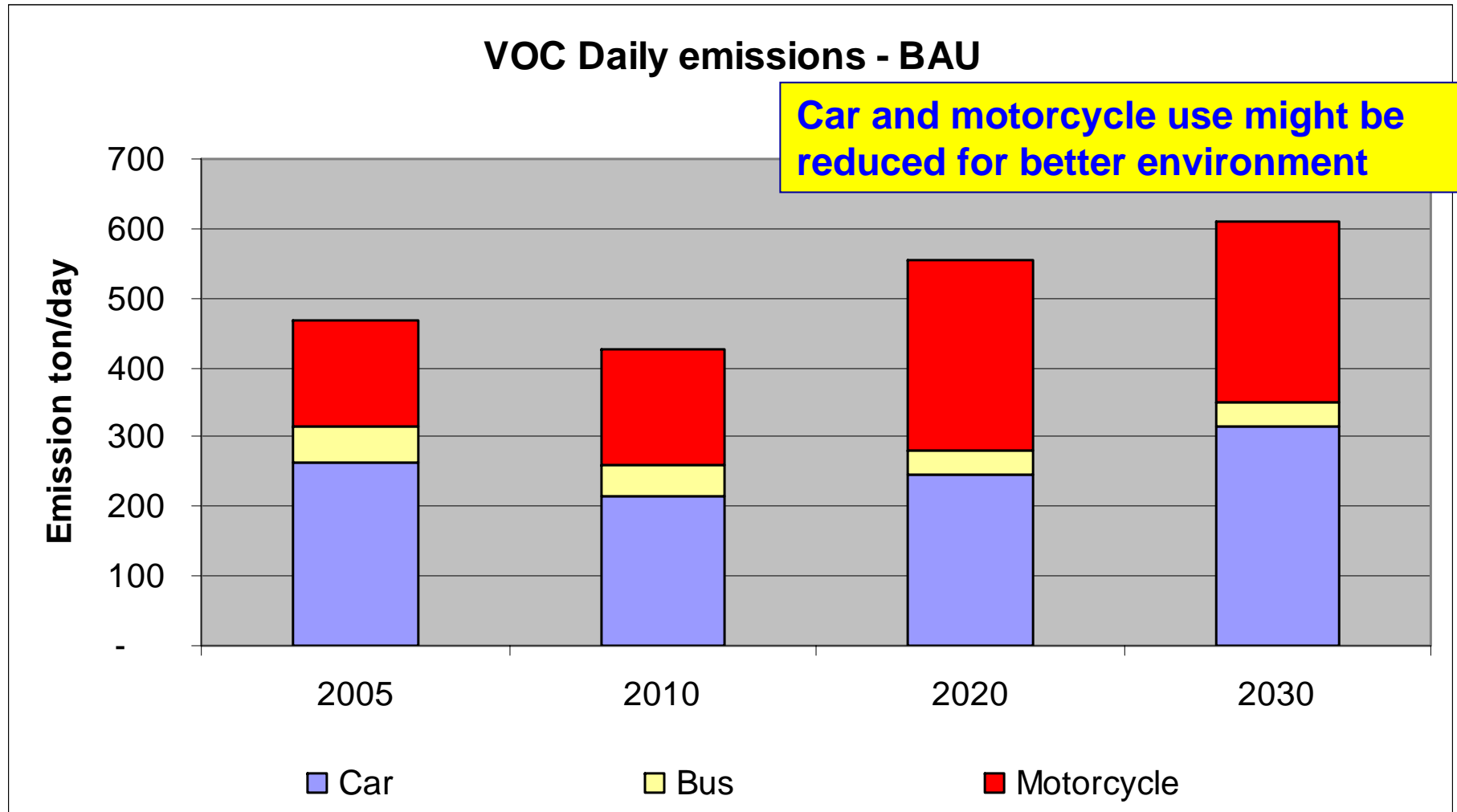
1,1 passenger per motorcycle

DAILY TRANSPORTATION EMISSION - CO



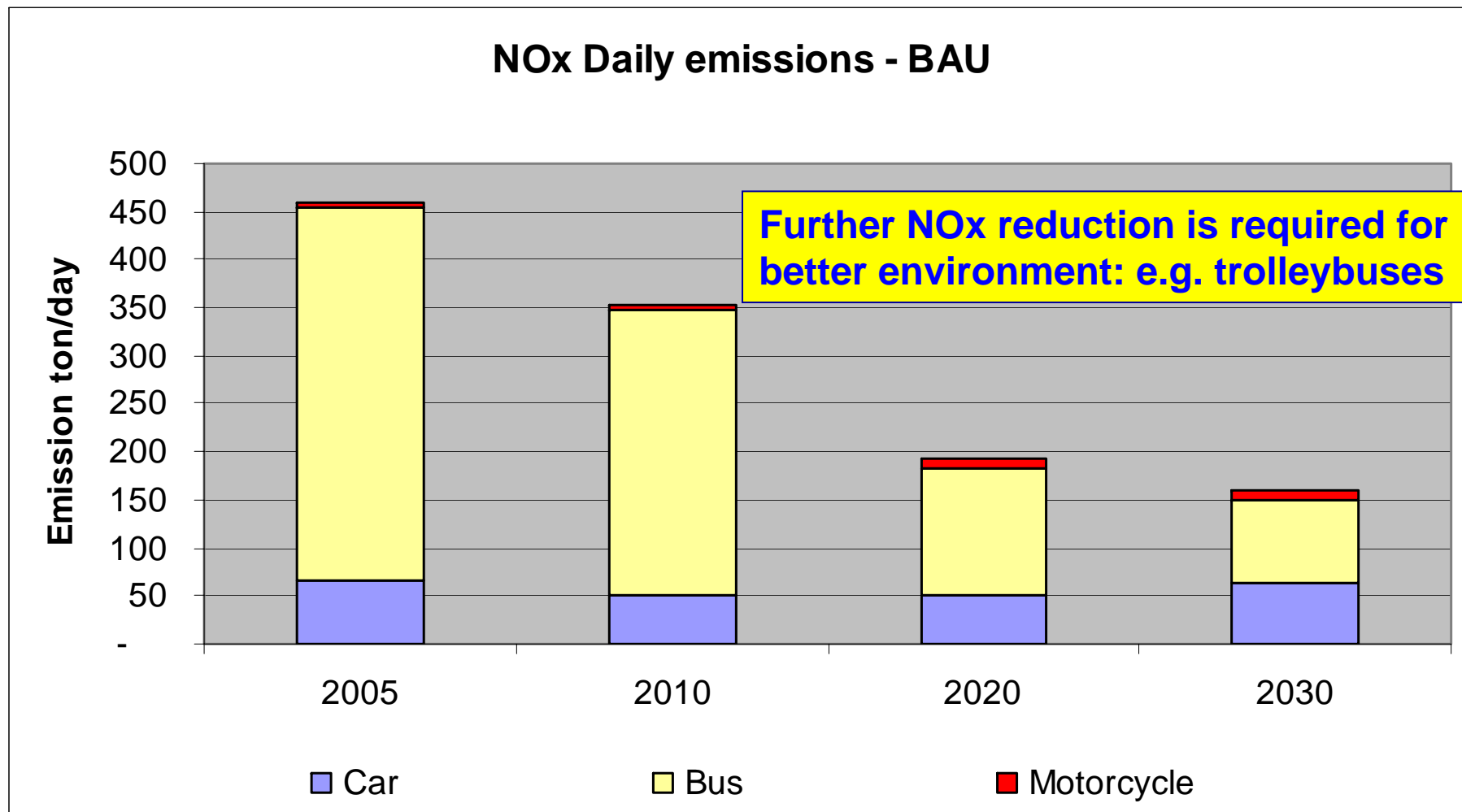
according to the people transportation demand in 457 cities (>60,000 inhabitants)

DAILY TRANSPORTATION EMISSION - VOC



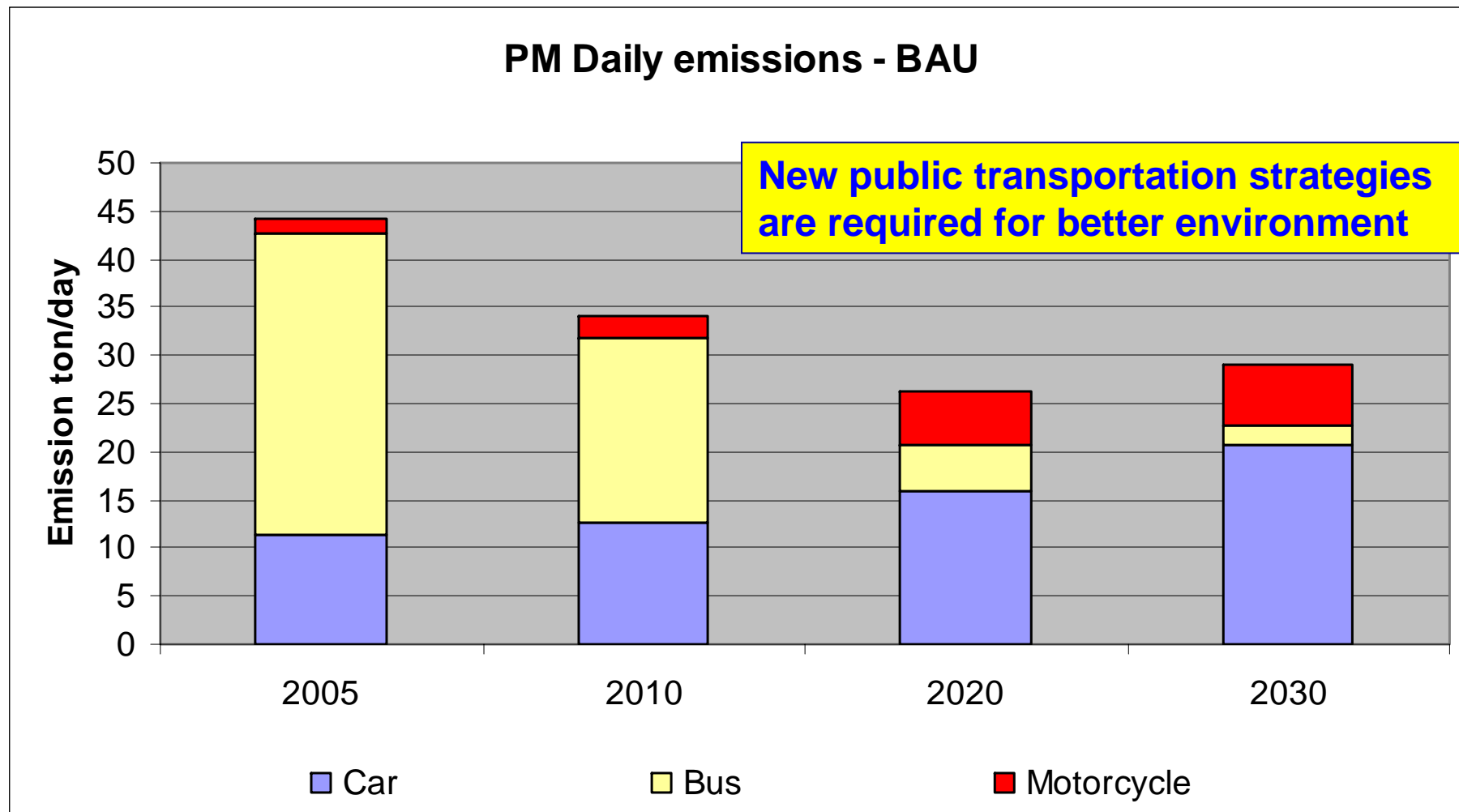
according to the people transportation demand in 457 cities (>60,000 inhabitants)

DAILY TRANSPORTATION EMISSION - NOx



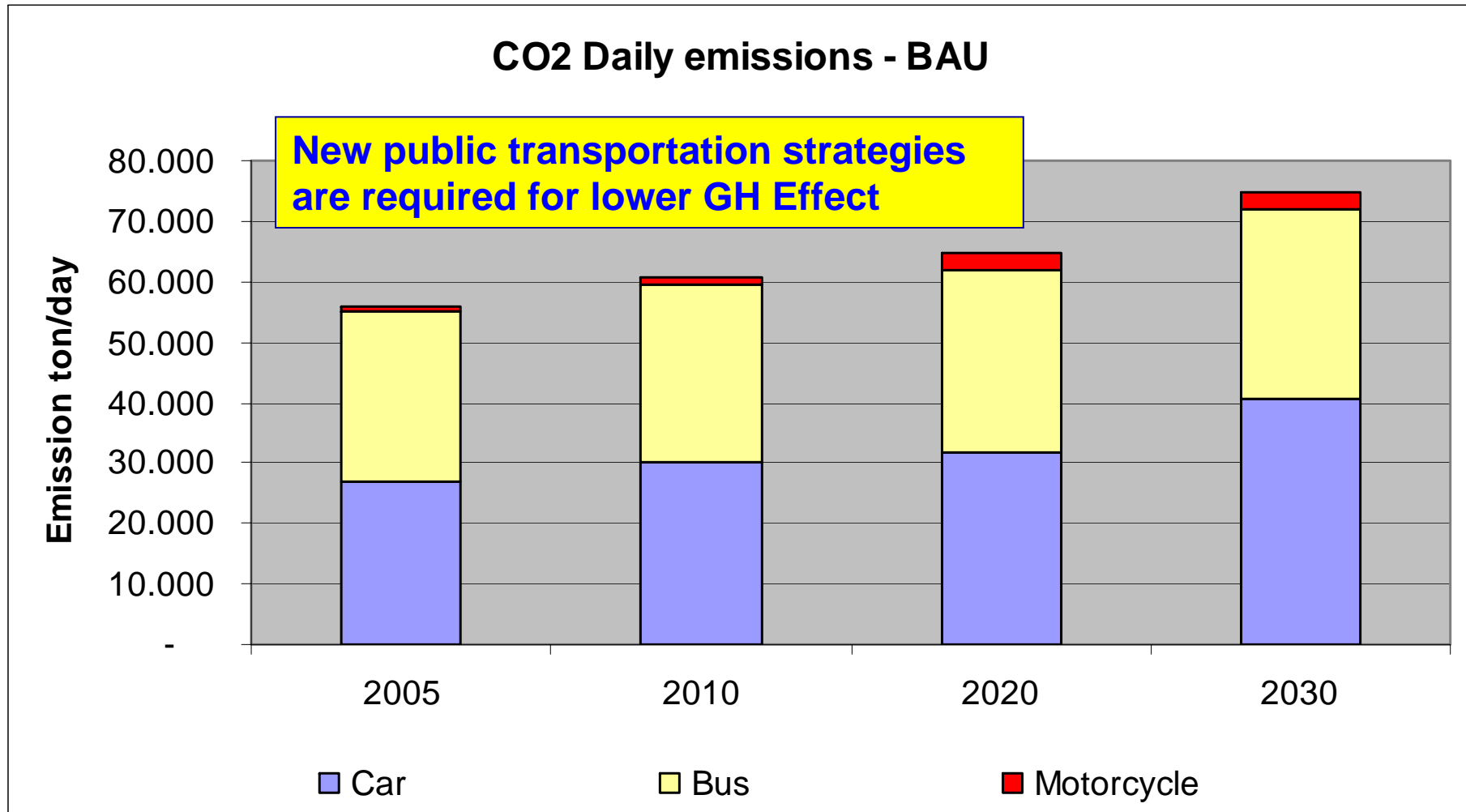
according to the people transportation demand in 457 cities (>60,000 inhabitants)

DAILY TRANSPORTATION EMISSION - PM



according to the people transportation demand in 457 cities (>60,000 inhabitants)

DAILY TRANSPORTATION EMISSION – CO₂



according to the people transportation demand in 457 cities (>60,000 inhabitants)

CONCLUSIONS

- **Current tendencies require a strong interference in transport policies to reduce environmental and energy impacts;**
- **Economic growth in Brazil tends to increase automobile and motorcycle use, at the expense of public transport;**
- **Energy consumption tends to increase, and fossil fuels will remain dominant in transport;**
- **Bus emissions of CO, HC and PM are far below auto emissions in a “per passenger basis”;**
- **Government transportation policies may also bring NOx reductions, but require new technologies (Euro 4 or better) and should be targeted on clean transportation systems (trolleybuses, hightech hybrids, BRT and mass transit)**
- **Motorcycle is not an environmental friendly option for private transport;**
- **Public transport seems to be the best strategy for reducing CO₂;**

THANK YOU



gabriel.tcl@uol.com.br
fabio.tcl@uol.com.br



Instituto Movimento
eavas@uol.com.br



aferreira@hewlett.org