

**LISBOA 2010**  
MAY 25/28  
**16th World Meeting**

# Towards Road Sustainability

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16th  
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International Road Federation

- 1 Footprint**
- 2 Limits to growth**
- 3 Major problems**
- 4 Tools**
- 5 Final comments**

The sustainability problems start  
**all here:**  
**... the ecological footprint !**



## **Ecological footprint**

**A measure of human demand on the Earth's ecosystems. It represents the amount of biologically productive land and sea area needed to regenerate the resources a human population consumes and to absorb and render harmless the corresponding waste.**

**Average footprint of an European Citizen:**

**3 ha/inhabitant**

**Average footprint of a north-American citizen:**

**5 ha/inhabitant**

**Available in our world:**

**1,5 ha/inhabitant !**

If we all had an **European** lifestyle:

**2 Planets!**



If we all had a **north-American** lifestyle:

**3 Planets!**

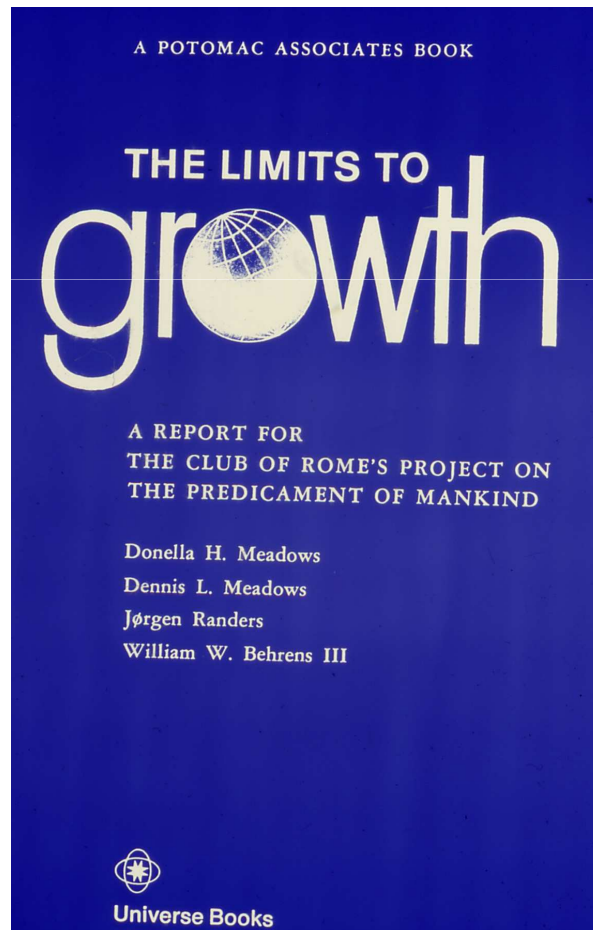




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## 2 Limits to growth

## Are there any limits to our growth?

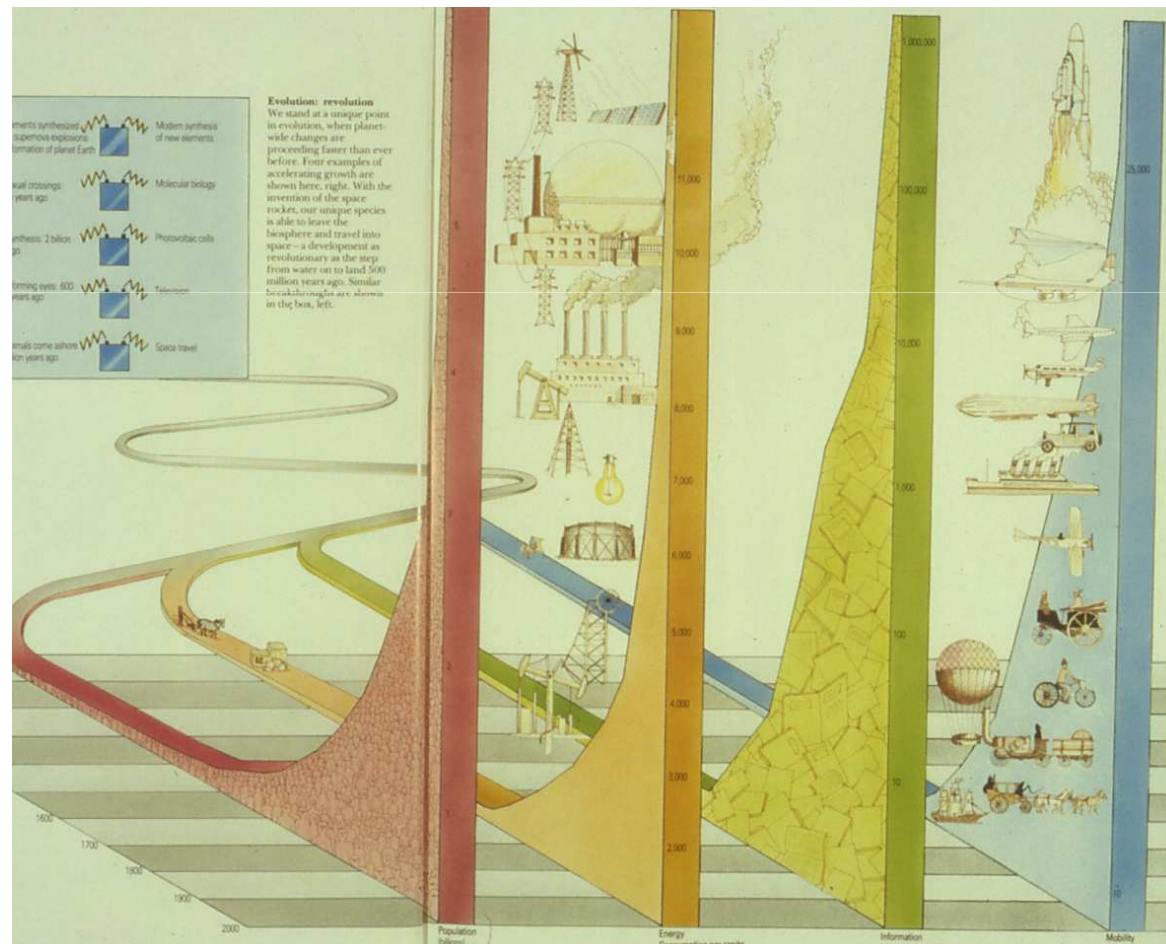


**This question  
was first asked  
in 1972**

**The answer  
seems to be  
YES!**



# Exponential growth is a mathematical concept... ... not a physically feasible one!



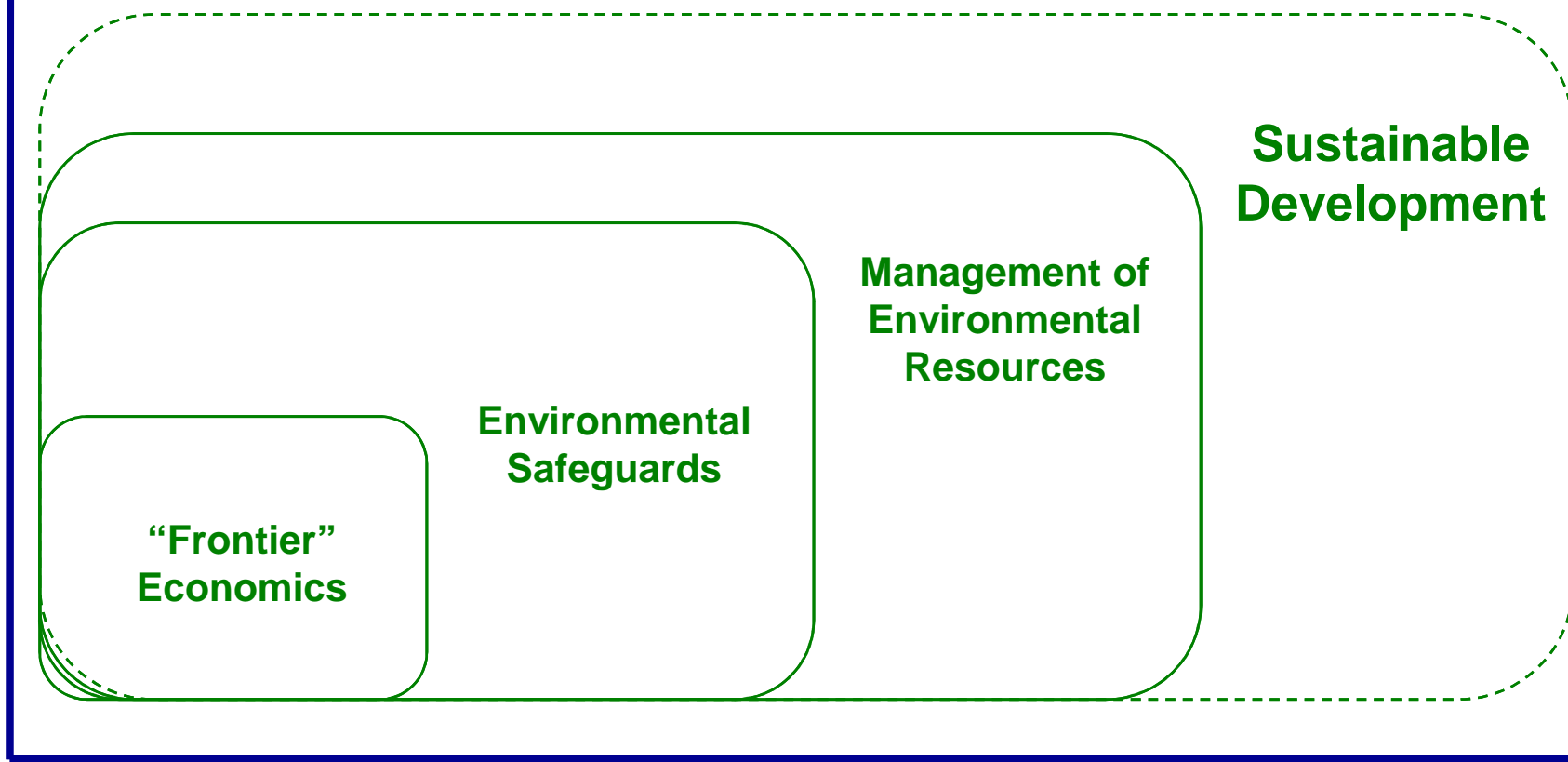


1972  
UN Stockholm  
Conference

1992  
UN Rio's  
Conference



Scope of environment concerns



"Frontier"  
Economics

Environmental  
Safeguards

Management of  
Environmental  
Resources

Sustainable  
Development

60's

70's

80's

90's

Y2K



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## **3** Major problems

# Major Global Environmental Problems:

**Climate Change**

**Loss of Biodiversity**

**Roads and transport  
are very relevant for both !**

## Climate Change

- **Transport is responsible for 23% of GHG emissions**
- **75% of it comes from road vehicles**
- **95 % of transport energy comes from petroleum**
- **1 ton of cement used in construction generates 1 ton of CO2**

## Loss of Biodiversity

- **Habitat loss**
- **Fragmentation of ecosystems**
- **Landscape downgrading**

## ... and other impacts

- **Significant use of construction materials**
- **Soil sealing**
- **Air and water pollution, noise, etc.**

## Two dimensions of the environmental problems:

### The infrastructure

Construction / Maintenance / Decommissioning

### The operation

Traffic / Integration in a transport system

**Both have significant impacts that require attention**



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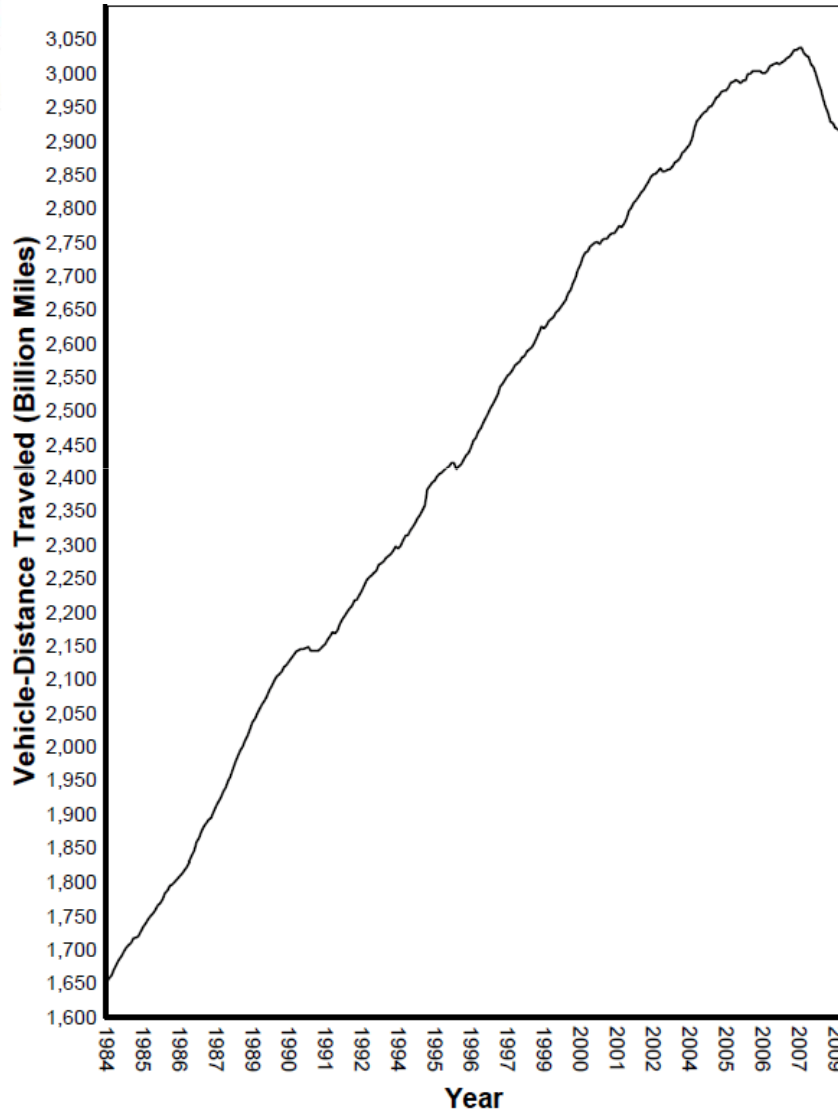




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## US vehicle miles travelled

**1984: 1 650 billion miles**

**2009: 3 050 billion miles**

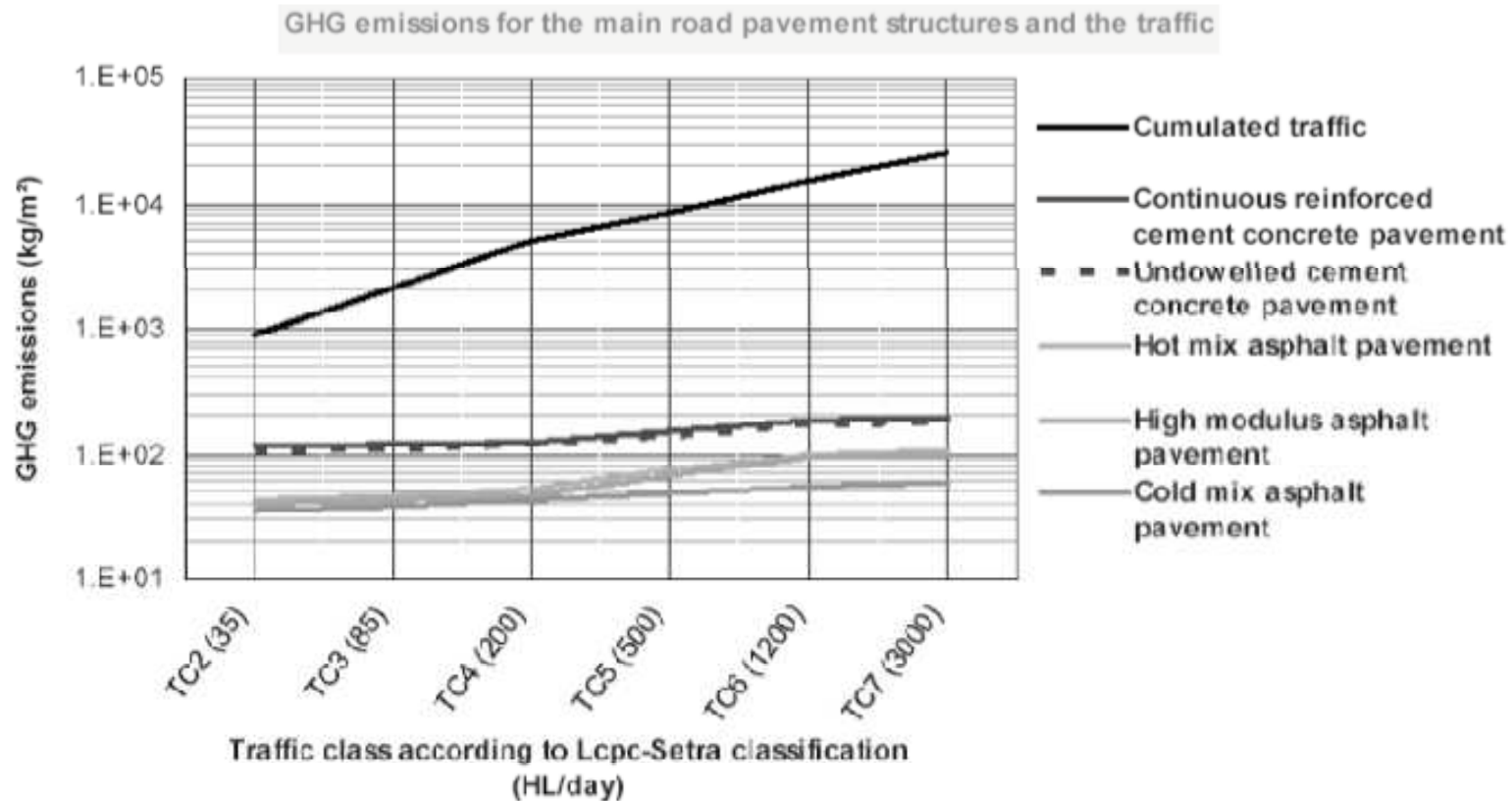
**An increase of 184% !**

(Source: US Federal Highway Administration 2009)

## Construction Phase vs. Operation Phase

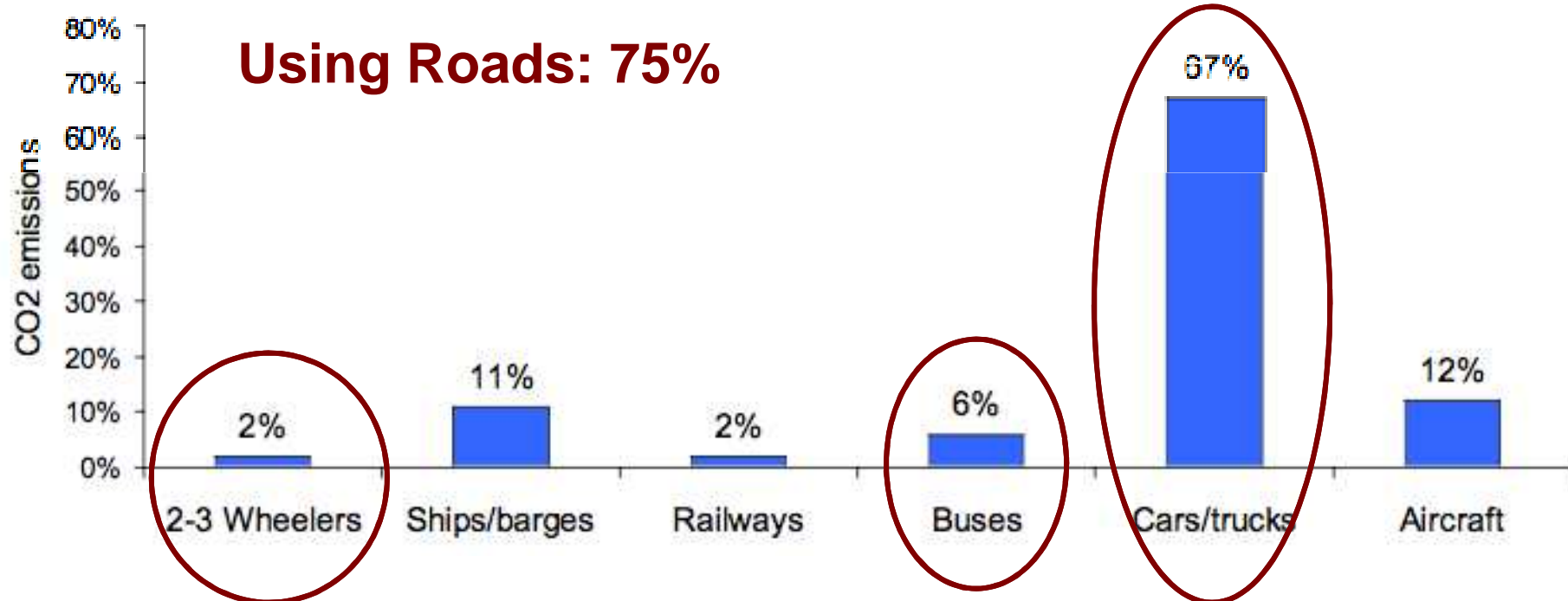
Impacts much beyond the construction phase !

(30 year)

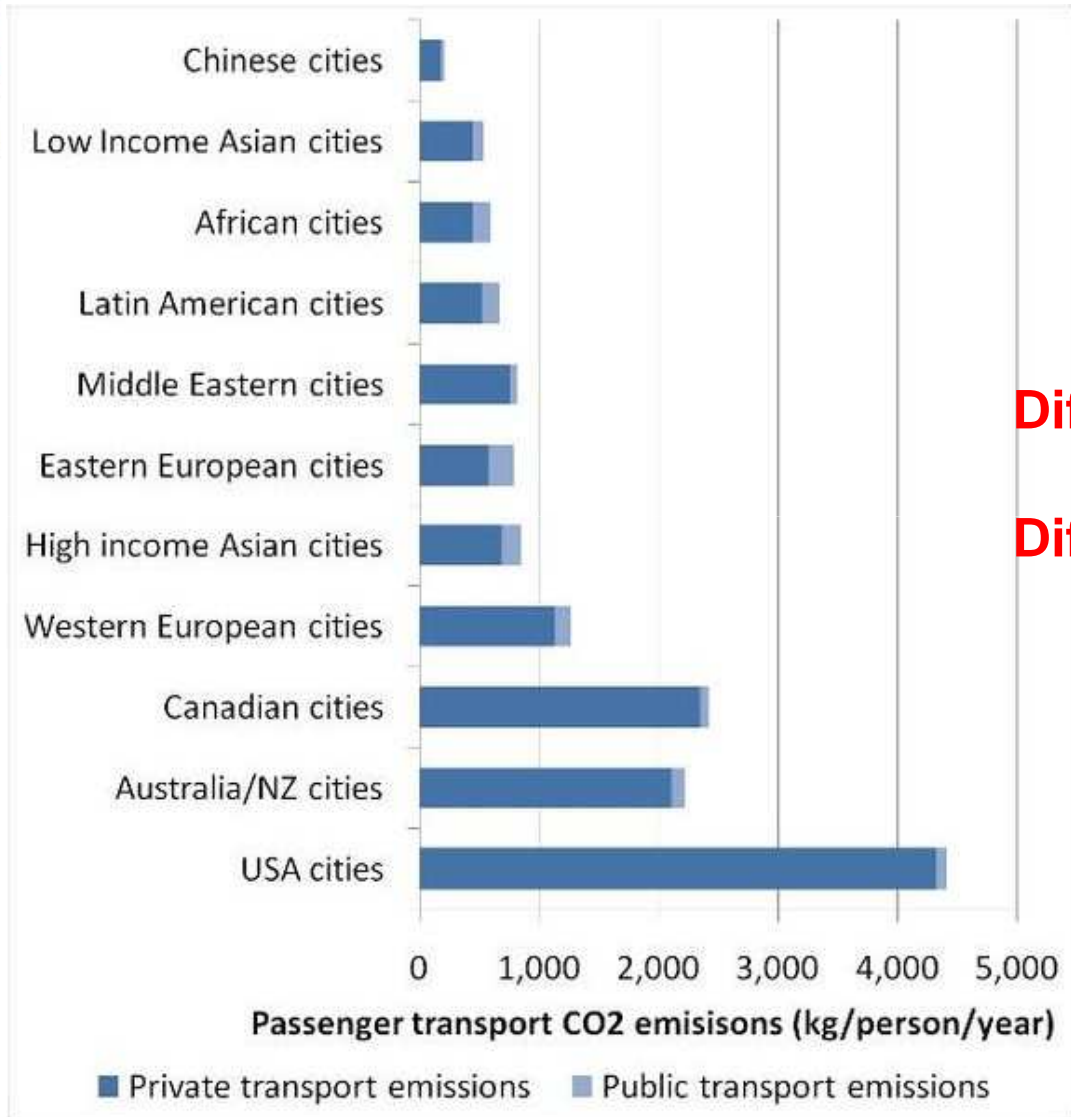


(Source: Alan Pears, 2004 – Sustainability and Roads)

## World transport CO2 emissions by vehicle type



World Bank, 2008 – Safe, Clean and Affordable Transport for Development



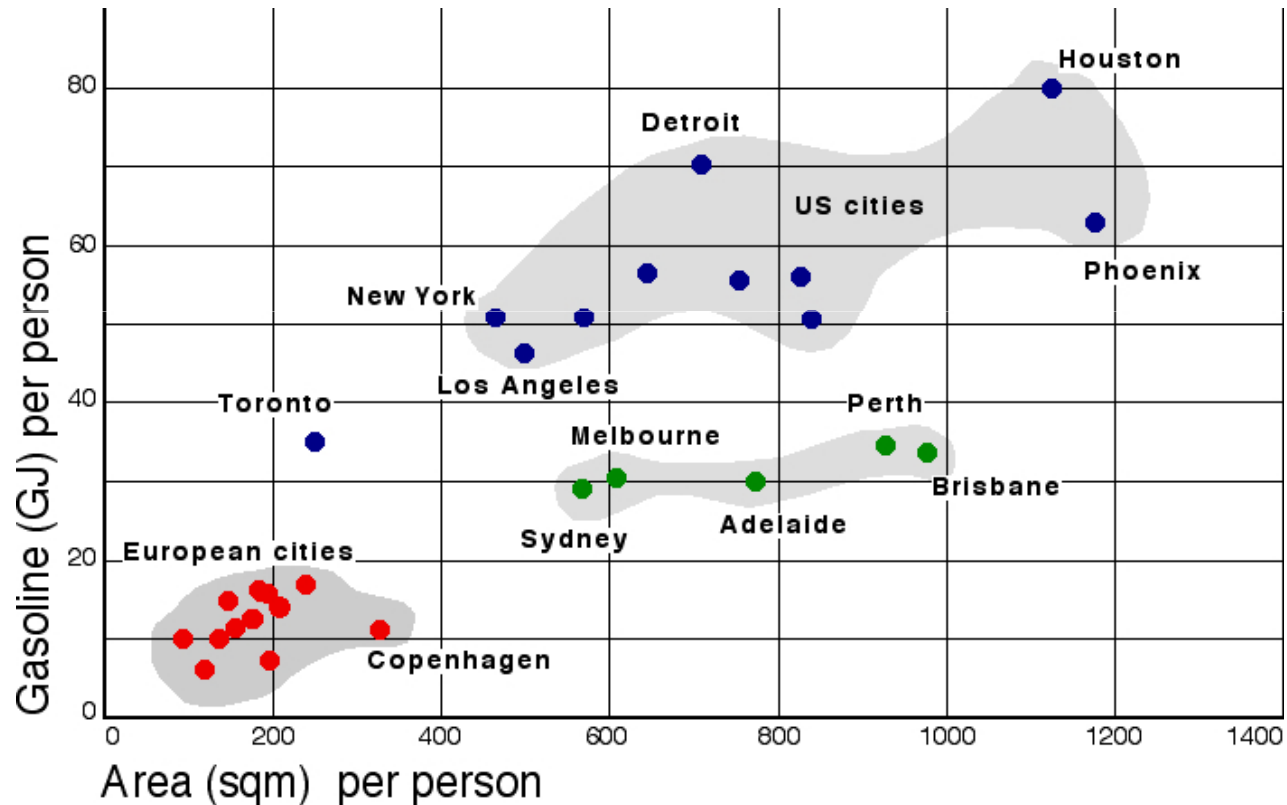
## CO2 Emissions

**Different Contributions,  
Different Responsibilities!**

(Source: Kenworthy, JR (2002) Transport Energy Use and Greenhouse Gases in Urban Passenger Transport Systems: A Study of 84 Global Cities)

# Energy Consumption vs. Urban Density

Land use matters... a lot !



(Source: P Newman, JR Kenworthy; Gasoline consumption and cities: a comparison of US cities with a global survey, Journal of the American Planning Association, 1989)



Calculator for Harmonised Assessment and Normalisation of Greenhouse-gas Emissions for Roads

## Emissions sources

CHANGER enables calculation of emissions by reference to the different phases of a construction project, its database covers a comprehensive range of construction processes and materials, including impacts from:

### Pre-Construction

Clearing, piling, cut transport, fill transport

### On-Site

use of electricity and fuel

### Materials

Construction materials, transport of materials

### Machinery

Excavators, pavers, rollers, etc.

## Flexibility

The flexibility of the system corresponds to a wide variety of user needs - from pre-project phase estimations, right through to comprehensive end-project assessments. In each case, CHANGER automatically generates full or partial reports that can be exported to Excel, Word, PDF and HTML format.

Emissions results are expressed in metric tonnes of CO<sub>2</sub> equivalent.

Further specifications are available on the dedicated website at

[www.irfghg.org](http://www.irfghg.org)



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# 4 Tools

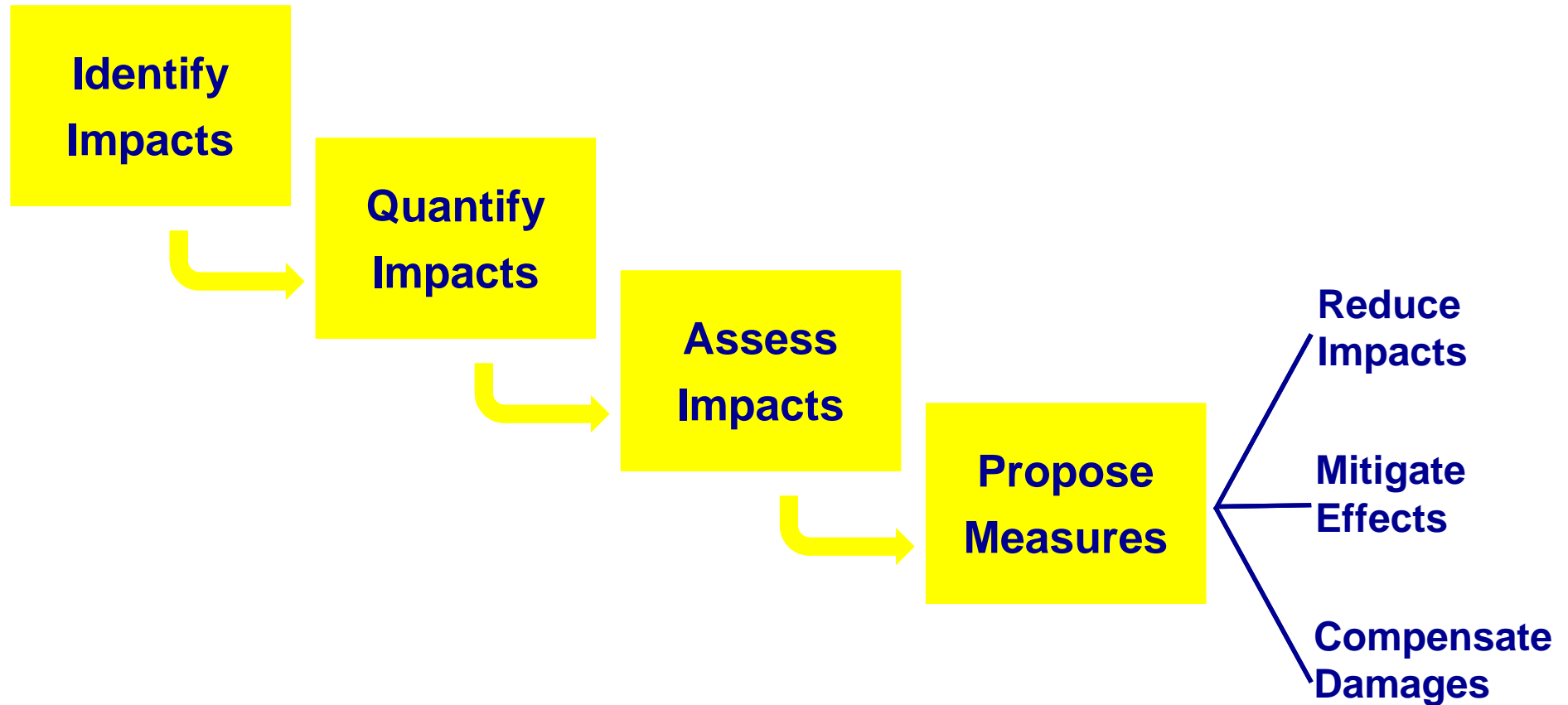
**Environmental Impact Assessment**  
is **THE** tool for preventing unwanted impacts

It is not a tool for **REJECTING** projects,  
but rather a tool for **IMPROVING** projects

**This is essential for moving towards sustainability !**



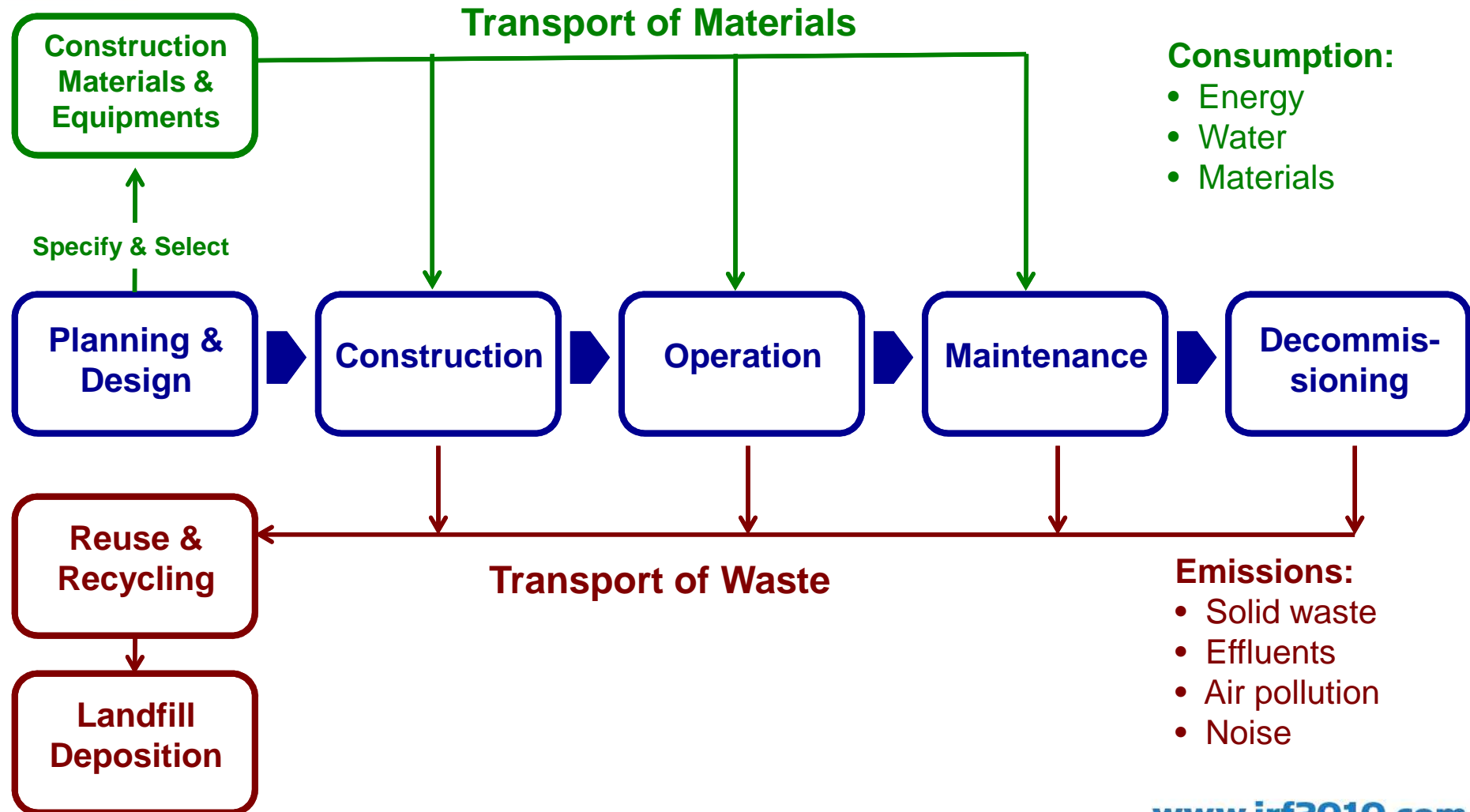
# Impact Assessment and Measures



## Main Environmental factors

- **Climate**
- **Geology and geomorphology**
- **Soils and land use**
- **Water resources**
- **Air quality**
- **Waste**
- **Noise**
- **Habitats and ecosystems**
- **Heritage**
- **Landscape**
- **Social and economic dimensions**
- **Protection regimes**
- **Risk analysis**

# Material Flow Analysis in all phases



## **An anticipatory approach at a very early stage of the project:**

- **Prevents many negative impacts;**
- **Provide more project options;**
- **Is better for the economy of the project.**

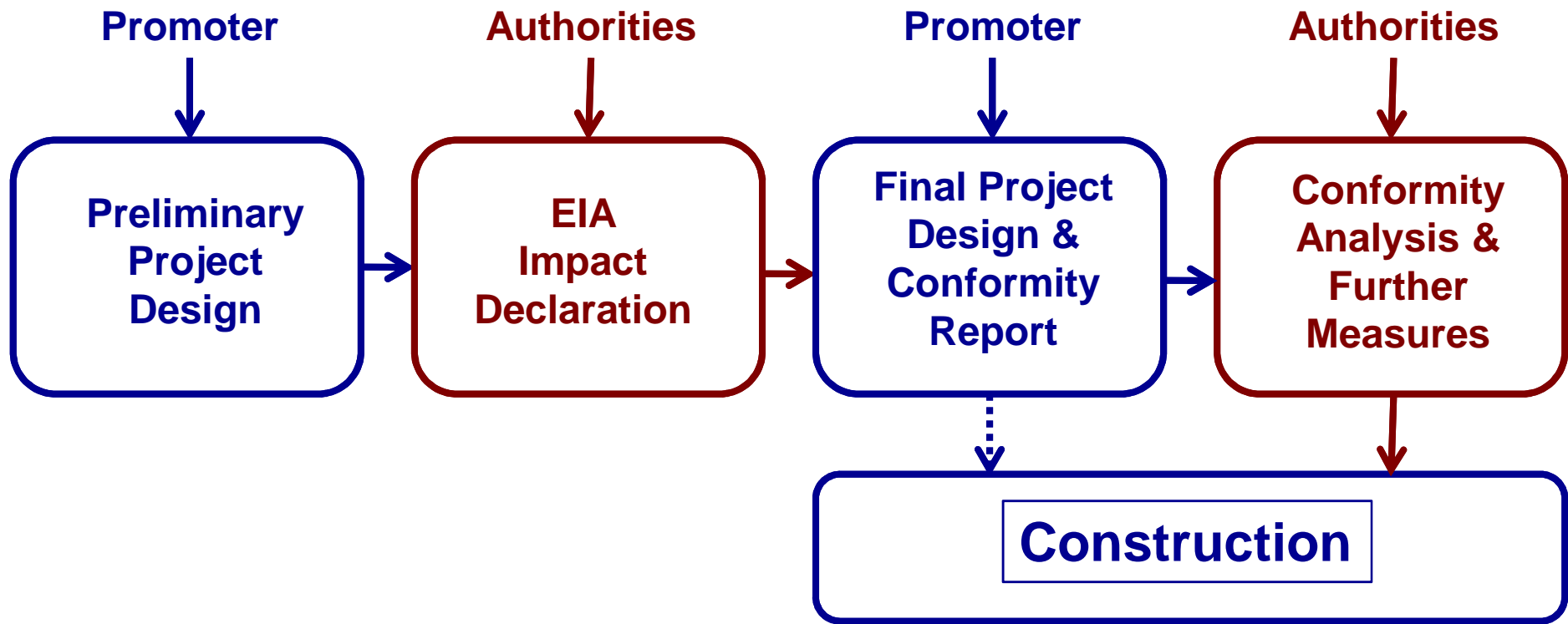
## The Environmental Impact Assessment (EIA) can **(should)** be done at a very early stage:

Portuguese procedure: two-phase assessment

- Promoter prepares the EIA at a preliminary design stage;
- Authorities establish an “Impact Declaration” with impact requisites for the final project design;
- Promoter prepares final project design and “Conformity Report” with the established requisites;
- Authorities evaluate the “Conformity Report” and may require further measures or studies, including during the construction phase.

Portuguese procedure: two-phase assessment

## Two-Stage Environmental Impact Assessment



## Strategic Environmental Assessment (SEA)

is as early as you can go:

- **Relative to Plans or Programs, instead of project design;**
- **It is not a substitute of EIA but it facilitates it at a later stage;**
- **Required by EU Directives in most situations.**



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## **5** Final comments



# Final Comment 1

**Sustainability: Construction + Operation**

**Infrastructure vs. Transport Policy**

Do not attempt to make policy  
by building infrastructure (fait accompli) !

Do not “write” the plans in concrete  
(or in asphalt) !



## Final Comment 2

**Infrastructure is instrumental to transport policy  
and not transport policy “after” infrastructure !**

**But...**

**... a lot of optimization can be achieved  
for the already built infrastructure !**



## Final Comment 3

**Sustainability is global and holistic...  
Life cycle analysis of the infrastructure  
and measures taken **at all stages**  
are essential !**



## Final Comment 4

**The bar has to be put higher**

**More ambition,**

**more demanding targets,**

**better performance !**



## World Bank 2008

“Safe, Clean and Affordable Transport for Development”

- **Safe Transport**
- **Clean Transport**
  - **Promote Mass Transit Transport projects ( BRT and LRT)**
  - **More investments in Non-Motorized Transport**
  - **Usage of Climate Change Funds in Transport ( clean buses for example)**
- **Affordable Transport**



## **Some steps forward:**

### **Infrastructure**

**Intelligent roads**

**Optimize the flow of traffic**

**Avoid congestion**

**Concentrate on black spots**

### **Vehicles**

**Electric cars**

**Other non-fossil fuels**

**Improve efficiency**

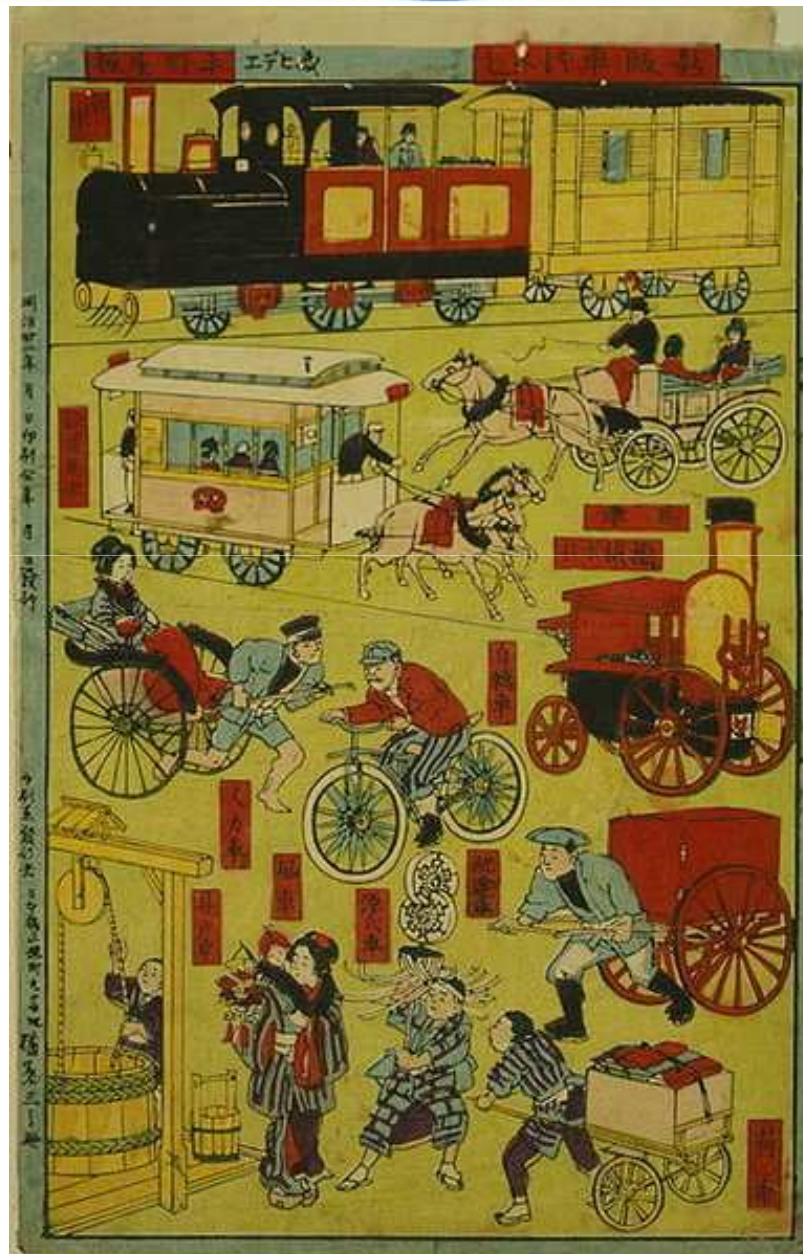
### **Transport policies**

**Better public transportation**

**Better intermodal connections**



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**Sustainable Transport:**

**Make your  
Choice**

**Thank You !**

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