

A Renaissance lies ahead The automotive case



***Patrick Oliva, Corporate Vice President
EIT seminar, Madrid, 16th March 2009***



Nowadays

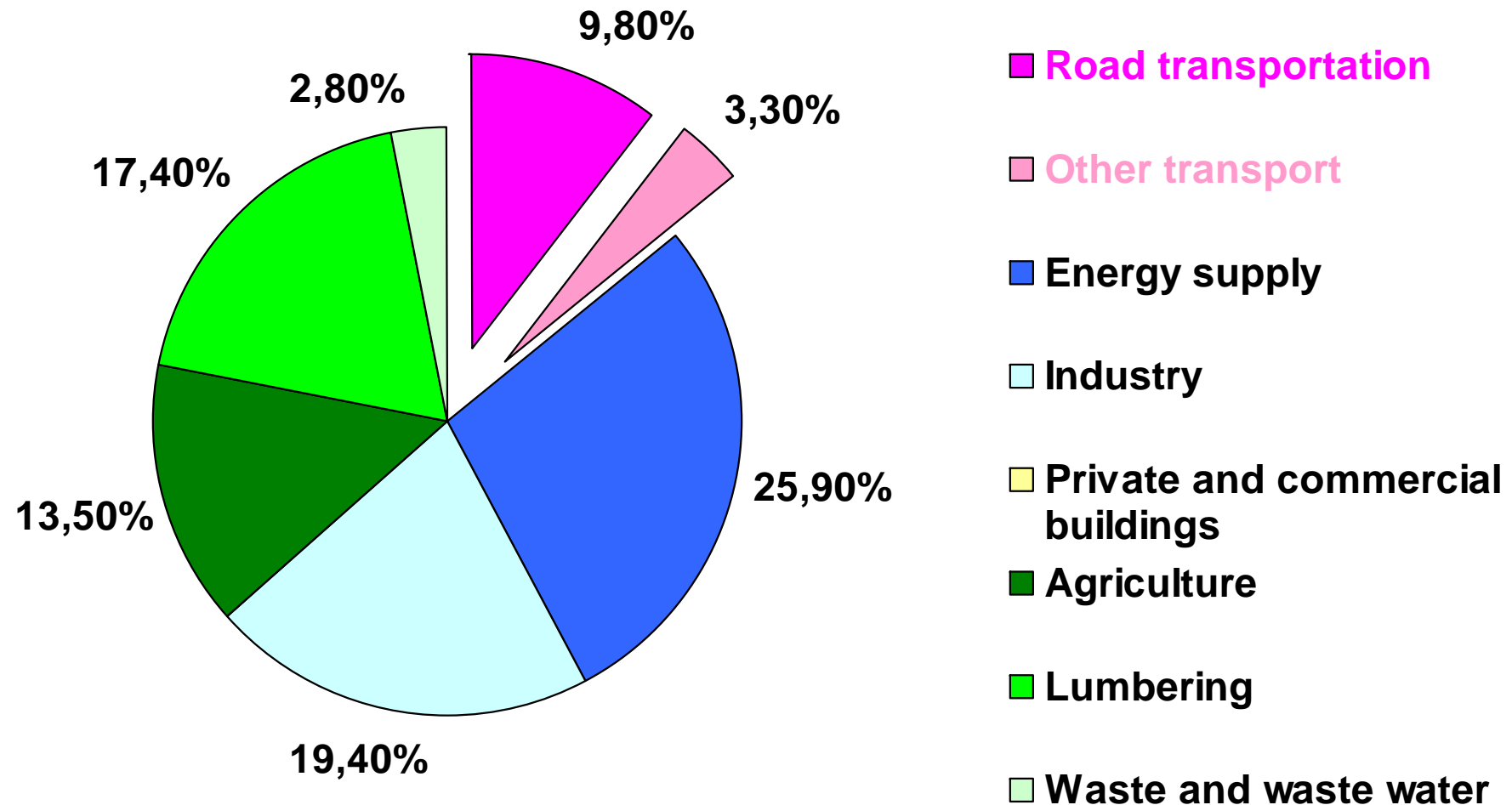
- >800 million vehicles
- 6.6 billion inhabitants (2 out of 5 live in China and India)
- 50% of the population is urban
- 24% of CO₂ emissions and 60% of fuel use are transport-related



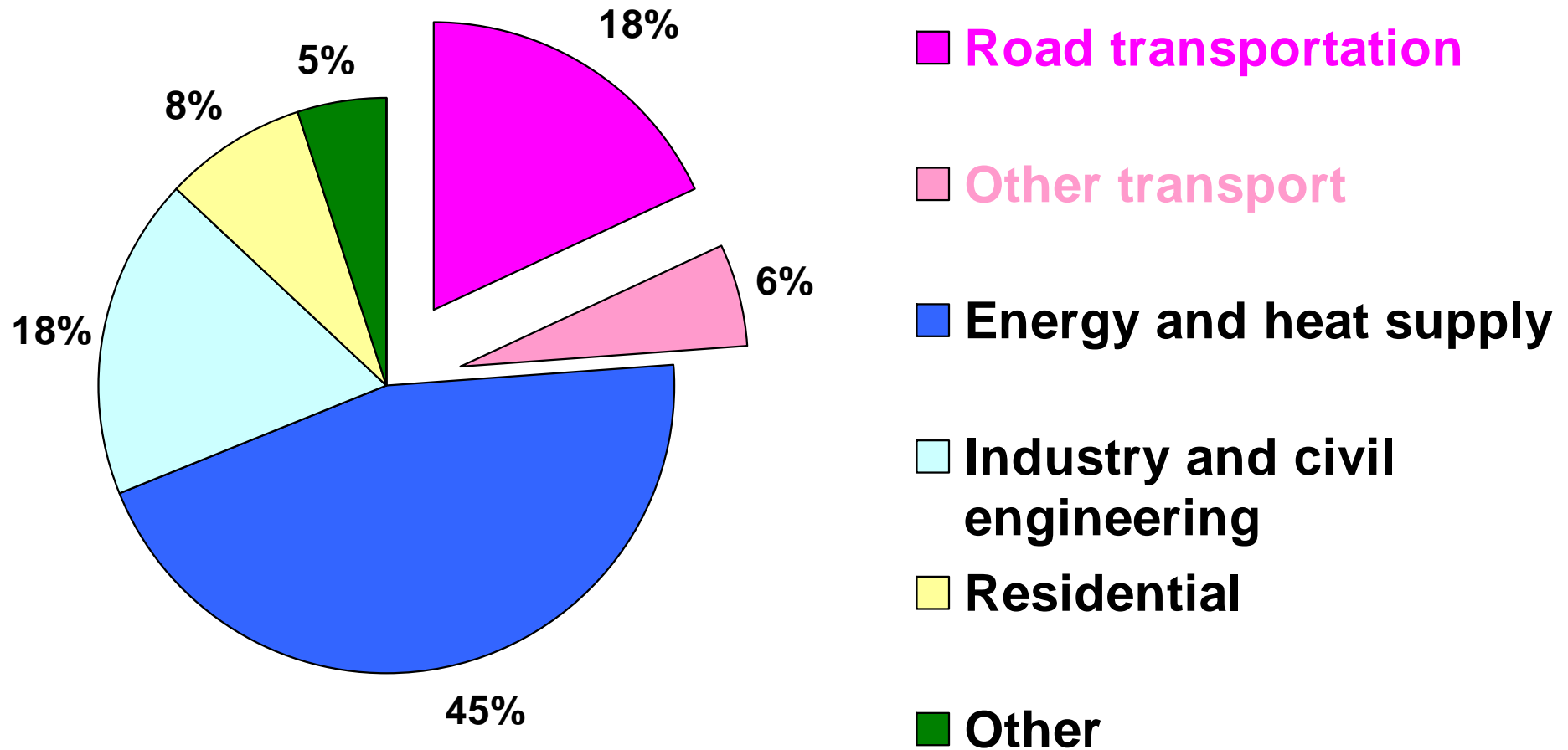
2050

- >>1,500 million vehicles?
- 9 billion inhabitants?
- 70% of the population is urban?
- >30% of CO₂ emissions and >75% of oil uses are transport-related?

GHG emissions: transportation plays a significant role

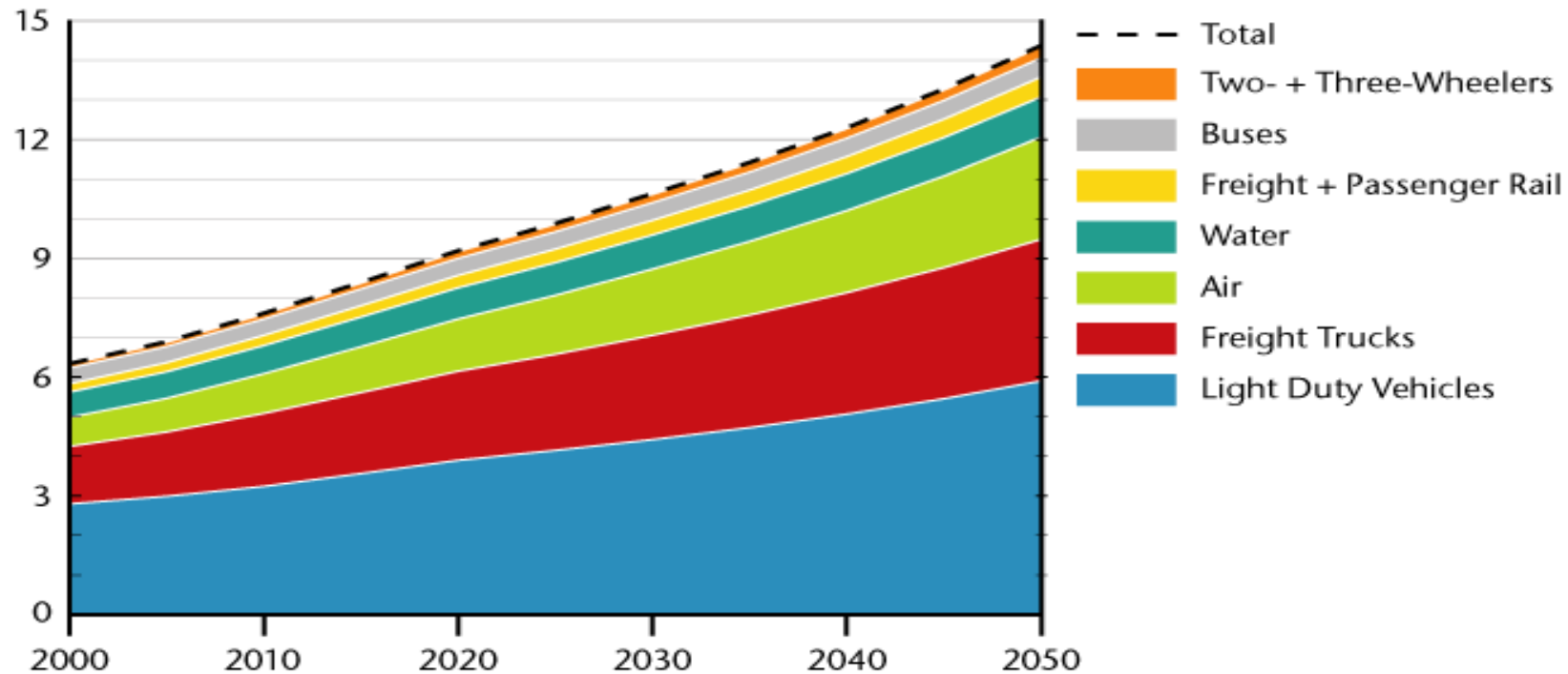


CO₂ emissions: transportation plays a critical role



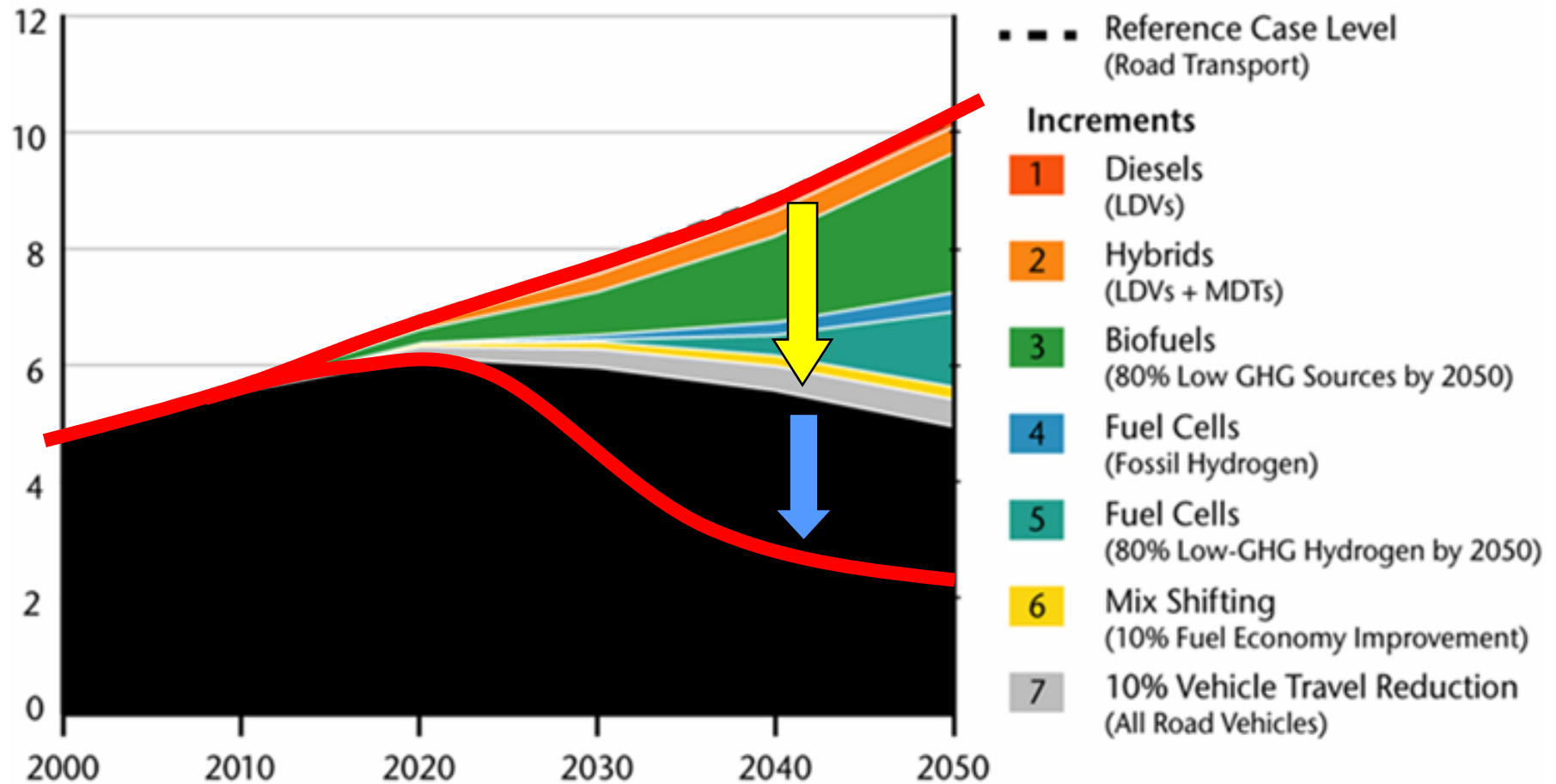
Transport CO₂ emissions forecast (WBCSD)

Gigatonnes CO₂-Equivalent GHG
Emissions/Year



Road transport must cut CO₂ emissions by 50%

Gigatonnes CO₂-Equivalent GHGs



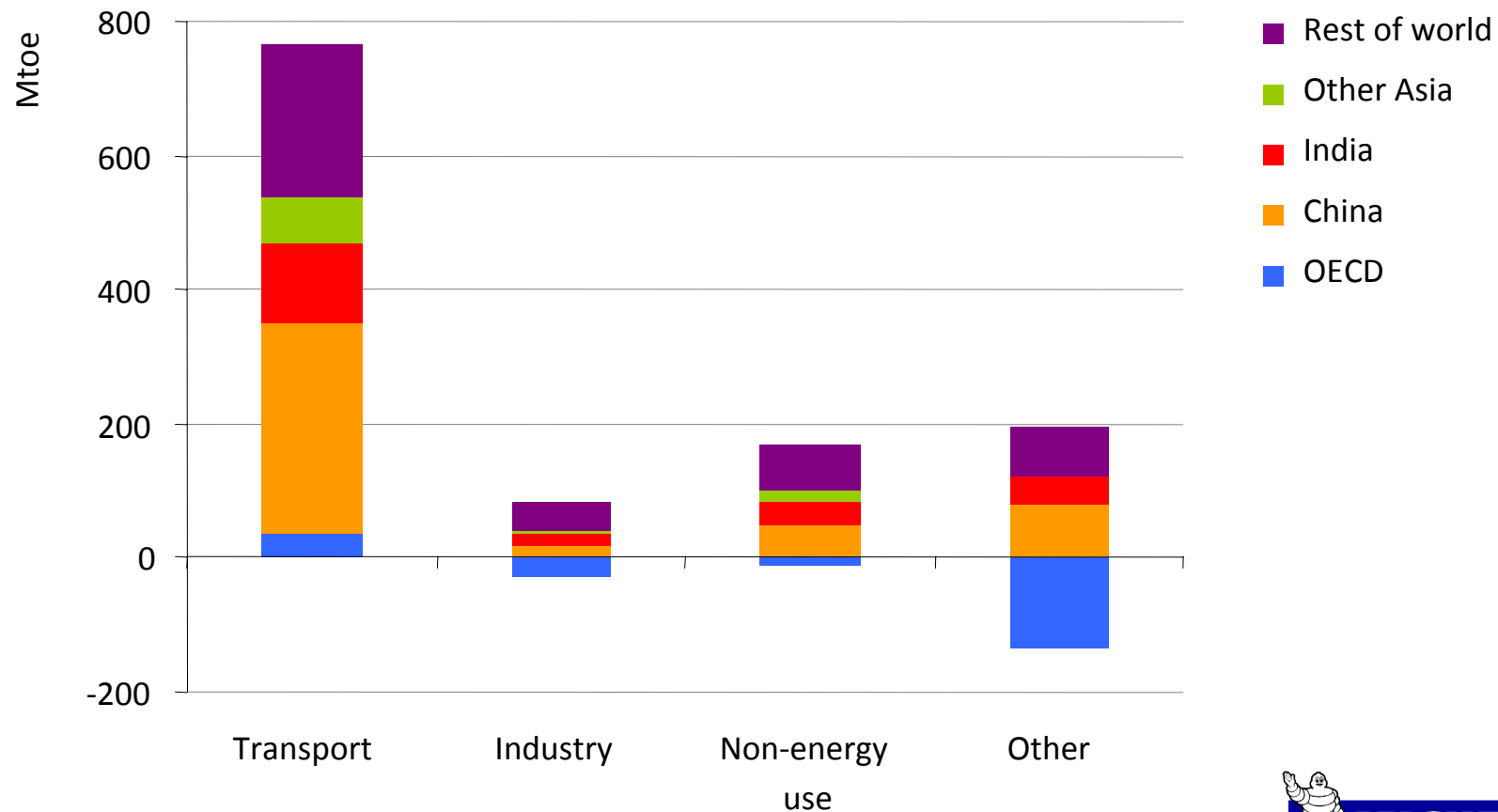
A conviction to share

- 2050 – Over 70% of the population is urban, predominantly Asian and emits half of the current CO₂: this world is significantly different from ours, particularly in terms of transportation.
- This world must be invented very soon (by 2015?); it is vital for the automotive industry...and for each of us.

Four messages to policy makers

- **1/ Road transport must play a leadership role to help reach the global objective of 50% less CO₂ by 2050. Procrastination would be dramatic for society at large and for the automotive industry.**
- **2/ Reducing energy consumption of cars by 50% is feasible with existing state-of-the-art technologies.**
- **3/ Electric vehicles can be made technically and economically viable, particularly in a rapidly urbanizing environment. It is time for road transport to stop depending solely on oil.**
- **4/ Governments and industry must “have the guts” to provoke the necessary disruptions.**

Around three-quarters of the projected increase in oil demand comes from transportation, the sector least-responsive to price changes (IEA - WEO 2008)



***« The cheap oil era is over »
Nobuo Tanaka, IEA Executive Director***



***« By design or by shock, our economy will
become decarbonized »
Achim Steiner, UNEP Executive Director***



***Let's be clear about it:
Road mobility as we know it is NOT sustainable and
the solutions contemplated
so far are not commensurate
with the criticality of what is at stake.
6 issues need to be addressed simultaneously:***



Congestion



Road (un)safety



**GHG
emissions**

Urban pollution

**Cost of
transportation**

Oil dependency

***Good news !
We are not in a dead end.***



The last edition of Challenge Bibendum has confirmed it: reducing vehicle energy consumption by 50% is achievable. Reducing CO₂ emissions by more than 50% is also achievable.



Food for thought

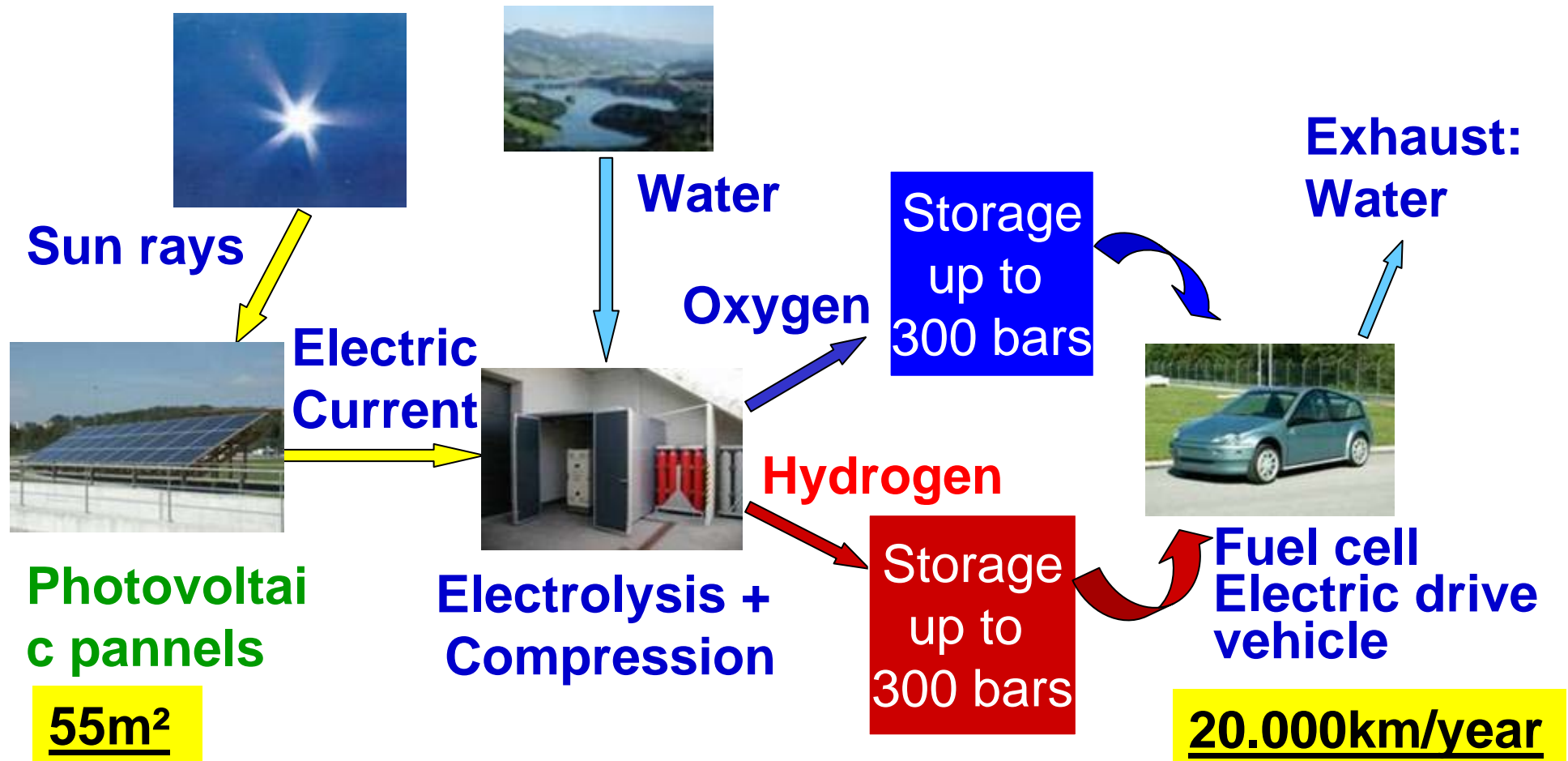


- 71g CO₂/km on the Shanghai roads with a modified Logan !

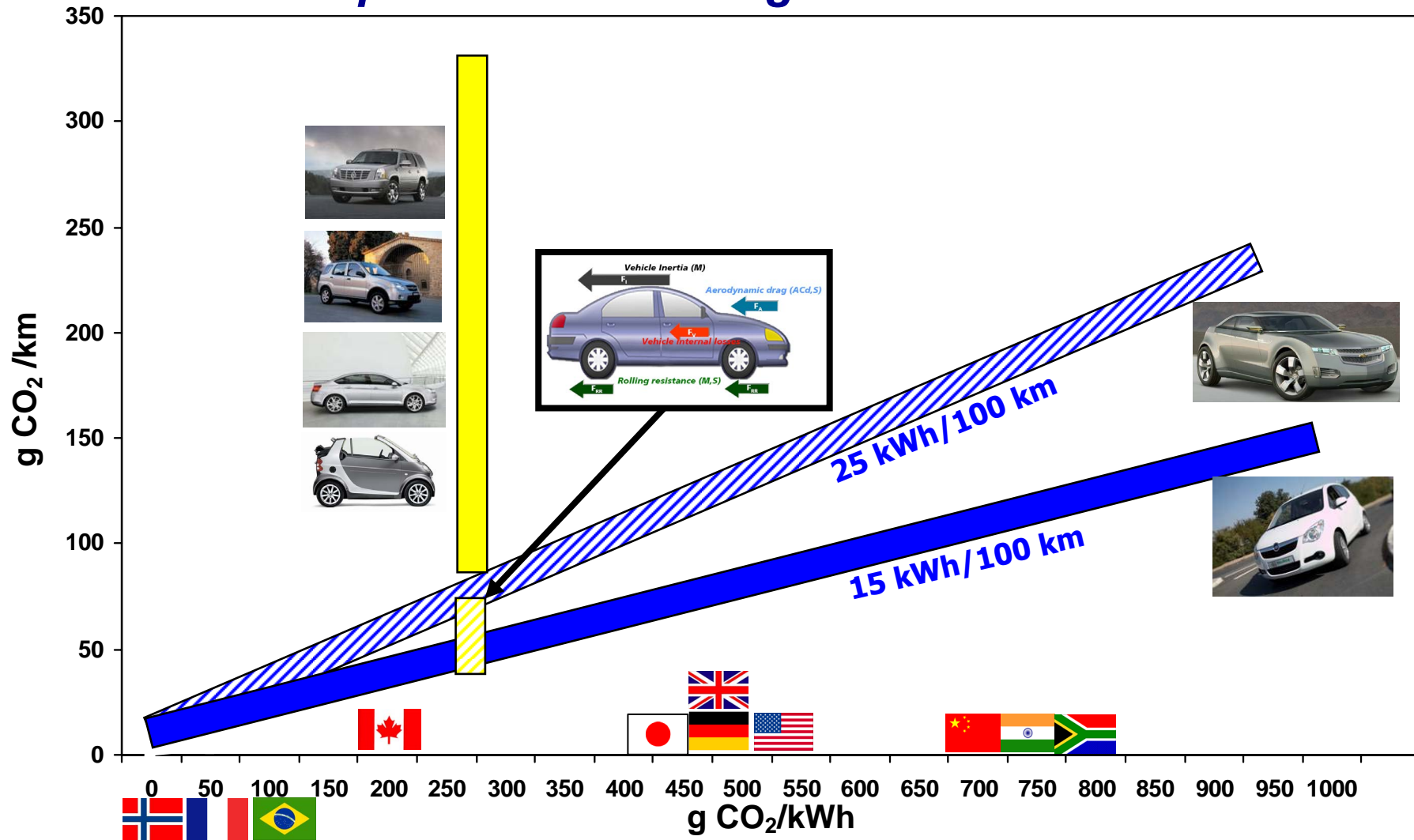


- Less than 30g CO₂/km in the last Monte Carlo rally with a Michelin demonstrator !

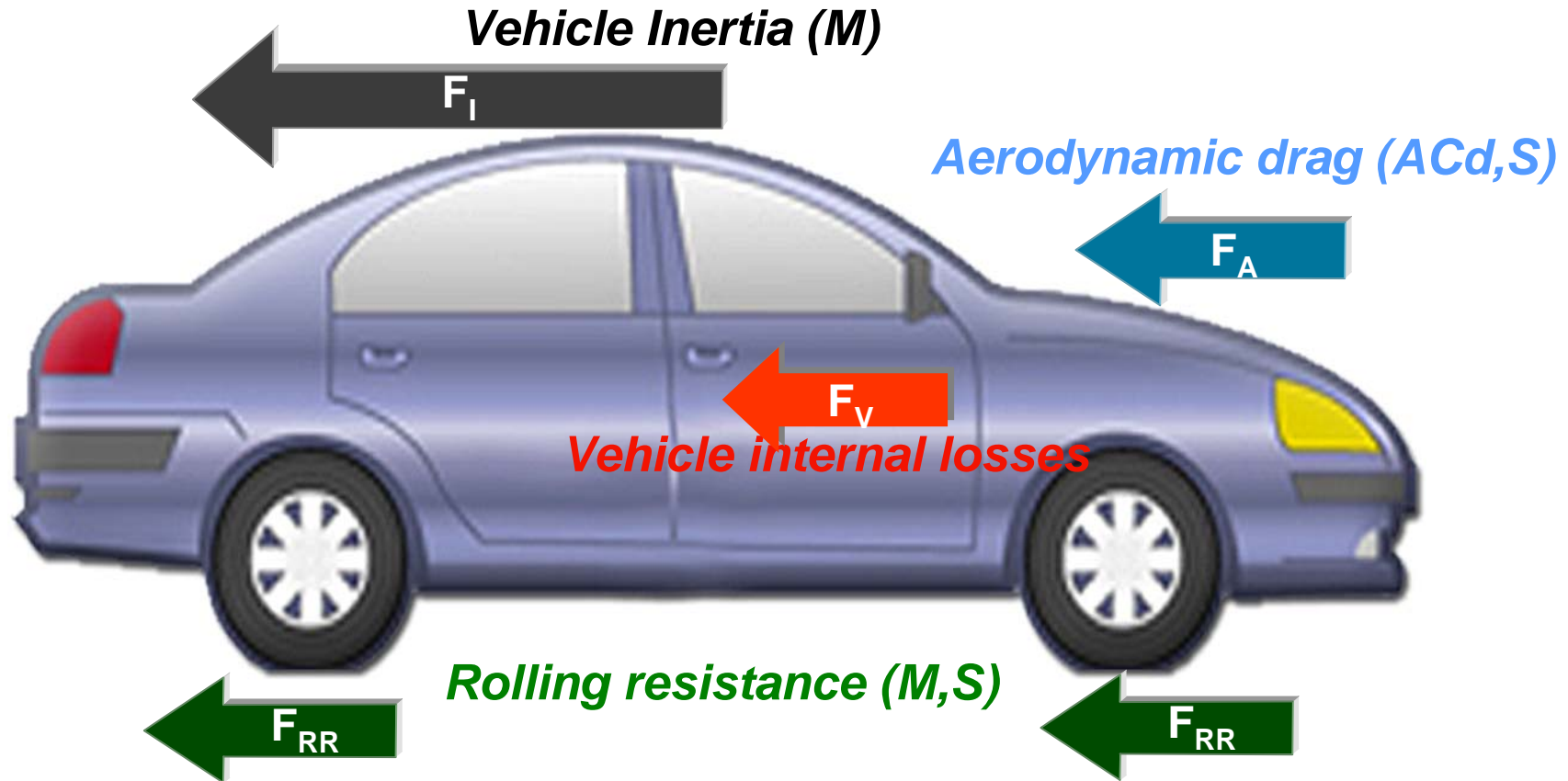
Food for thought: an integrated vision of modern, clean mobility!



Worldwide comparison of well to wheel CO₂ emissions per km driven with a battery powered car (15 kWh or 25 kWh/100 km) and ICE powered cars using oil-derived fuels



Why so much energy consumption?



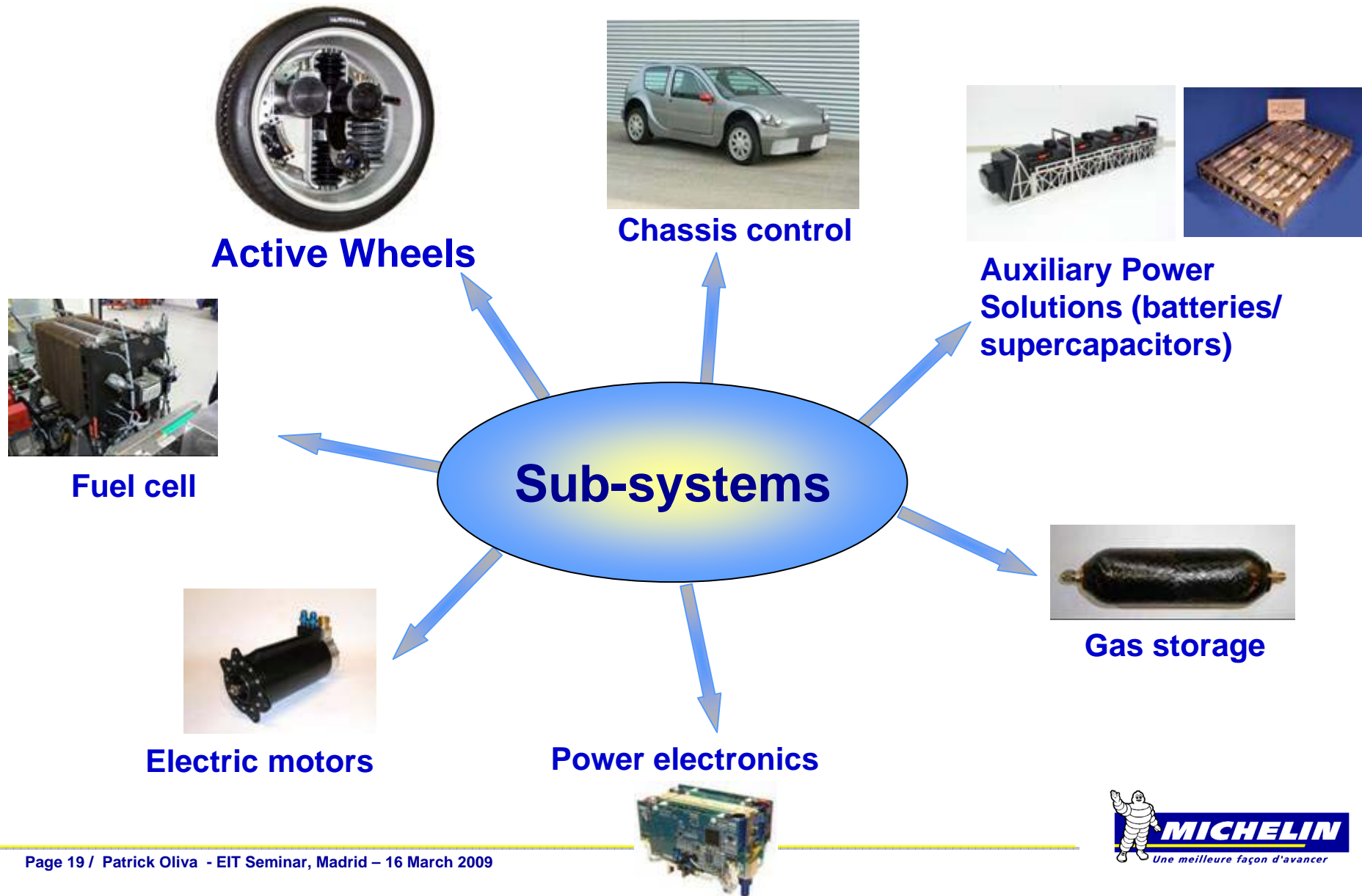
- 1- to overcome (often excessive) resistances
- 2- because engine efficiency is not terribly good (<30%) ... and even pretty bad in urban conditions!

Some common sense solutions

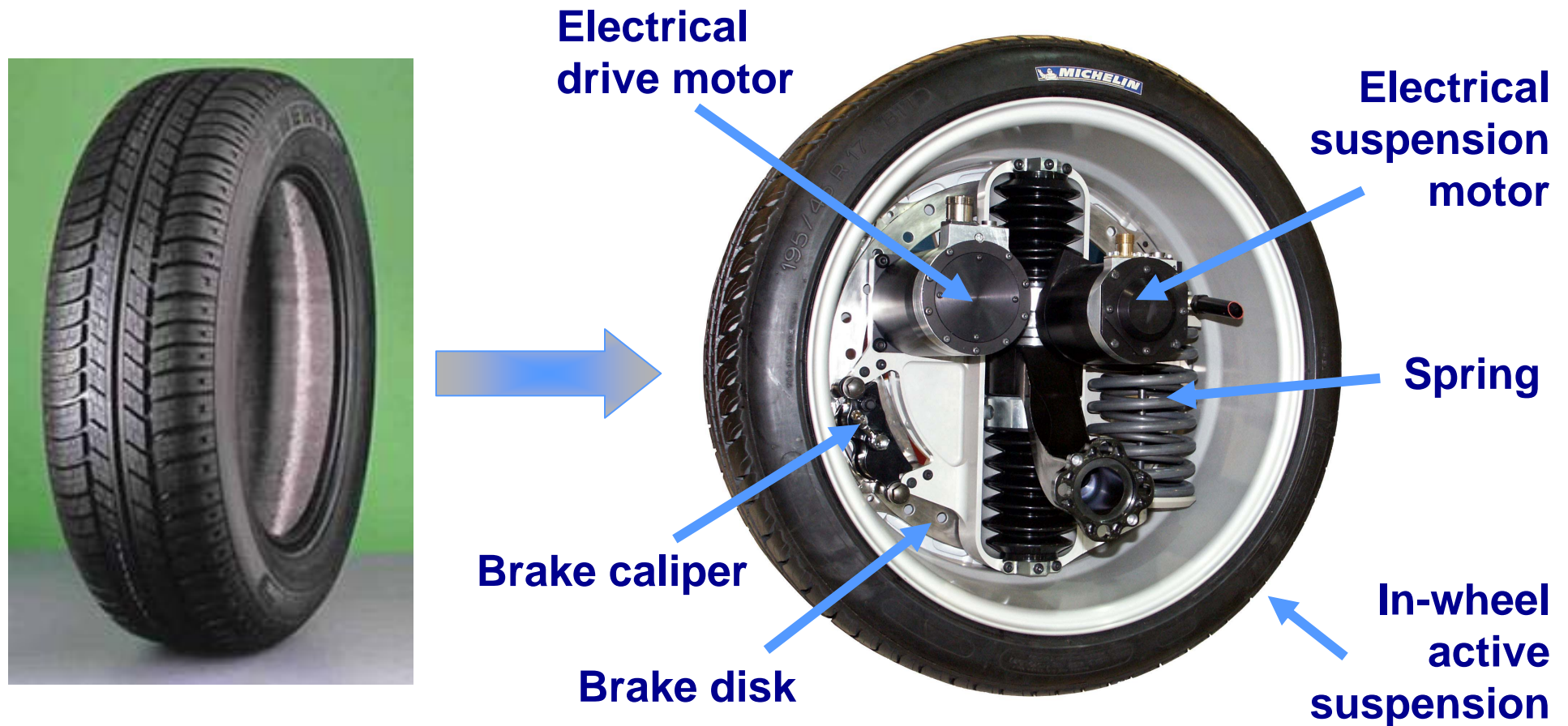
- Optimizing aerodynamics
- Choosing the right tires
- Working on mass
- Adapting the vehicle to its purpose
- Adapting GMP to urban reality



Sub-systems for mobility (EVs / HEVs)



Michelin Active Wheels



Would you buy or lease such an EV?

- **5 seats, L: 3,74m**
- **0-100 km/h : 12s**
- **Autonomy: 150km to 400km**
- **Mass: 1000kg**
- **Max speed: 140km/h**
- **High speed internet connection: WIFI, 3G+, machine-to-machine communication**



EVs should achieve cost parity with advanced ICEs well before 2020 !

Venturi Volage

- 2 seats
- 4 motorized wheels
- 0-100 km/h : <5s
- Autonomy: 300km
- Max speed: 150km/h
- E-braking: 50kW



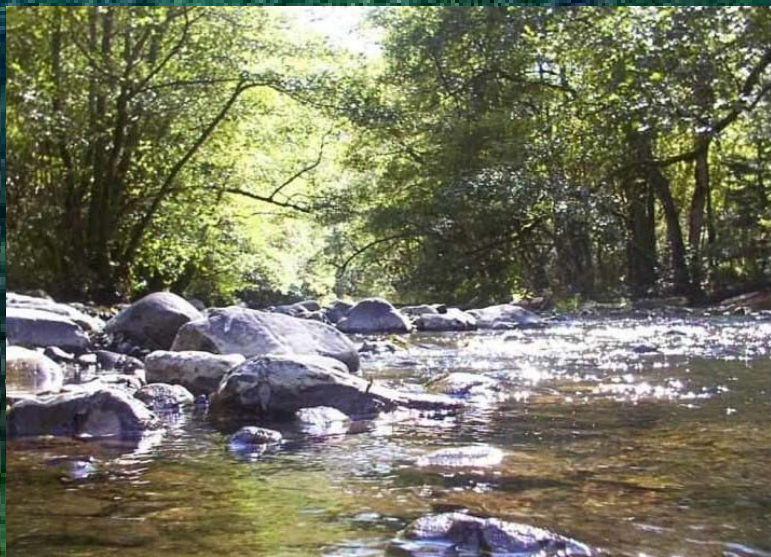
***In the face of today's
challenges, procrastinating
in terms of innovation will
lead to
price wars,
consumer weariness,
legal interventions!***



**Challenge Bibendum Rio:
May 30 – June 2, 2010**

***It is still possible to dream
about cars and tires!!!***

Thank you !



Annex

In the next 25 years, the global trends are expected to be (1)

- continued dominance of ICEs and liquid hydrocarbon fuels (with enhanced combustion efficiency, exhaust gas treatment and fuel evolutions)



Reducing ICE park CO₂ emissions

- **Reducing consumption:**

- Engine efficiency: from 30% to 40%
- Cylinder reduction
- Vehicular mass reduction
- Aerodynamic, tire and internal friction optimization
- (in cities) benefiting from hybrid technology,
- Evolution of the vehicle mix,
- Reduced use?

- **Diversifying fuel sources
multi-fuel technologies)**

- Bio-fuels
- Natural gas
- Hydrogen, synthetic fuels (GTL + CTL)



In the next 25 years, the global trends must be (2)

- dynamic market penetration of hybrid vehicles (featuring various degrees of hybridization) and electric vehicles.
- ZEV mode development

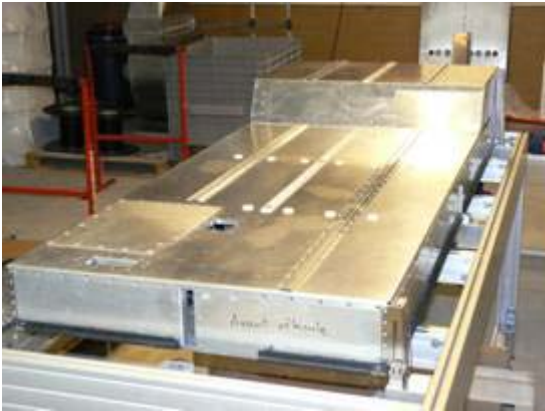
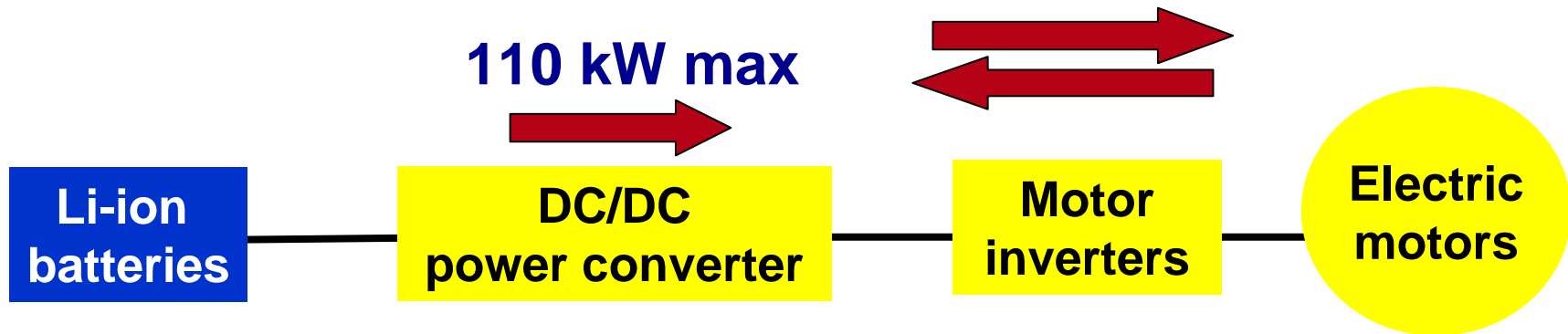


In the next 25 years, the global trends are expected to be (3)

- **significant development of:**
 - **combined active and passive safety systems,**
 - **car-to-car and car-to-infrastructure communication,**
 - **ITS technologies**
- to enable (in particular), cars to be both lighter and safer.**



Energy management principles



Cost? Status?

- Total cost of ownership after 5 years: better than with conventional cars
- Unrivalled comfort due to electric drive and electric suspension
- Unmatched road handling performance and safety
- Exceptional torque and acceleration
- Unprecedented interior space
- Big step into modernity