

Energy and Environment: Key challenges for the automotive industry

Dr Philippe Schulz, Renault



THREE MAJOR ENVIRONMENTAL CHALLENGES AT THE SAME TIME ...



**URBAN AIR
POLLUTION**



**GLOBAL
WARMING**



**RESOURCES
DEPLETION**

... THREE OPPORTUNITIES FOR RENAULT



**ENVIRONMENT
& HEALTH**



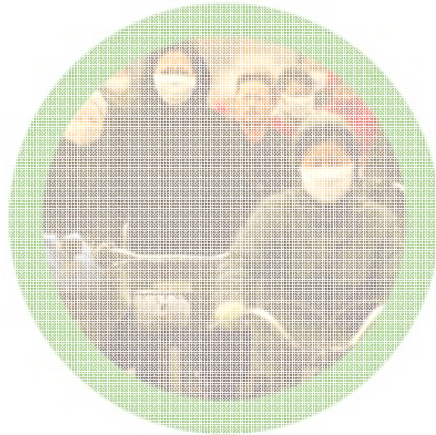
TOP 3 CO₂



**LIFE CYCLE
...UP TO RECYCLING**

FOCUS ON CO₂ & ENERGY CHALLENGES

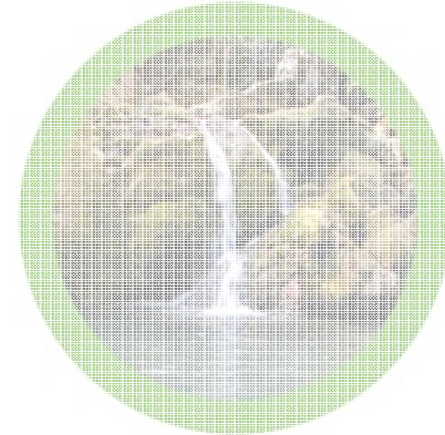
CO₂ reduction = Fuel economy



ENVIRONMENT
& HEALTH



TOP 3 CO₂

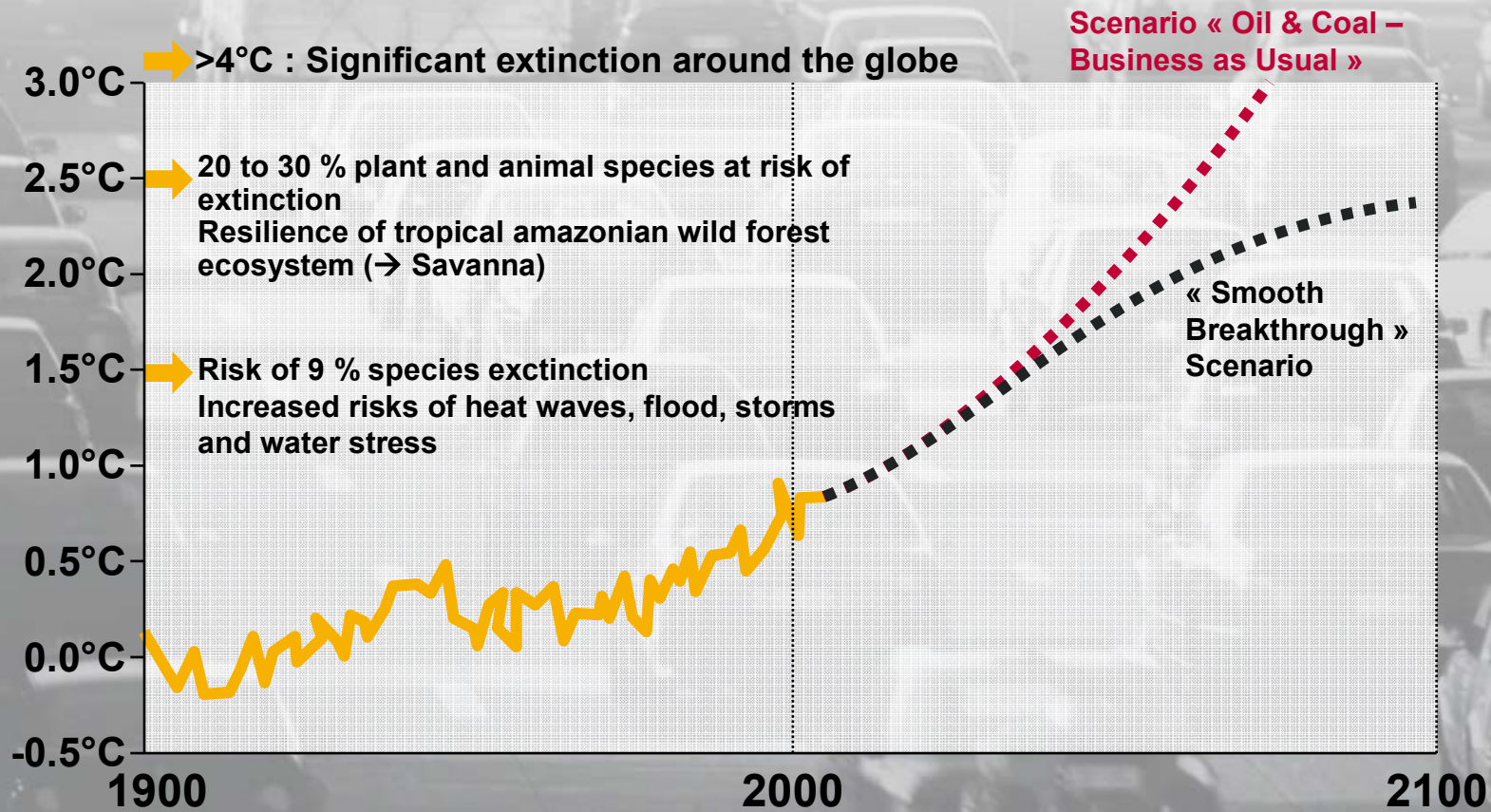


LIFE CYCLE
...UP TO RECYCLING

GLOBAL WARMING – CO₂ & Energy

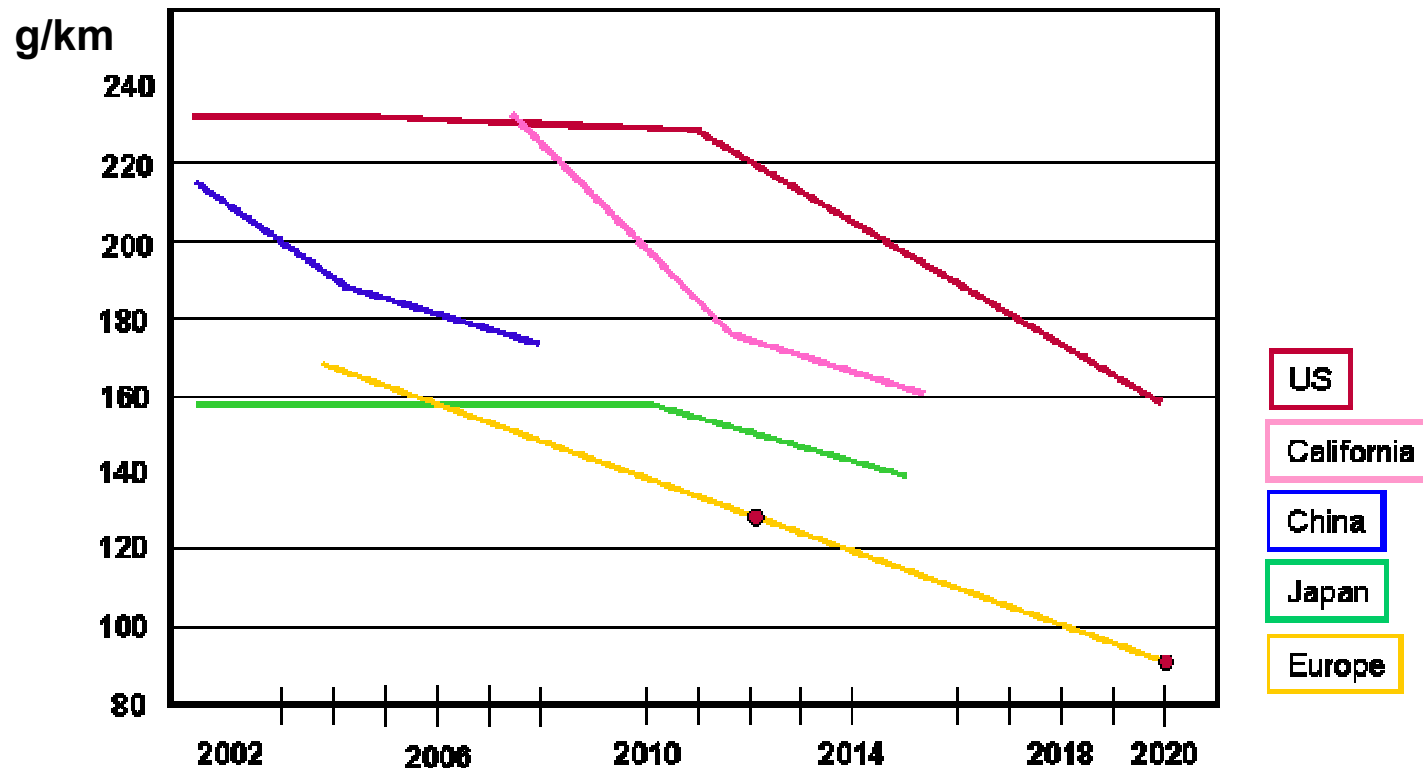
IPCC 2007 STUDY ON CLIMATE CHANGE

AVERAGE EARTH TEMPERATURE INCREASE SCENARII



Cars and anthropogenic CO₂ emissions

- Personal cars are responsible of about 12 % of the European CO₂ emissions
- Europe takes the lead of car CO₂ emission reduction (confirmed by Dec 19, 2007 Proposal of EU Commission)



How to reduce fuel consumption ?

- **A global energy approach**

- ✓ Energy use
- ✓ Best use of energy (cost/benefit and CO₂ WtW analysis)
- ✓ Low carbon fuels

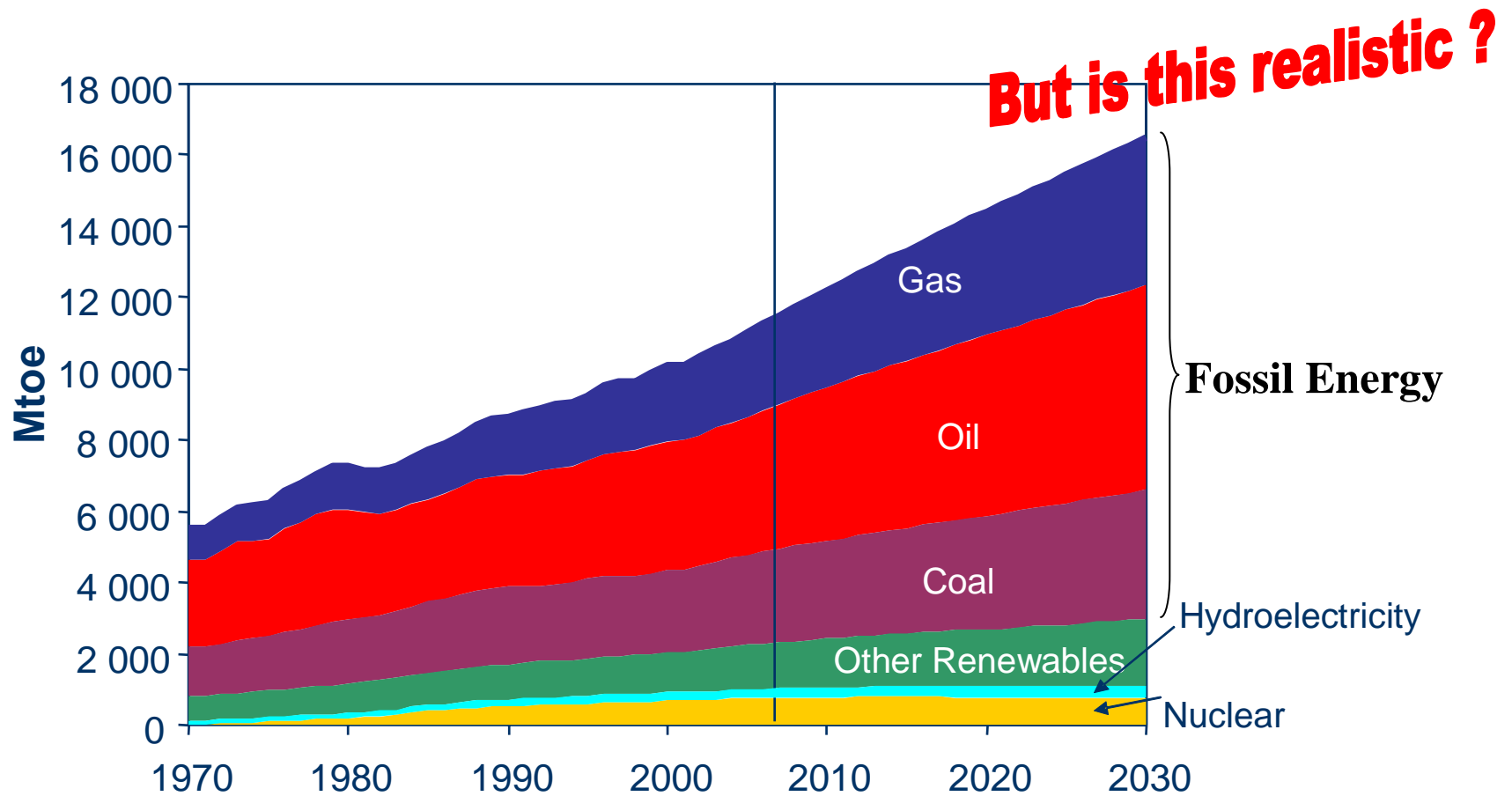
- **An individual vehicle-based approach**

- ✓ CO₂ valuation of technology and customer value
- ✓ Roadmaps and new business models: EV



An unsustainable appetite for energy

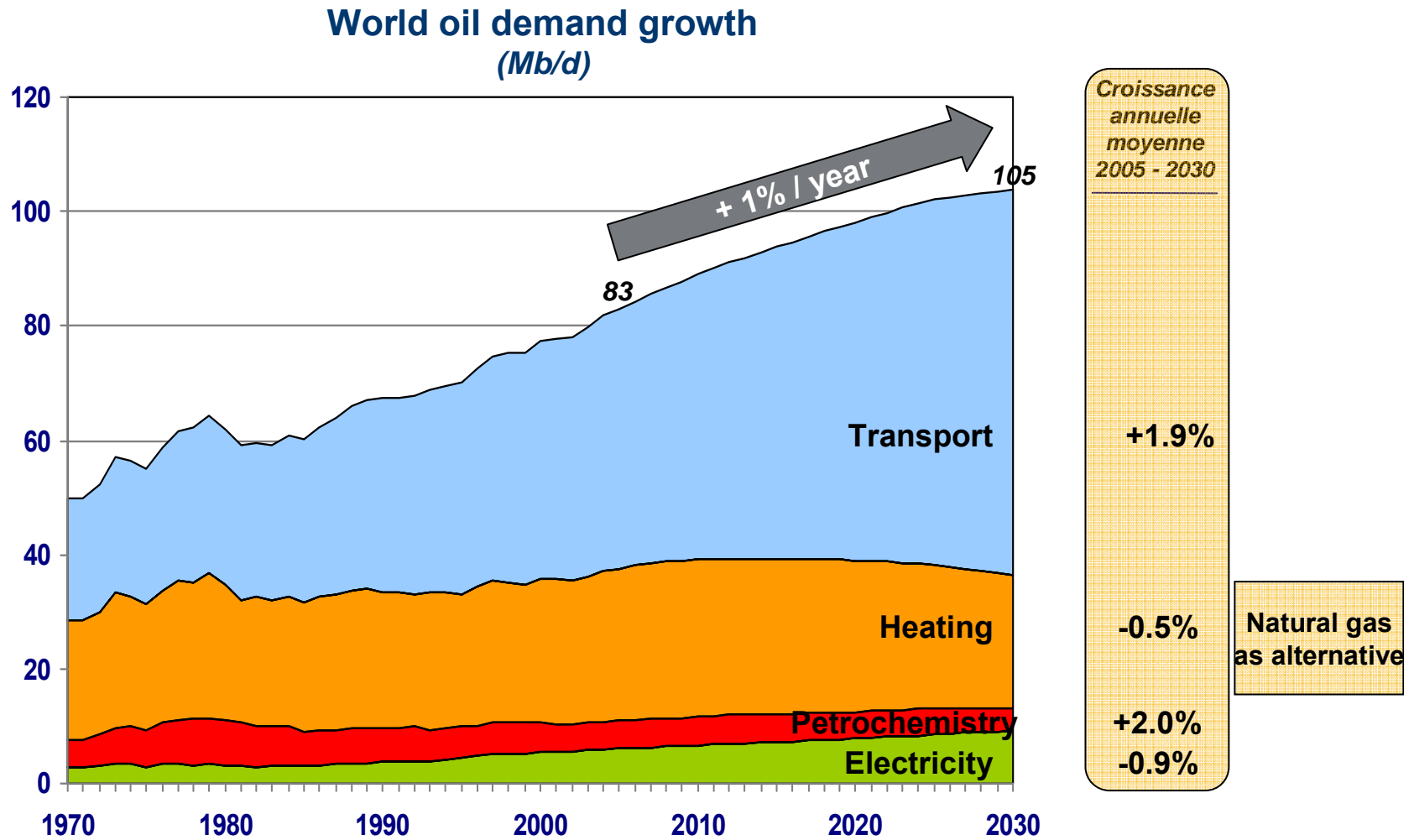
Current IEA scenario plans increasing demand by 52%,
mainly through Fossil Energy



Source: IEA



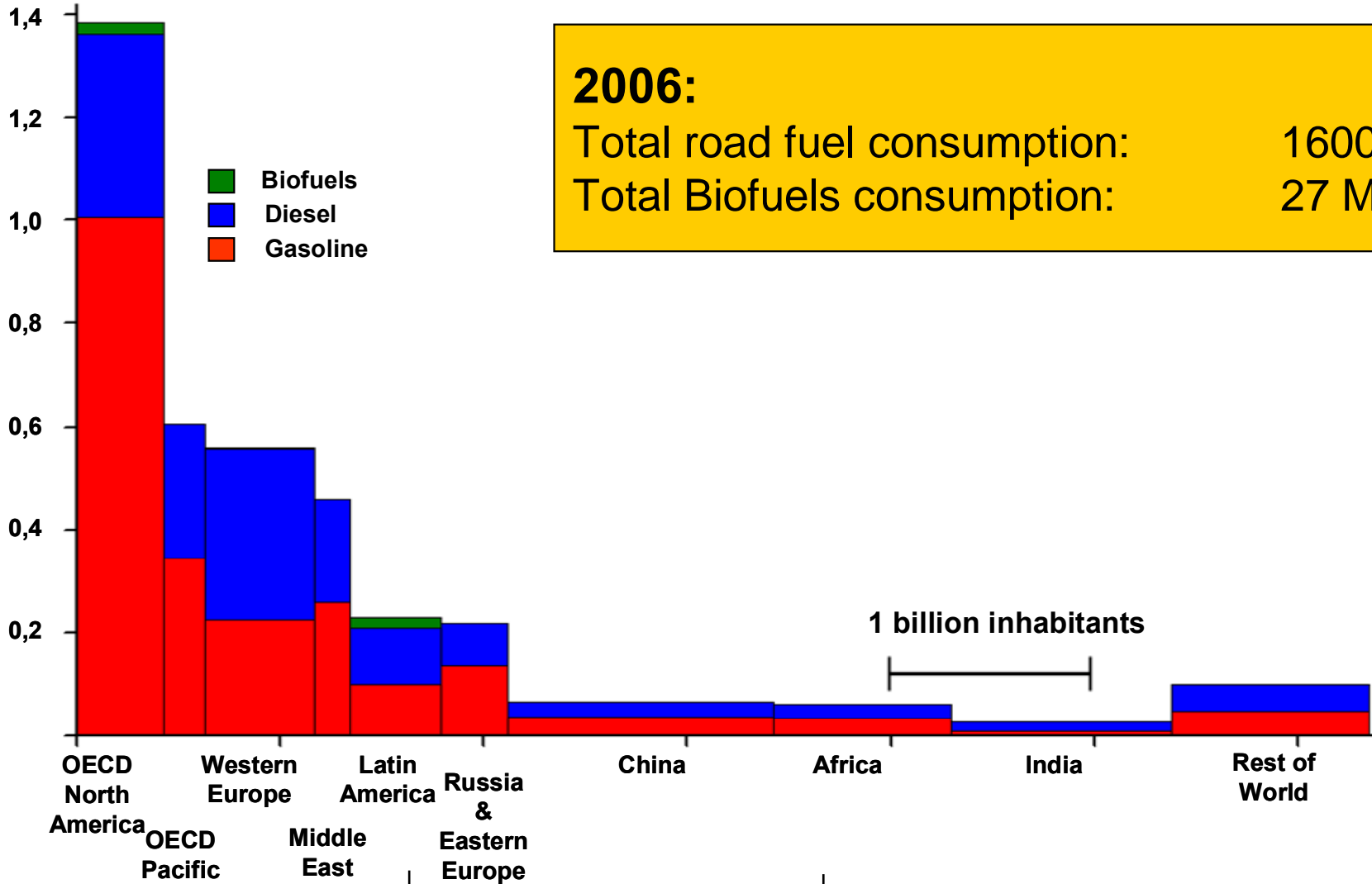
Oil use: More and more for Transport...



- ✓ Oil & Transport: more than 50 % of usages in 2005 and 65 % in 2030
- ✓ Only alternatives are biofuels, gas (CNG, LPG) and electricity

On-road fuel consumption worldwide...

Tons of oil equivalent per capita and per year



2006:
 Total road fuel consumption: 1600 Mtoe
 Total Biofuels consumption: 27 Mtoe



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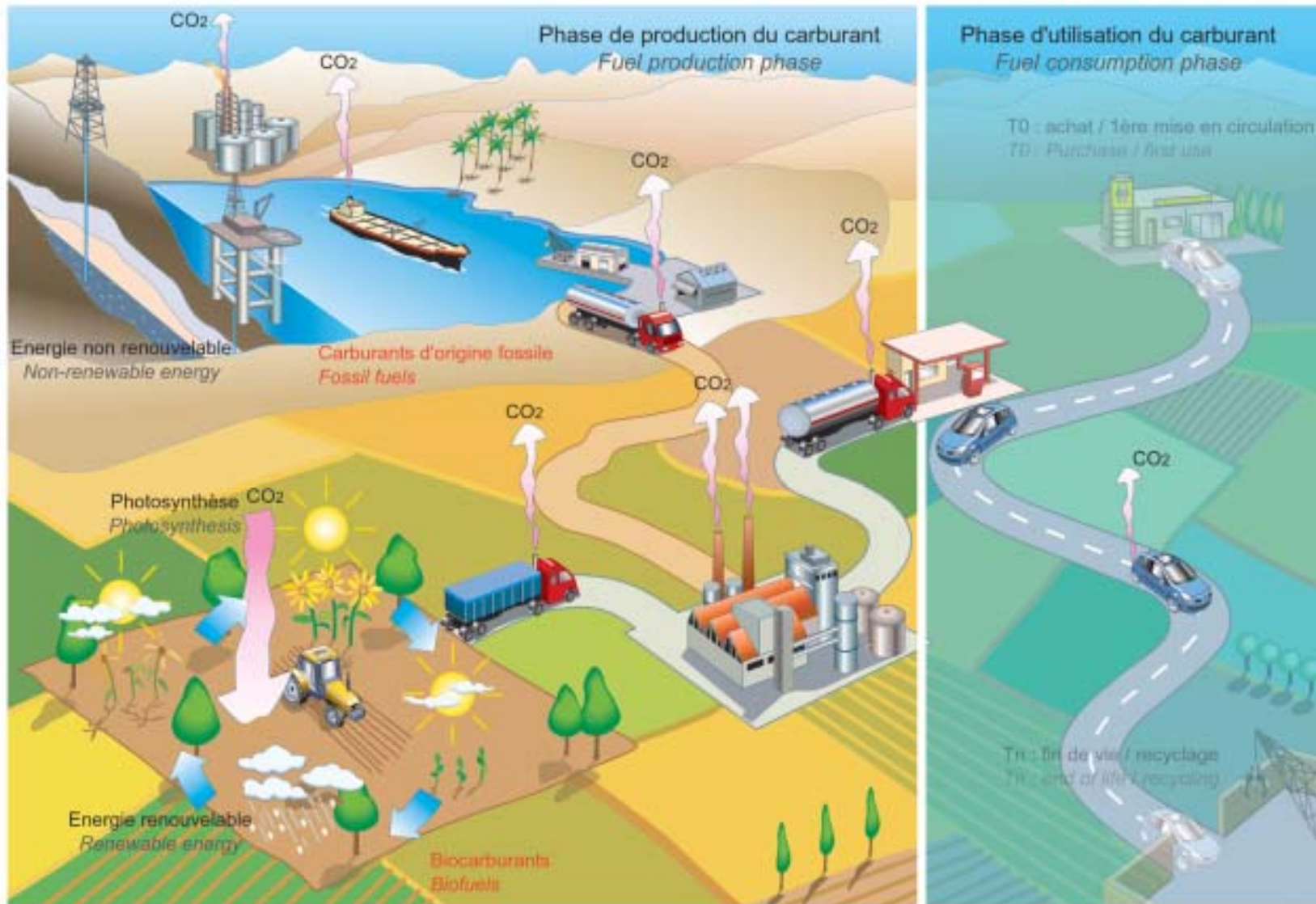
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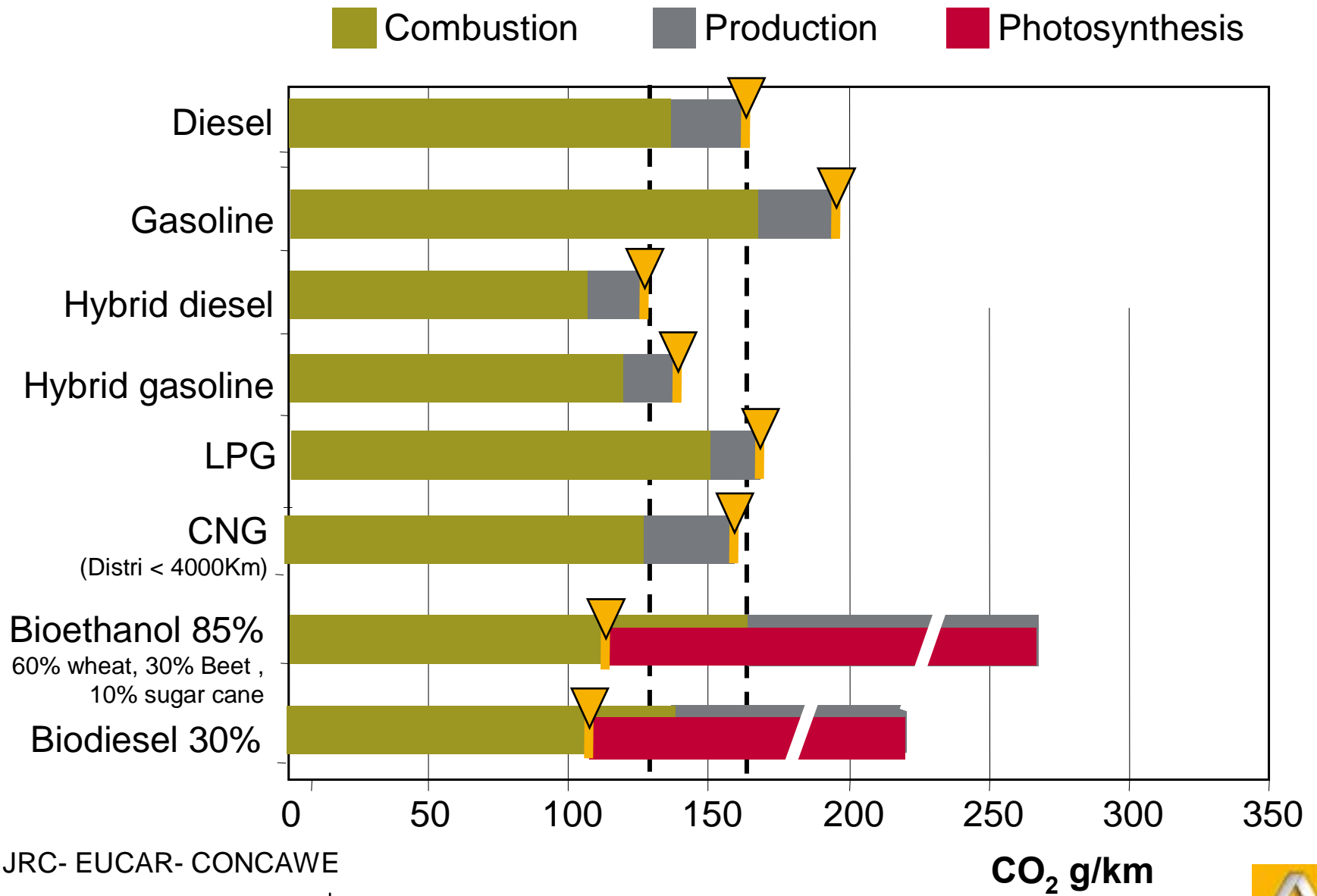


Well to Wheels CO₂ analysis



Approche du "puits à la roue"
"Well to wheels" approach

Well to Wheels CO₂ analysis



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Fuel Economy and CO₂ reduction at Renault

Already a long history of progress

Gasoline



Clio I	1991	8,2 l - 193 g/km
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Clio II	1999	6,7 l - 158 g/km
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Clio III	2007	5,9 l - 139 g/km
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Diesel



R19	1993	6,5 l - 172 g/km
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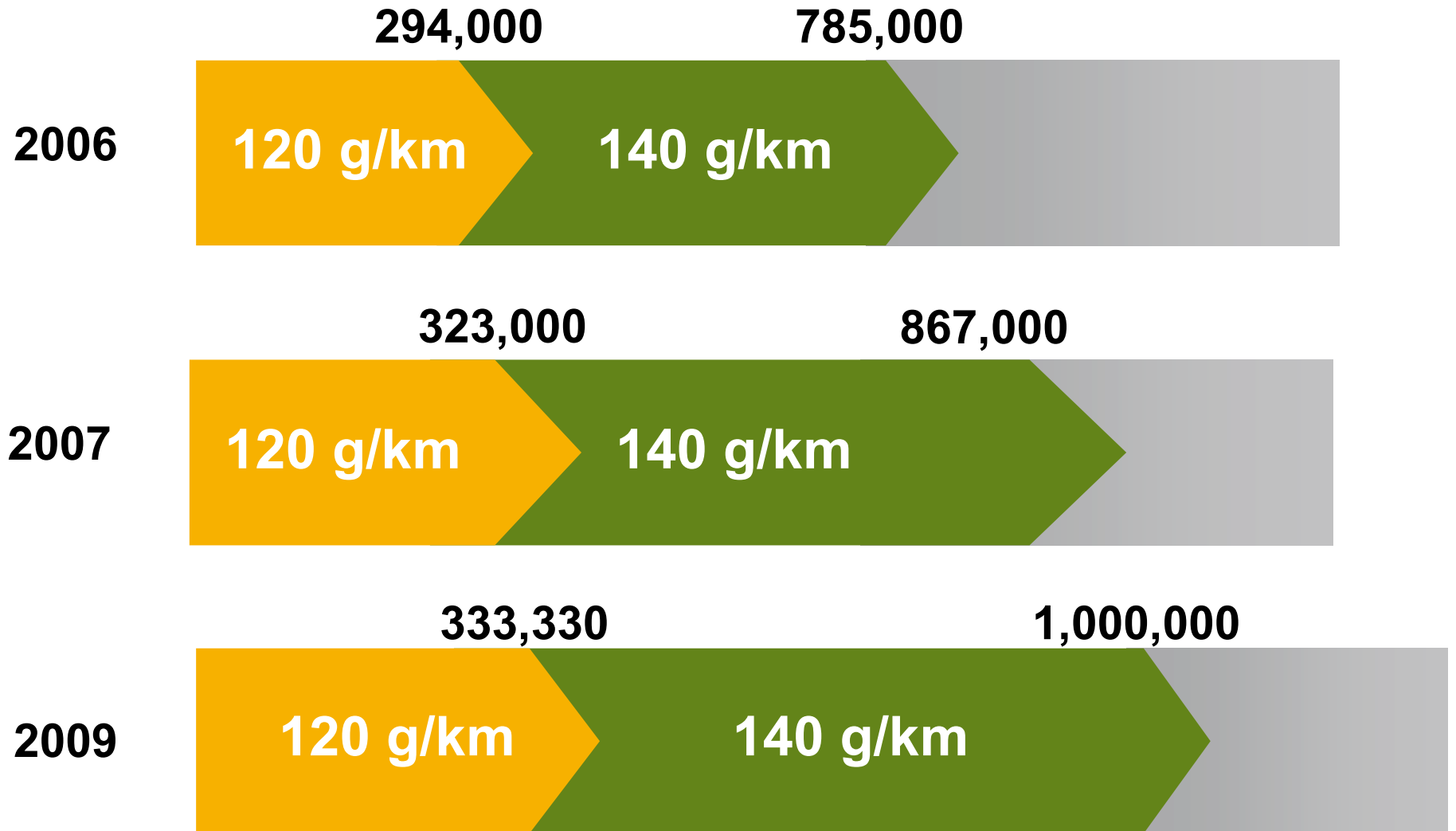
Mégane I	2000	5,2 l - 138 g/km
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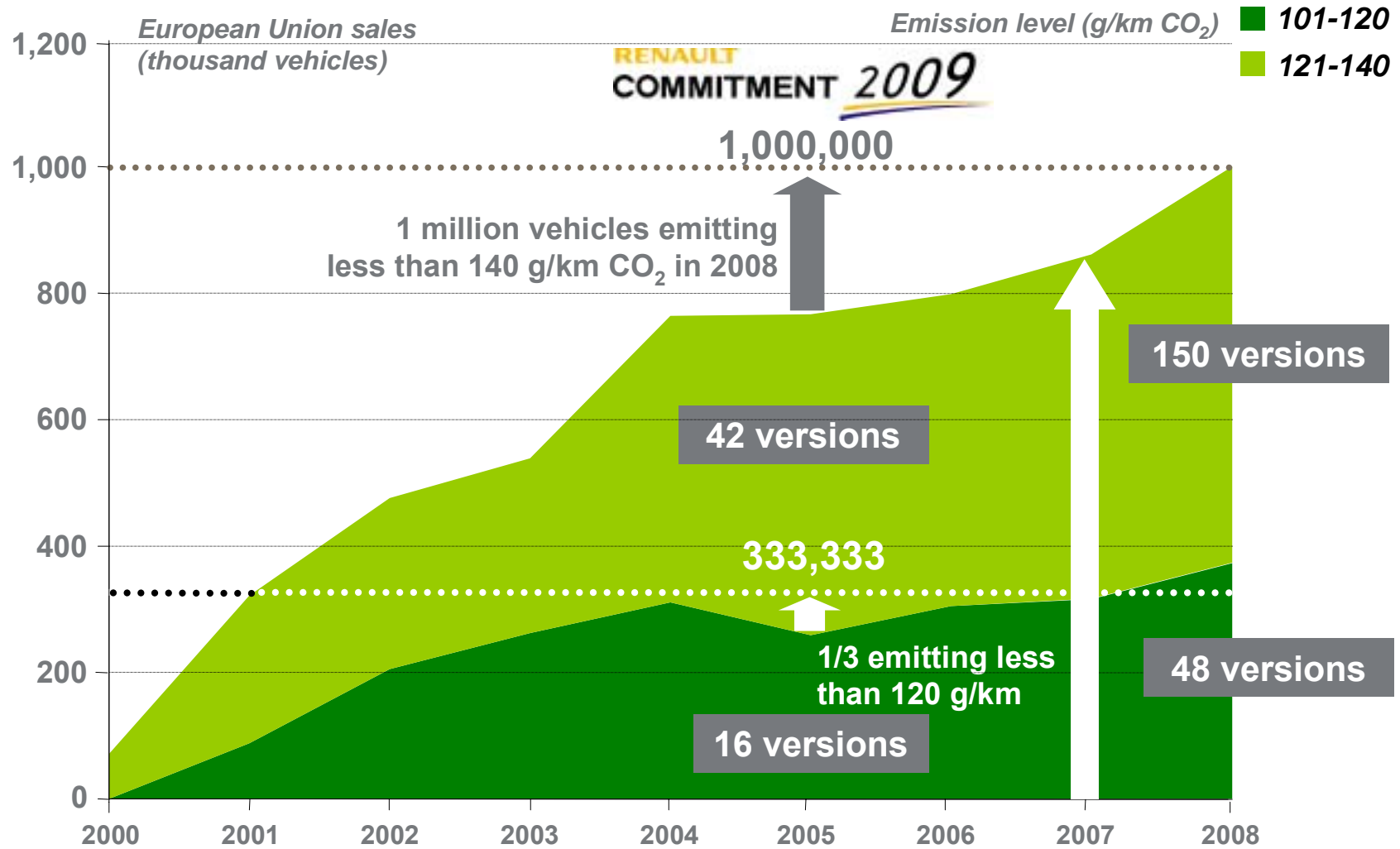
Mégane II	2006	4,5 l - 120 g/km
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Renault Commitment 2009

Be in the top three in terms of CO₂ emissions reduction

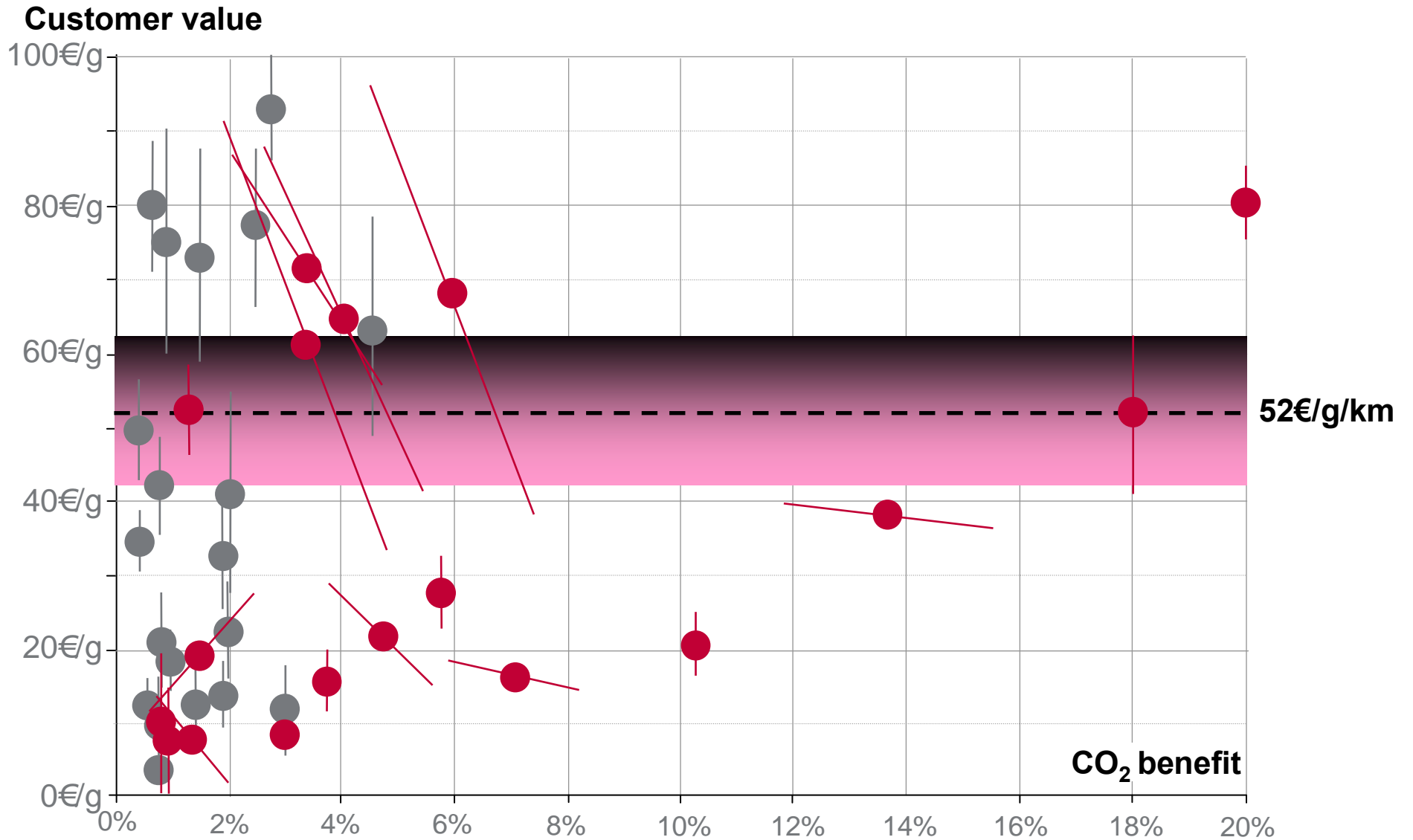


A WIDER OFFER UNDER 140 g/km CO₂ IS A MARKET OPPORTUNITY



CO₂ Technologies

- Vehicle management
- Powertrain technologies



Renault eco² signature introduced in May 2007...



Low fuel consumption, tax management, affordability to a wide majority of customers supported by the ecological efficiency.

ECOLOGICAL & ECONOMICAL

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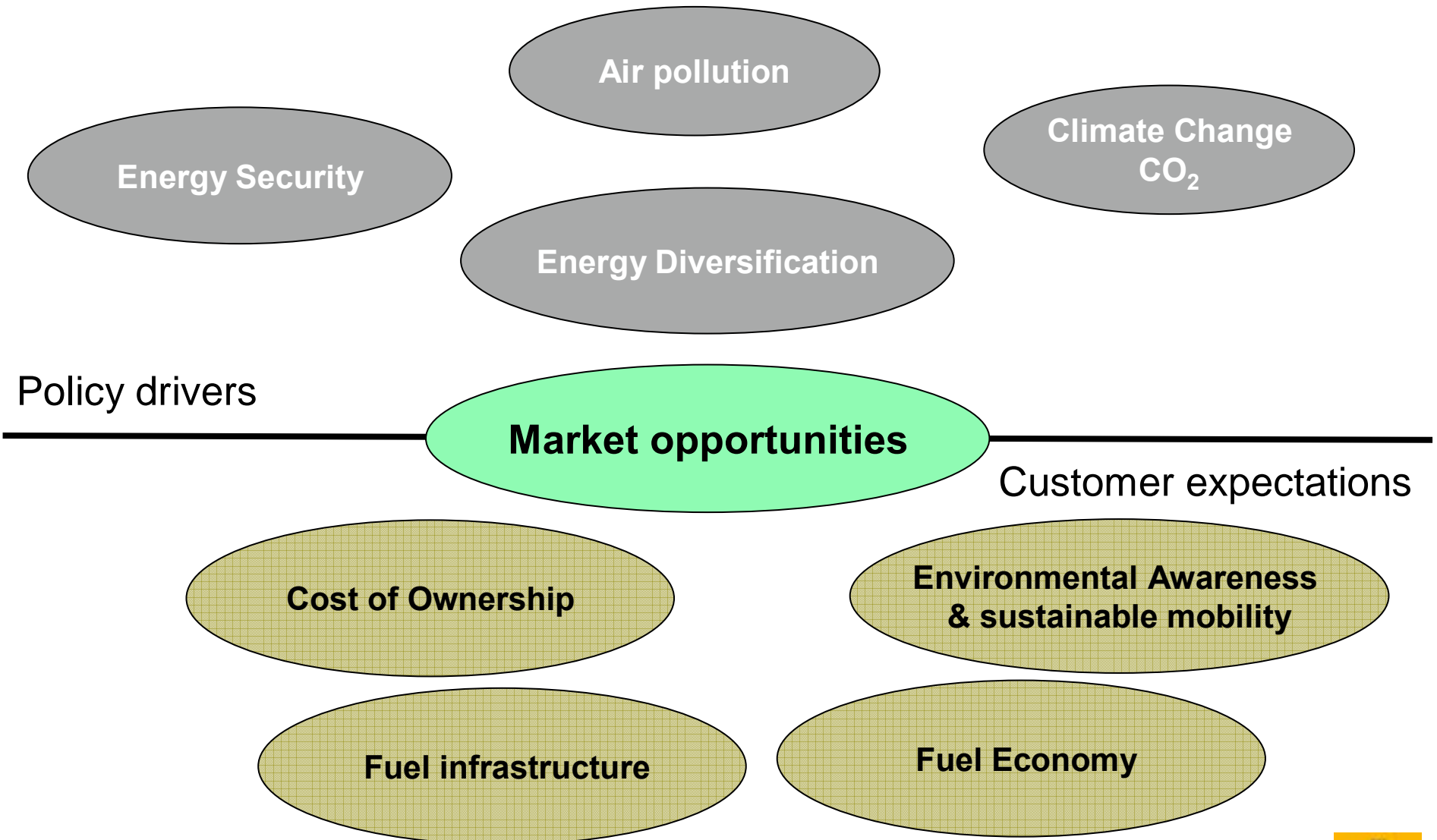
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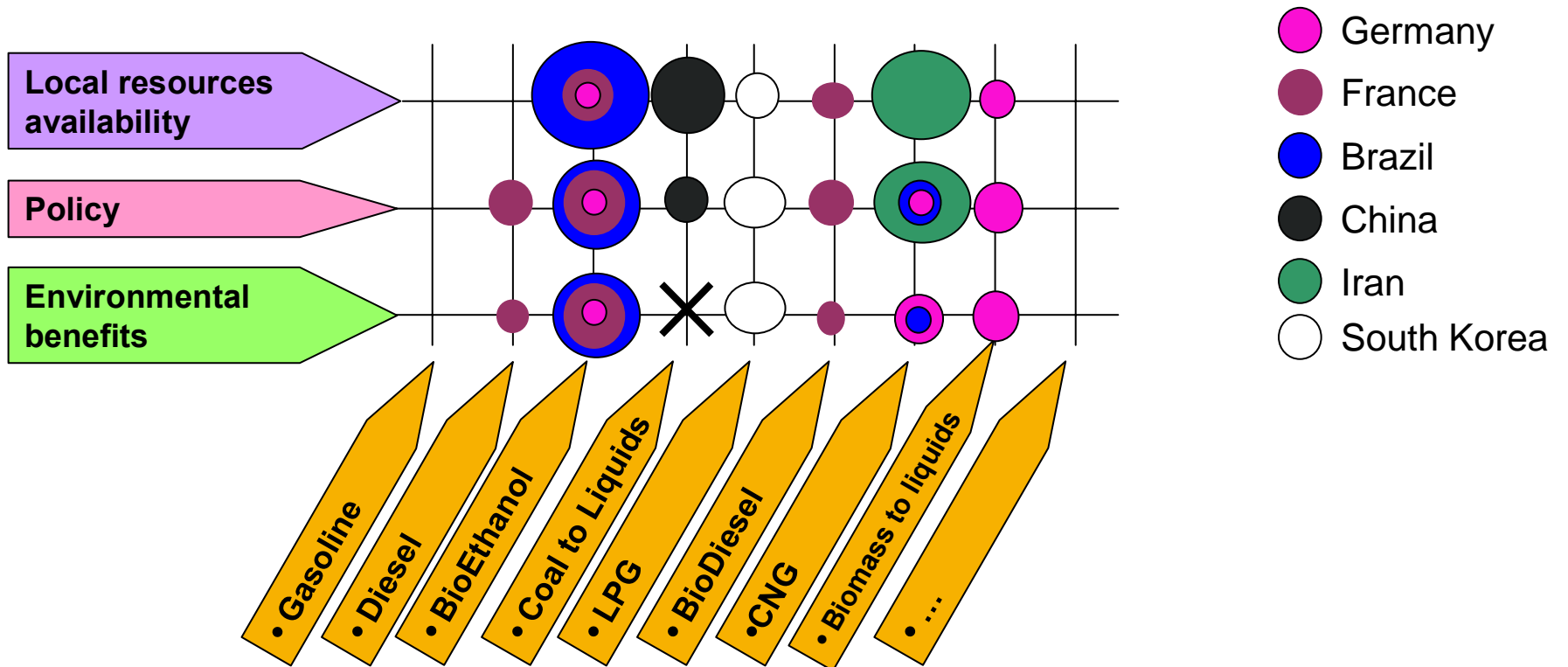
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A favourable context to new energy paradigms in Transport



Fuel markets more complex and diverse



And EVs ?



What's new on EVs ?

- 1842 : first electric car built by Davidson
- 1899 : first electric race car to exceed 100km/hr








- 1925 : Renault electric car assembly line



- 1997 : The Praxitèle experience
- 1998+: The electric Kangoo

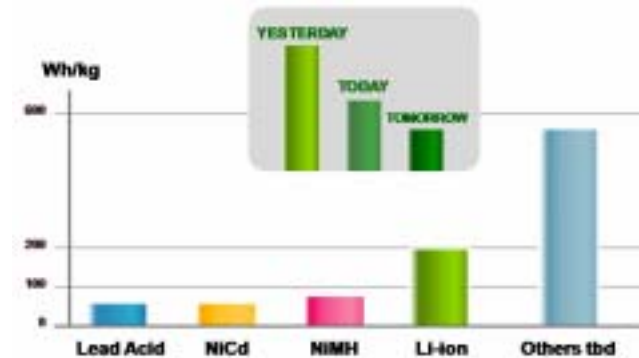


Electric cars : advantages and drawbacks

- **Zero exhaust gas emission** 
- **Torque at low speed** 
- **Silence** : noise-free engine, only rolling noise  
- **Autonomy** : low energy density of batteries vs liquid fuels 

Three reasons for a massive deployment of electric cars during the next decade

- 1. Technology & Cost



- 2. Sociology & Market

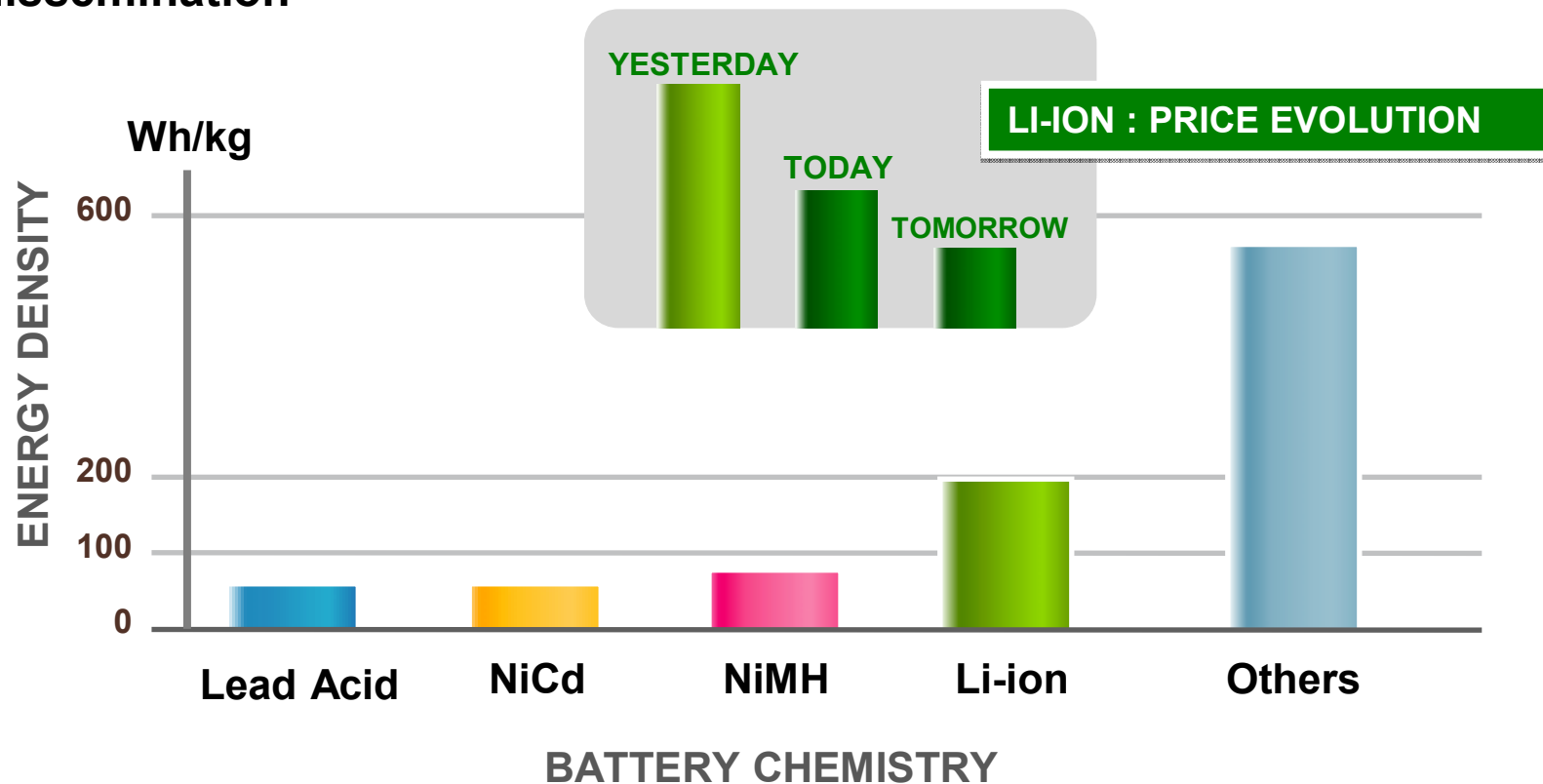


- 3. Regulations & Incentives



Technology & Cost

- Lightweight Li-ion batteries allow autonomy ≥ 100 km
- Performance, safety, recyclability to be compatible with massive dissemination



Sociology and Market

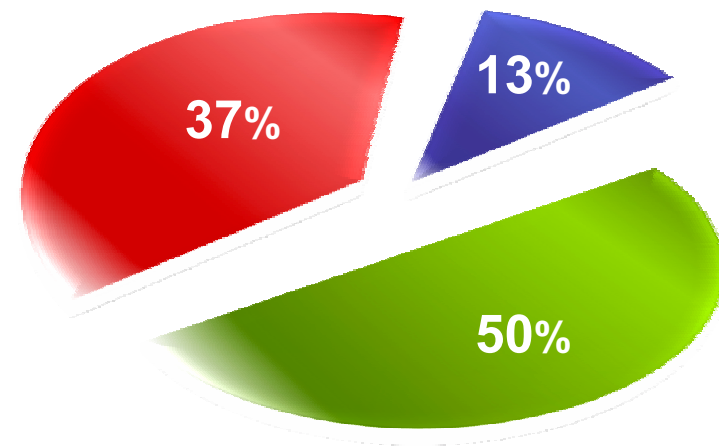
- **An increasing fraction of the world population living in cities**

- ✓ 2006 : > 50%

- ✓ 2050 : > 70%

- **Specific need of mobility in suburban areas**

- ✓ Average distance covered daily by a suburban driver (*Example: « Ile de France »*)



 < 20 km/day  20 – 60  > 60

Regulations & Incentives

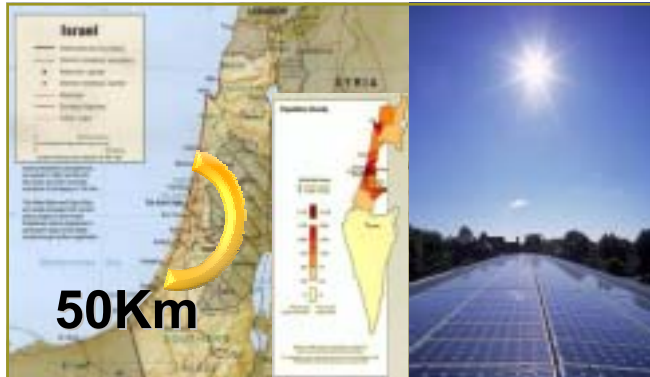
- Ban or restriction of circulation in cities for high emission vehicles
- Bonus-malus and taxes on cars depending on CO₂ emission



NEW URBAN MOBILITY: ISRAEL' EVs

1

GEOGRAPHY



2

POLICY & REGULATIONS




3

BUSINESS MODEL




Massive deployment plans in Israël and Denmark starting in 2011



RENAULT NISSAN PROJECT BETTER PLACE

PRESS RELEASE January 21, 2008

Renault-Nissan and Project Better Place prepare for first mass marketed electric vehicles
MOU signed today in Jerusalem for first application on Israeli market



RENAULT NISSAN

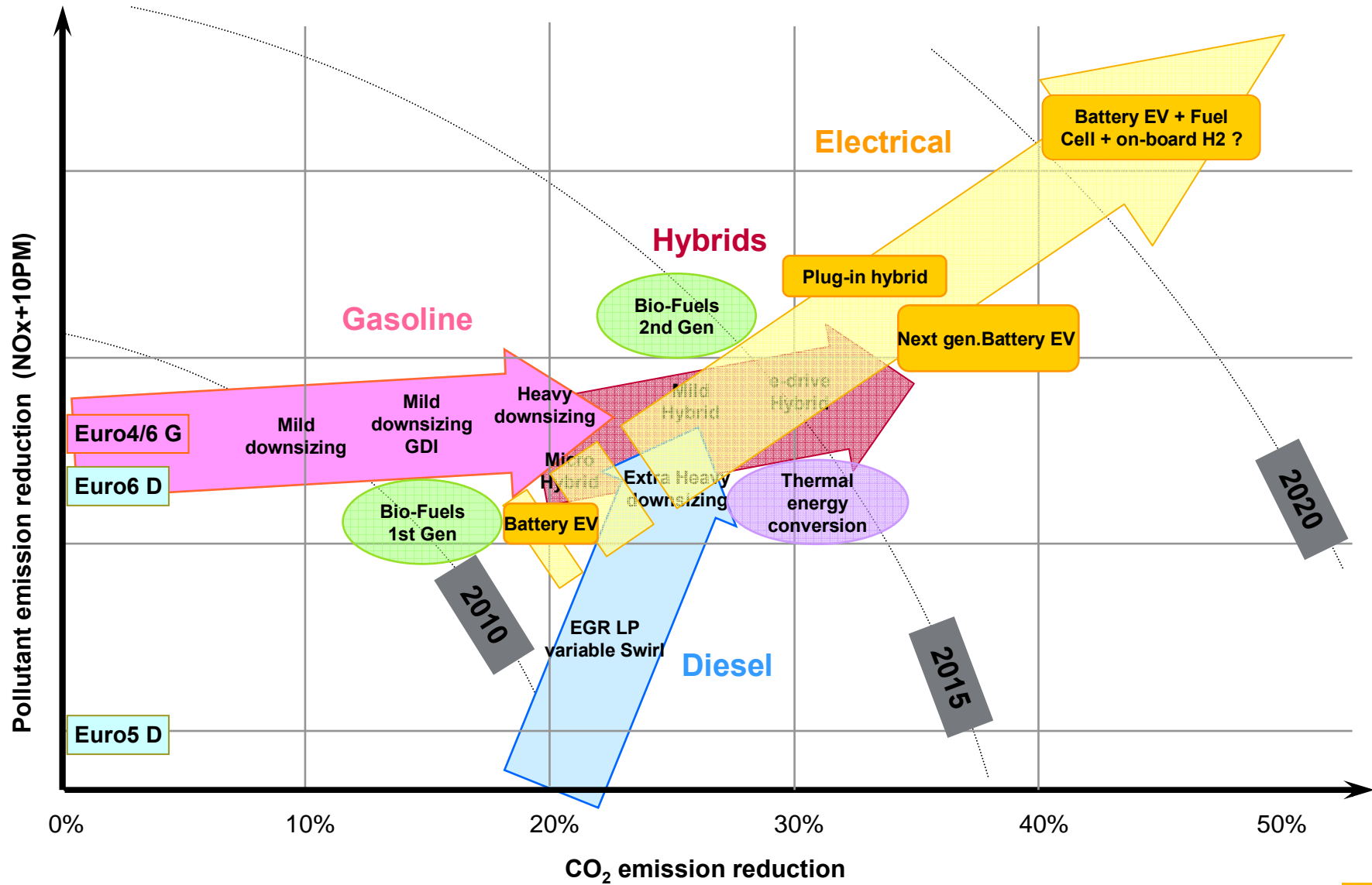
PRESS RELEASE March 27, 2008

Renault-Nissan and Project Better Place pursue their strategy of zero-emission vehicles in Denmark

The Renault-Nissan Alliance actively supports the initiative of Project Better Place, which announced today its second deployment in Denmark.



Vehicle and powertrain roadmap



Conclusions

- Low carbon fuels and cars considered as a single system
 - ✓ Use of integrated approach (Well to Wheels)
 - ✓ Cost/benefit analysis
 - Technology valuation
 - Customer value

- Renault's approach
 - ✓ Ecological and economical (Renault eco²) to get rapidly massive results
 - ✓ Ambitious vehicle roadmaps with new business models (eg EVs)

