Aaqius & Aaqius
STRATEGIC MARKET & BUSINESS DEVELOPMENT
PARIS_BRUXELLES

French perspective on diesel engines & emissions

DEER 2002 - San Diego

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Strategic Market & Business Development

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Aknowledgements

- OEM's :
  - Audi, BMW, PSA Peugeot-Citroën, Ford Europe, VW, Renault-Nissan, GM-Opel, Daimler-chrysler, Fiat

- Project Team :
  - Project Director / VP Business Development Aaqius & Aaqius Paris: Dr Ing. Marc Lagarrigue
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- Aaqius Network representatives in :
  - Beijing, Bruxelles, Detroit, Frankfurt, Paris, San Francisco, Tokyo.

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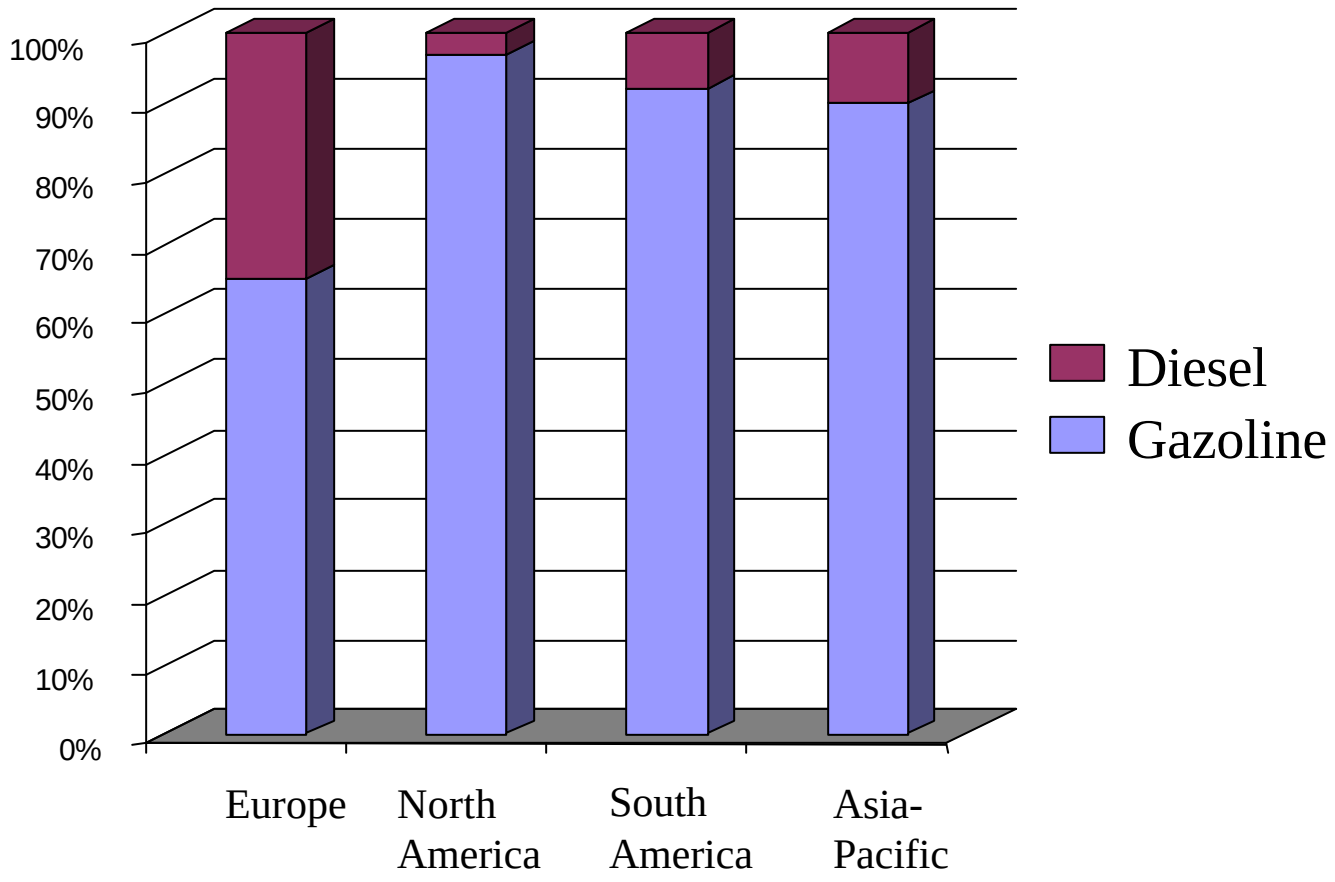
Diesel emission control : a strong concern for Europe

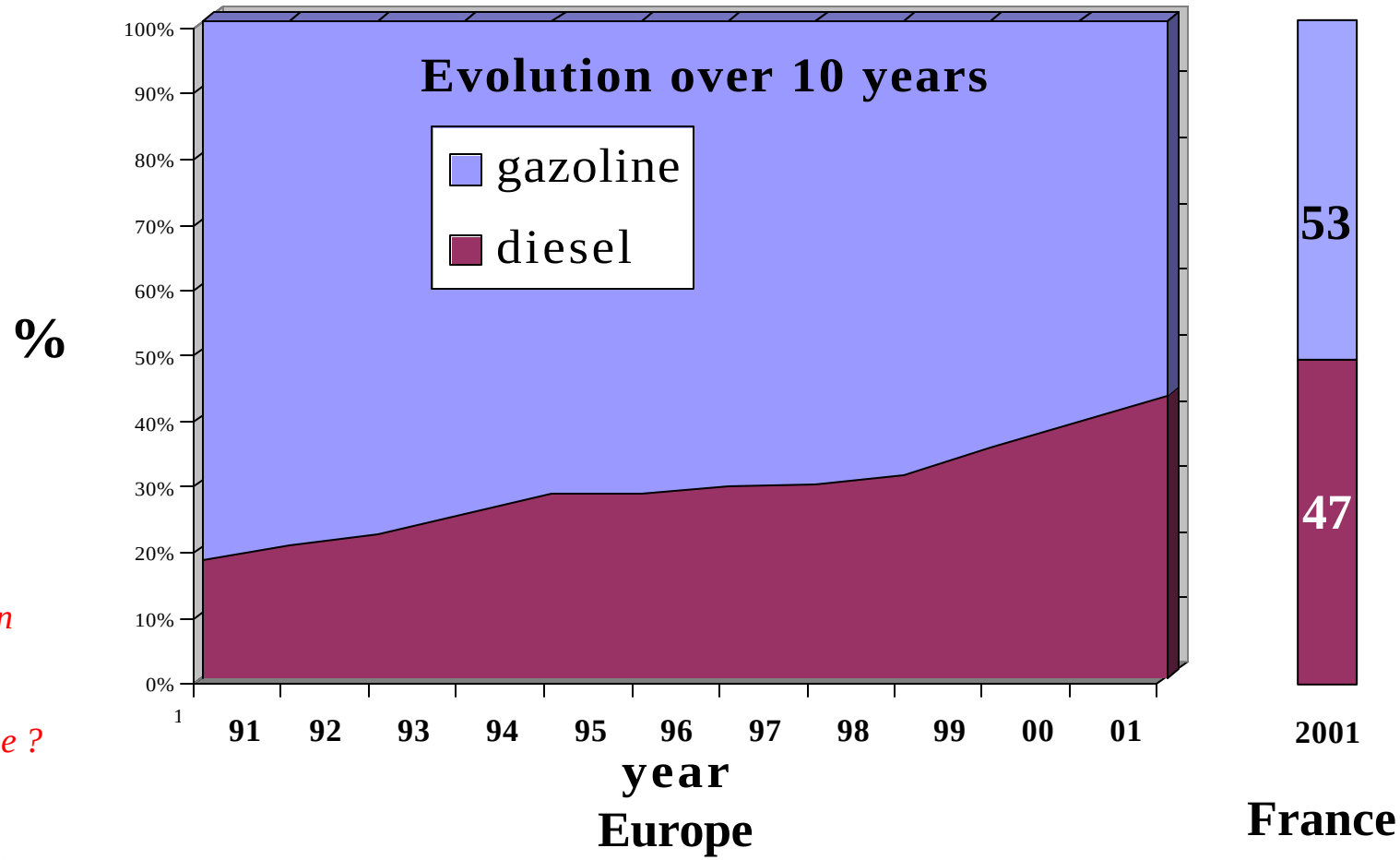
- Market volume : total vehicles in use 2001



Regulations have a strong impact on European countries but the problem has to be solved worlwide

Diesel will continue to grow if PM & NOx are controled

- Sales of new passenger car and light commercial vehicule (< 3,5t)



With an advantage on CO2 emissions, can diesel challenge the leadership of gazoline ?

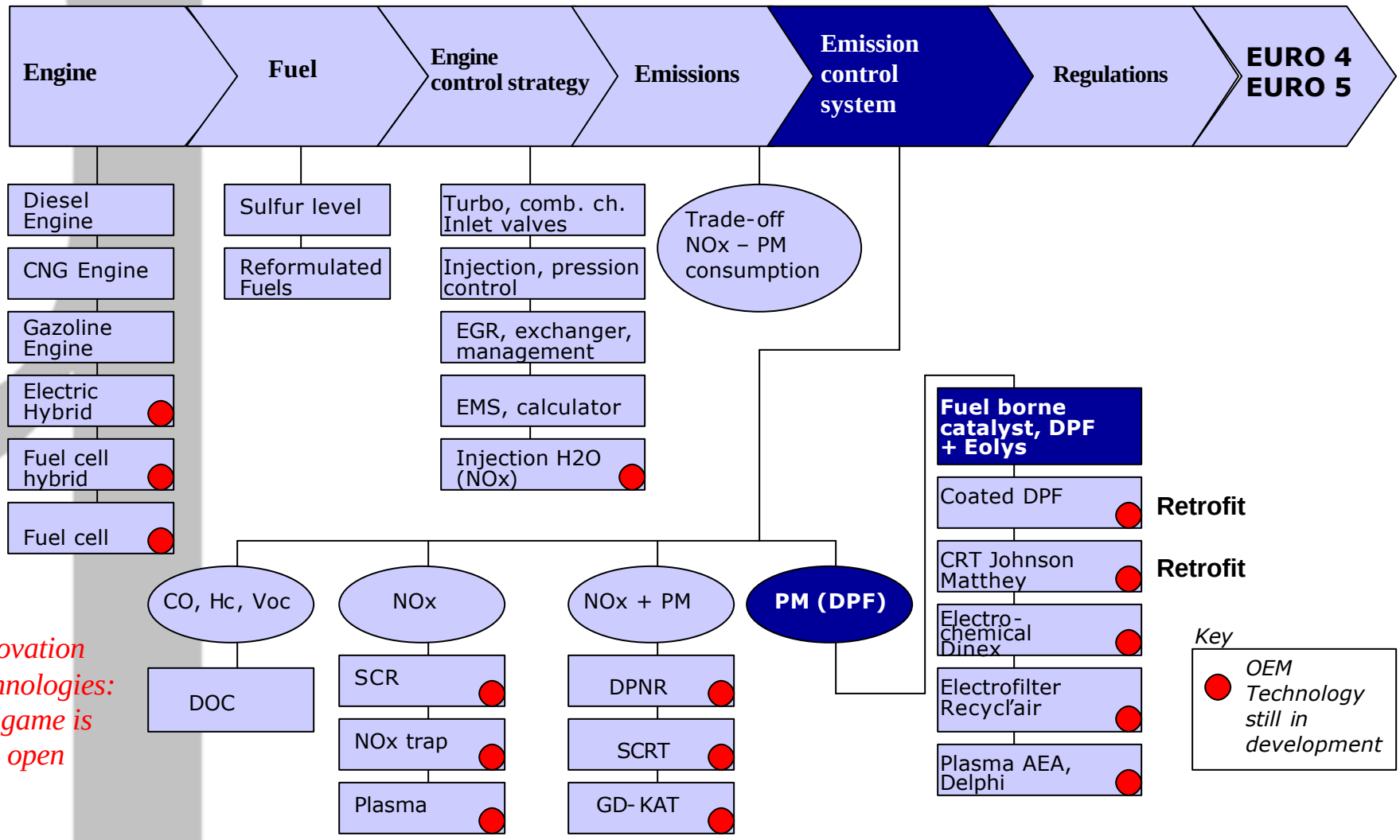
Why final users buy diesel ?

Pros	Cons
Fuel price Consumption Better resell Durability Comfort of driving (better torque at low regime)	More expensive (12 %) Noise

CO2	PM and Nox

Final buyers are strongly attached to the advantages of driving a diesel car

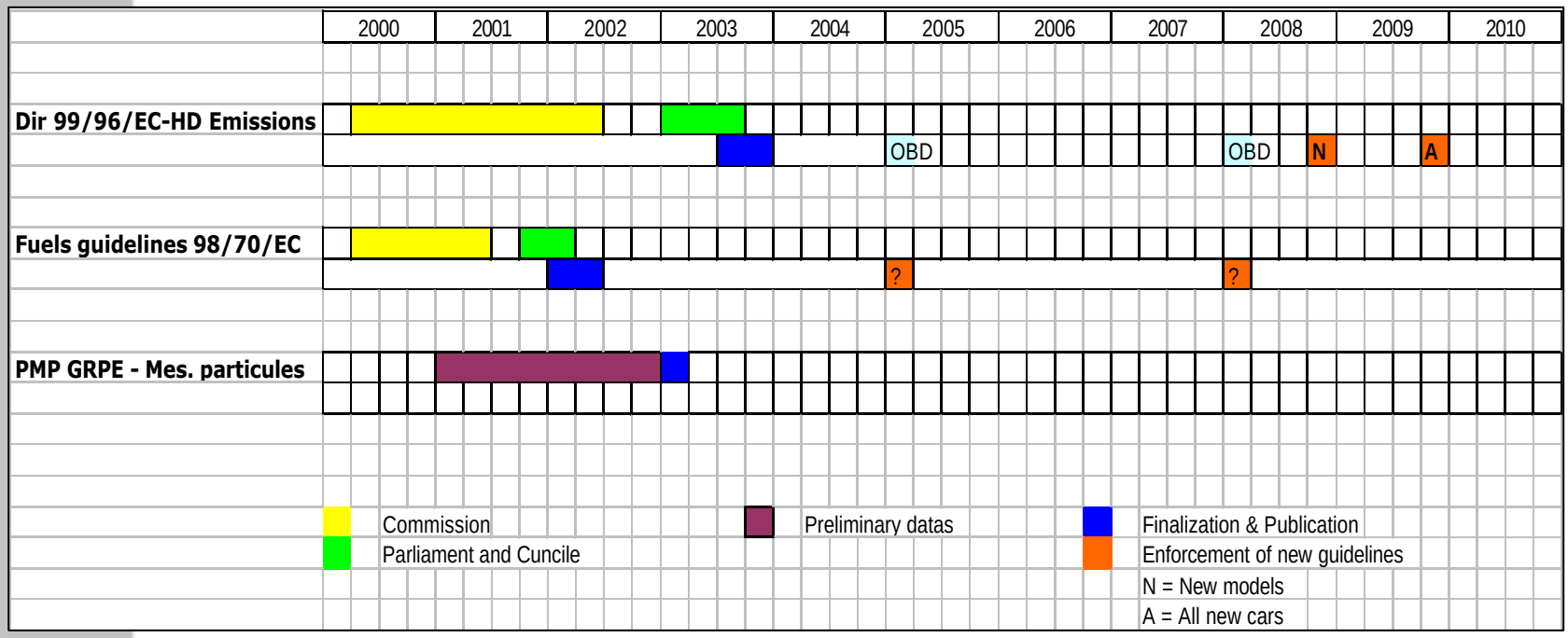
A complex technology map to control emissions issues



Innovation technologies: the game is still open

European regulations

Agenda

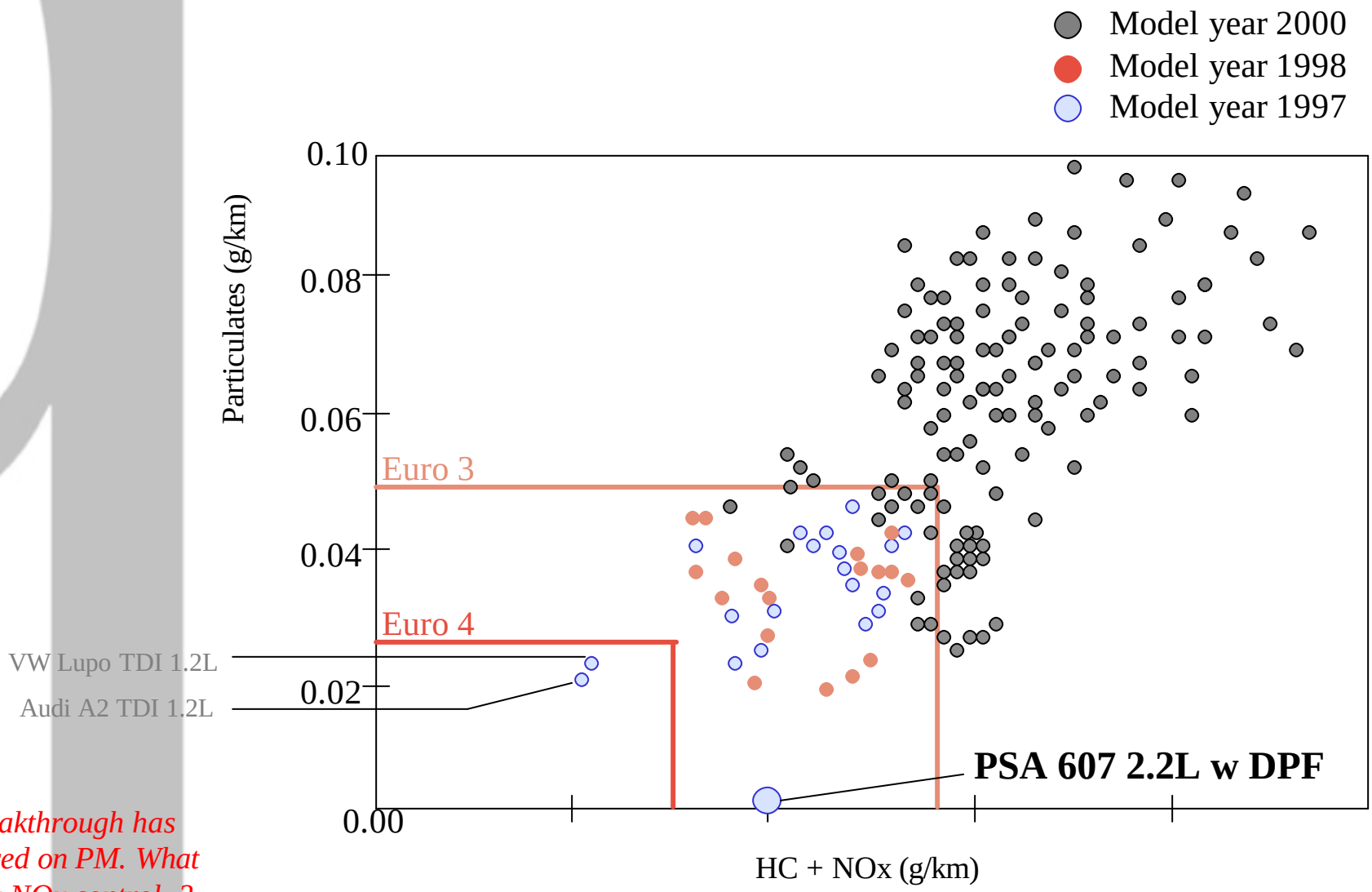


EURO 5 still on discussion for measuring PM by mass or by number

Sulfur levels

	2000	2005
Sulfur ppm	350 ppm	50 ppm

Emission levels of cars MY 1997-2000



A breakthrough has occured on PM. What about NOx control ?

Car maker strategies to meet future european standards

Vehicles size	Euro 4	Euro 5
Small & medium	**DOC + DPF(1)**	**DOC + DPF(1)**
Large	**DOC + DPF(1) or NOx trap**	**DOC + DPF and NOx Trap**

(1) Some will have a DPF for marketing strategy

DOC : Diesel Oxydation Catalyst
DPF : Diesel Particulate Filter

The growing marketing impact of DPF could make the volumes of production even bigger

Only one DPF regeneration strategy fully industrialized

- DPF with Fuel borne catalyst → Winner
  - > Equiped since 2 years
  - > Efficient & durable
  - > No failure
- Coated DPF → ???
  - > Still in development

The European initiative

Peugeot 607

- Achievement
  - Regeneration every 500-1000 Km
  - Soot burning t°450- 500°C w additive.
  - Regeneration time lowered to 3 mn.
- Proven experience
  - No dependance on sulfur level
  - Cleaning at 80,000 km (50,000 miles)
  - System mounted on various models :
    - > Peugeot : 607 + 406 + 307 + 807
    - > Citroën : C5 + C8
    - > Lancia : Phedra
    - > Fiat : Ulysse
- Next step
  - > Lowering system price
  - > Lowering back-pressure
  - > Lowering weight

Fiat Ulysse

Citroën C5

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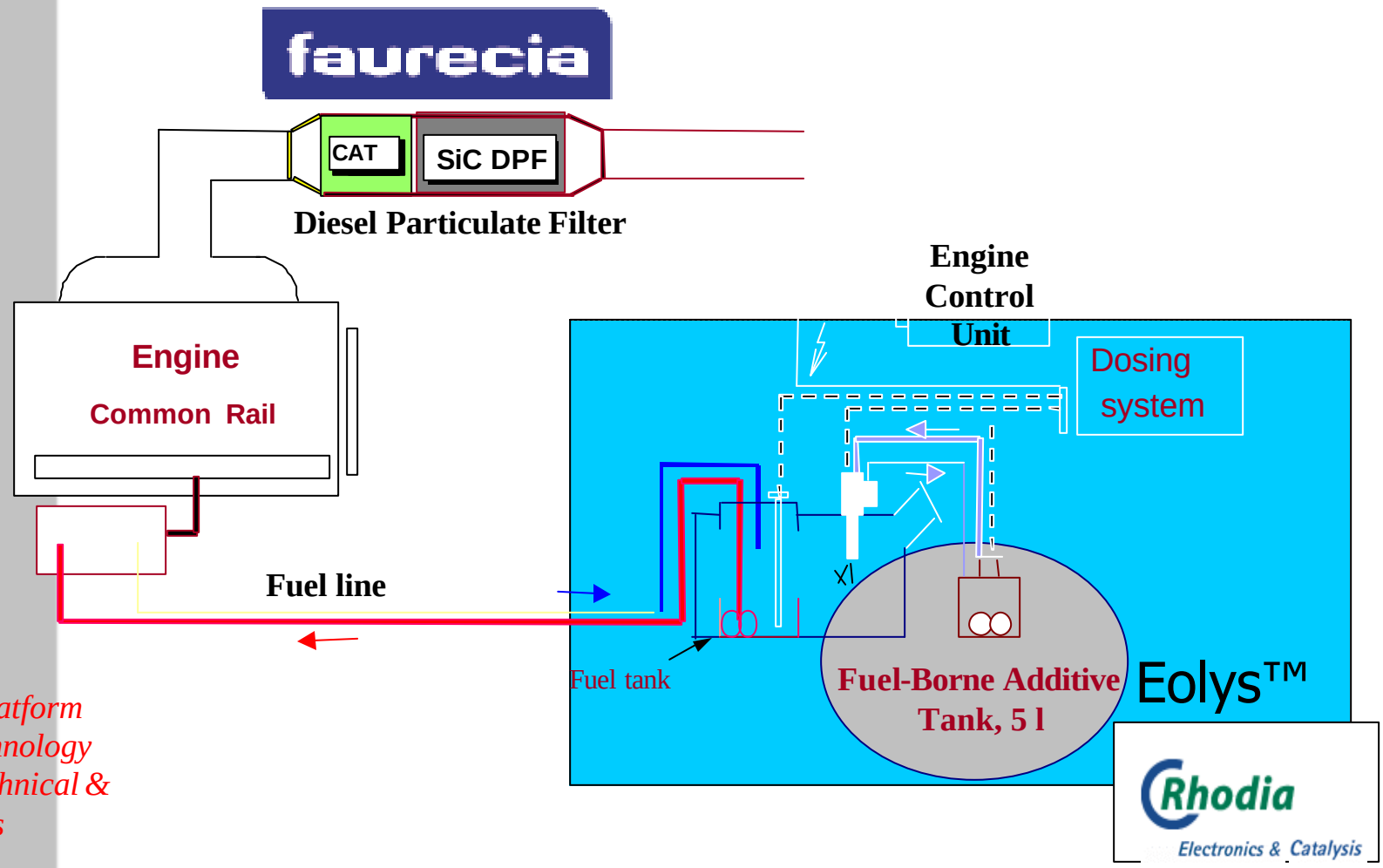
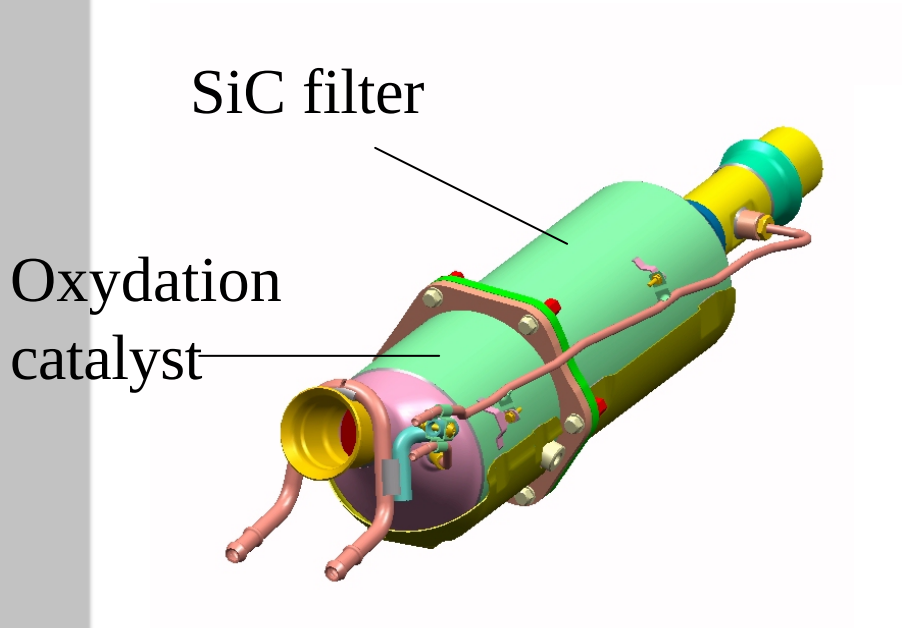
DPF PSA Peugeot 607 : on the road in Europe since Dec. 1999

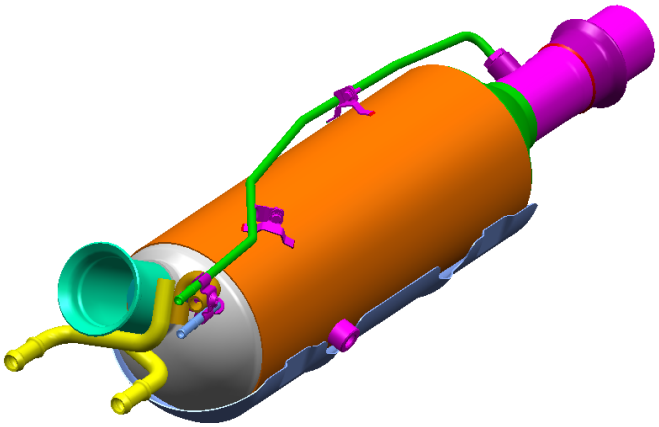


A performing collaborative platform allowed the technology to meet both technical & customers needs

The state-of-the-art particulate filter



Peugeot 607 : SOP Dec. 1999



Peugeot 307: SOP June 2001

- 400.000 units on the road at the end of 2002

Market survey on 180 retrofit programs

- Public transportation

Options evaluated

	Much better than EURO 2	Better than EURO 2	EURO 2	Less than EURO 2	Much less than EURO 2

	Pollutants				Greenhouse effect	Maintenance	Investment	extra costs	Users' point of view	
	CO	HC	Nox	PM					Noise, smell, smoke	Image
CNG		(CH4)								
Hybrid										
Diesel + DPF										
Electric										

Source : ADEME

EURO 3 and after

	Progresses awaited

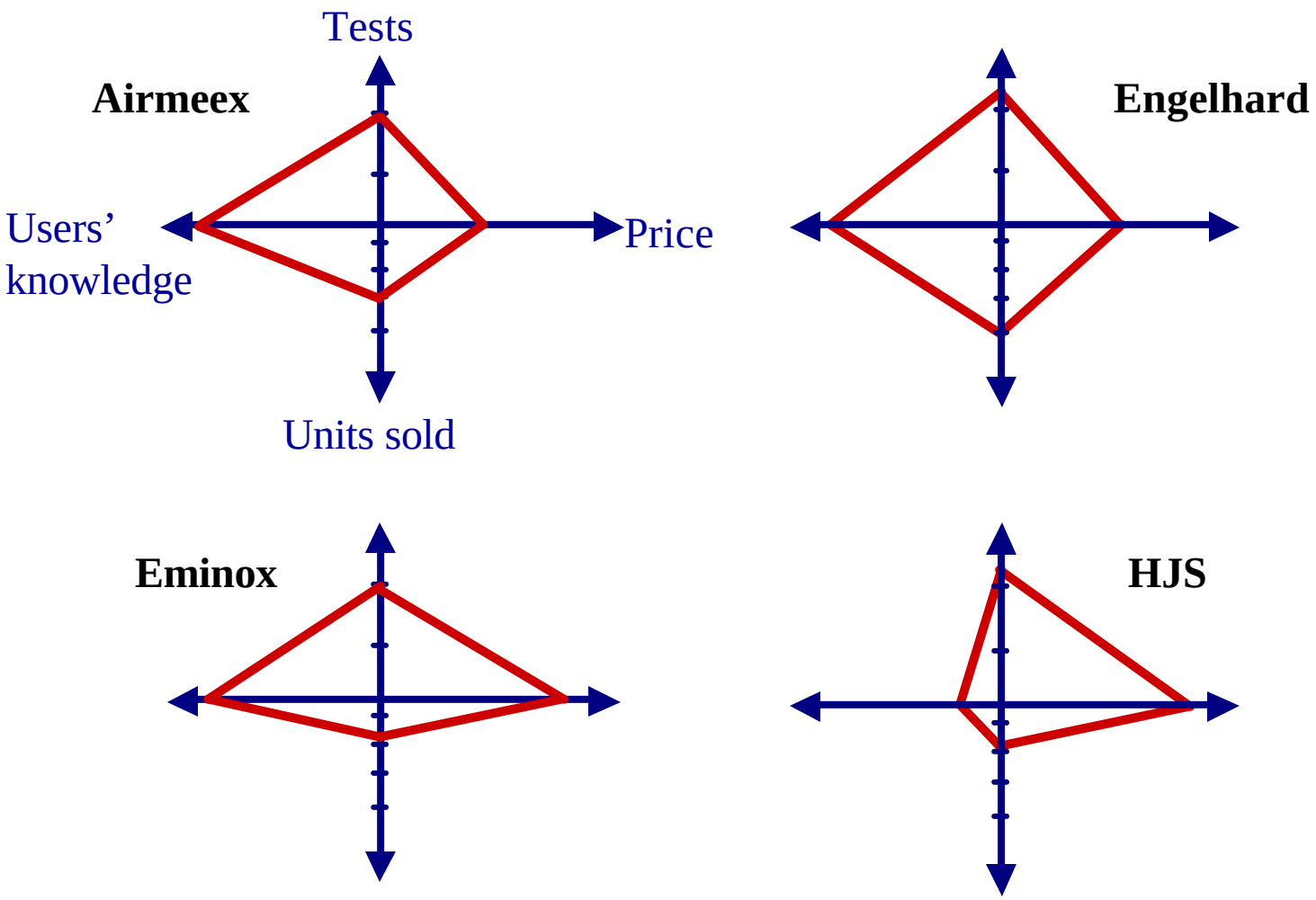
	Pollutants			Greenhouse effect	Maintenance	Investment	extra costs	
	CO + HC	Nox	PM					
CNG								CNG
Hybrid								Hybrid
Diesel + DPF + DeNOx								DPF

Source : ADEME

Emissions controled diesel is efficient

Fuel cell : partnership beween Paris, Madrid and Turino and private companies for exploitation of hybrid buses in 2003.

Competitors on the retrofit market : the game is still open



Facts & prospective : the key to success

- Facts :
  - Only 1 OEM solution fully industrialized with Fuel borne catalyst proven solution
  - Durability & performance (2 years experience - 400.000 systems on road)
  - Alternative solutions to treat both NOx & PM are emerging but are still under development
- Prospective :
  - Major Tiers 1 not yet active on the retrofit market
  - Global solutions will come out from technology platform partnerships involving :
    - System integrator
    - Technologies
    - Retrofit suppliers network

Conclusion

In the future, Aaqius & Aaqius, will continue to :

- evaluate technologies
- study the strategical markets needs in collaboration with governemental agencies
- build the collaborative platform to develop and market emission control solutions for the retrofit market.

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Thank you for your attention

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