



Trends & Developments in European Automotive Fuel Quality

Sandrine Dixson-Decleve, Director Europe & Africa
International Fuel Quality Center

Hart Downstream Energy Services

www.IFQC.org



International Fuel Quality Center

- ❑ What is the *International Fuel Quality Center (IFQC)*?
 - ❑ A specialized member service that provides comprehensive information and concise analysis to members on pertinent actions and issues facing the transportation industry worldwide.
 - ❑ The service focus and emphasis is on automotive fuel quality, vehicle and engine related standards, and the health and environmental legislative and regulatory pressures leading these changes

- ❑ Who is *IFQC*?
 - ❑ Currently: over 82 Global Refining, Automotive and Technology Companies and Governmental Organizations (more than 350 leading executives)
 - ❑ Working on the national, regional and international stage to facilitate dialogue and information exchange between transport related industries and governments



International Fuel Quality Center



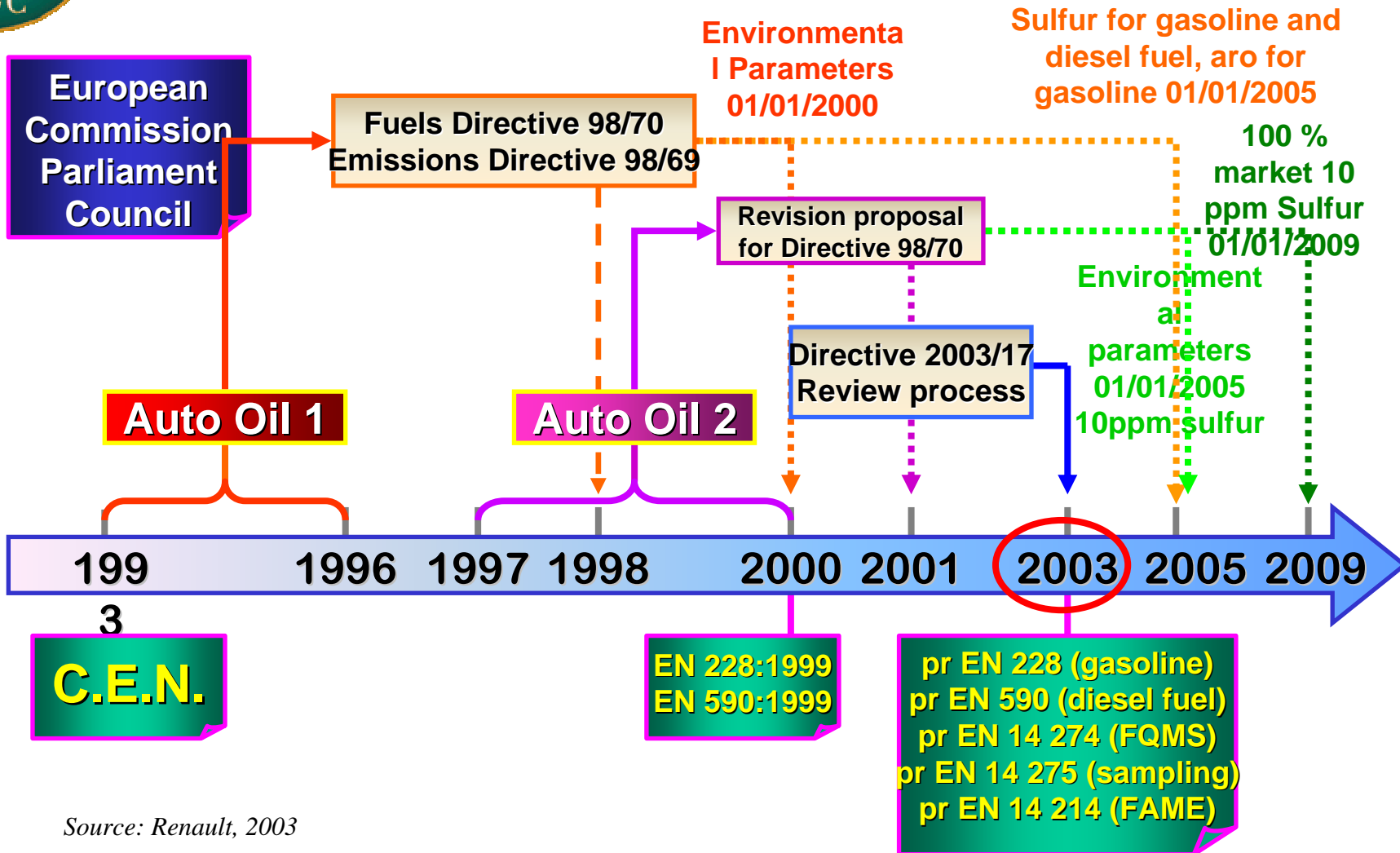
HART DOWNSTREAM ENERGY SERVICES



European Regional Fuel Quality Developments



EU Fuel Quality Developments



Source: Renault, 2003



EU Overview of Fuel Quality Programs

Fuel Program	Program Type	Implementation Date and Coverage	Target Pollutants
Lead Prohibition	Current - Banned the use of Lead in Gasoline	2000 (Greece, Italy, Spain, French overseas territories derogation to 1/1/2002) (UK, Denmark, Sweden, Finland started phasing out lead in the 80's)	Lead (Eliminated to enable vehicle emission controls as well as protect public health from lead toxin exposure)
Volatility Control	Current	“Stage II Directive” – refueling emissions legislative proposal	Ozone <i>Evaporative Hydrocarbons</i>
Reformulated Gasoline program	Current – Performance Standards for Nitrogen Oxides, Volatile Organic Compounds, Air Toxics and maximum standards for oxygen content	Phase I - 2000 focus on lead phase out, sulfur, aromatics and benzene decrease. Phase II – 2005/2009 – focus on low and ultra low sulfur	Ozone <i>Nitrogen Oxides</i> <i>Hydrocarbons</i> Air Toxic Controls
Reformulated Diesel Program	Current – Performance standards for Nitrogen Oxides, and particulates.	October 1998 Phase I 2000 – focus on 350 ppm sulfur maximum Phase II 2005/2009 – focus on low and ultra low sulfur 2009 align non-road diesel	Ozone <i>Nitrogen Oxides</i> Particulate Emissions CO2
Sulfur Liquid Fuels	Current- standards for Nitrogen Oxides, SO2 and particulates, ozone.	March 1997 Off-Road Diesel Sulfur Content – Maximum permissible sulfur content 1000 mg/kg by 1 st January 2008.	Ozone <i>Nitrogen Oxides</i> Particulate Emissions CO2



Auto Oil I&II Directives: General Overview

❑ Fuel

- ❑ Requires all EU Refiners/ Importers to meet a max sulfur levels 350ppm (diesel) and 150ppm (petrol) in 2000 and 50ppm in 2005 plus 10 ppm availability. 10ppm petrol set for 2009
- ❑ Requires all EU Refiners/ Importers to meet new petrol limits for benzene, olefins, aromatics & bans lead and sets diesel limits for cetane, density, distillation, PAH by 1 Jan 2000. Future specs review 2005.
- ❑ Flexibility includes
 - ❑ Derogation option for sulfur due to economic hardship (2002), and lead (2003)
 - ❑ Marketing of fuels with more stringent environmental specifications allowed
 - ❑ Tax incentives

❑ Vehicle

- ❑ Requires New Passenger cars and Light Commercial Vehicles to meet new exhaust and evaporative emission limits for 2000 and 2005
- ❑ Applies to all vehicles post 2000
- ❑ Higher durability distance from 2005
- ❑ OBD
- ❑ New specifications for test reference fuels
- ❑ Revised and new testing procedures
 - ❑ Evaporative emissions test procedures,
 - ❑ New low temperature test
 - ❑ In use conformity testing
- ❑ Flexibility includes
 - ❑ Review clause



Gasoline & Diesel Specifications

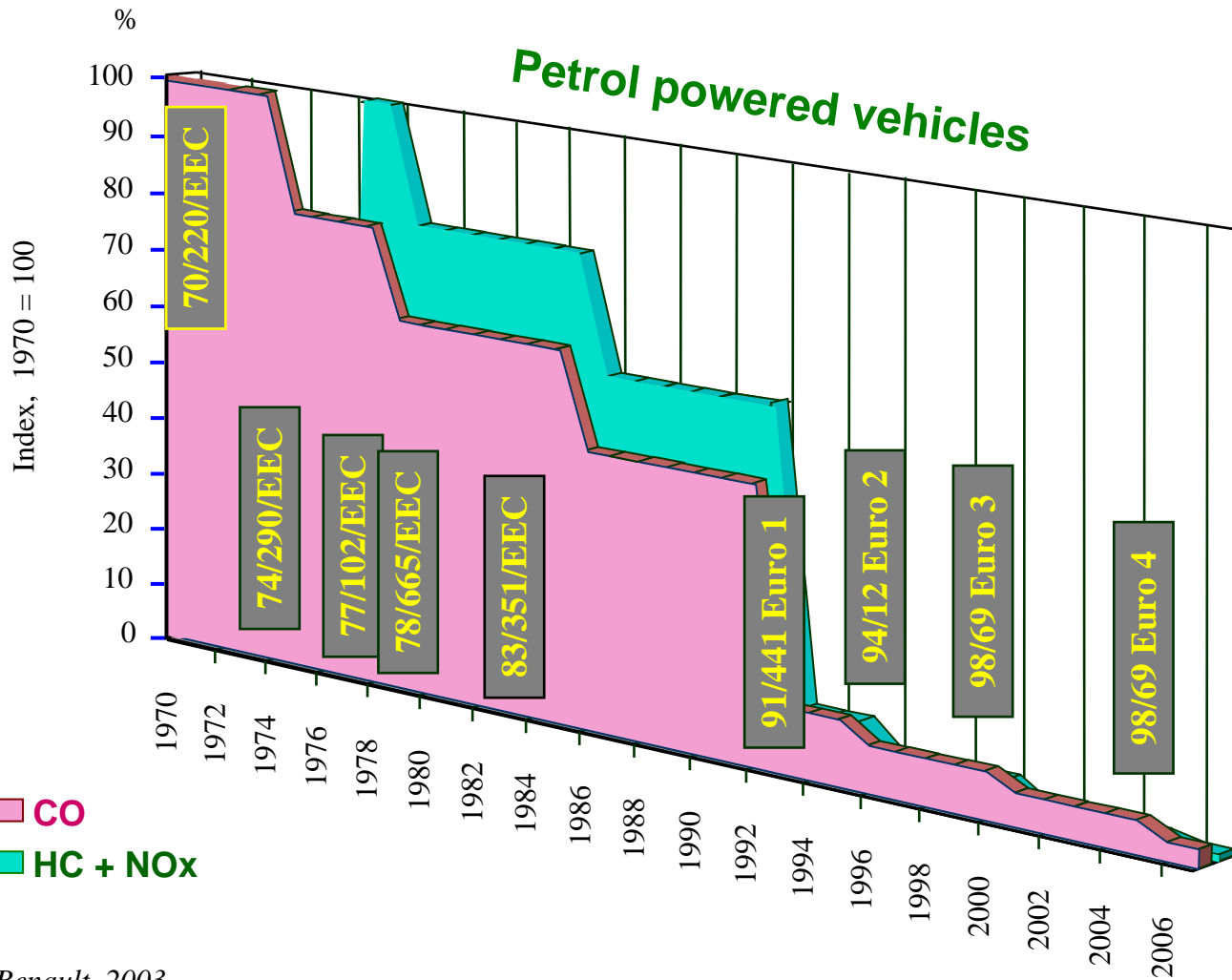
<i>Gasoline</i>				
	EN 228: 1993 <i>Euro II</i>	Dir 98/70 2000 <i>Euro III</i>	Dir. 98/70 2005 <i>Euro IV</i>	Dir. 98/70 2009 (EP/Council)
Aromatics, vol%, max	-	42	35	(Review) *
Olefins , vol%, max	-	18	18	(Review) *
Benzene, vol%, max	5.0	1.0	1.0	(Review) *
Oxygen, wt%, max	-	2.7	2.7	(Review) *
Sulfur, ppm, max	500	150	50(10) **	10
RVP, kPa	35 - 100	60.0 /70.0	60.0/70.0	(Review) *
Lead, g/l max	0.013	None	None	none
<i>Diesel</i>				
	EN 590: 1993	Dir 98/70 2000	Dir. 98/70 2005	Dir. 98/70 2009* (EP/Council)
Poly Aromatics, vol%, max	N/A	11.0	11.0	(Review) *
Sulfur, ppm, max	2,000	350	50/10 **	10ppm (review)
Cetane number, min	49	51	51	(Review) *
Density @ 15 °C , kg/m ³	820 - 860	845	845	(Review) *
Distillation, T95 °C, max	370	360	360	(Review) *

* **Review clause:** By end 2005 the European Commission will carry out a comprehensive review of the other non-sulfur parameters and alternative fuels and see if new specifications are necessary, the outcome of the various commitments with the auto-manufacturers to reduce fuel consumption and CO2 emissions of new passenger cars, the effect of metallic additives on new pollution abatement technologies, and the final date of on-road and non-road diesel 10ppm introduction.

** **2005 introduction of 10ppm sulphur** – Fuel must be geographically available in an appropriately balanced manner



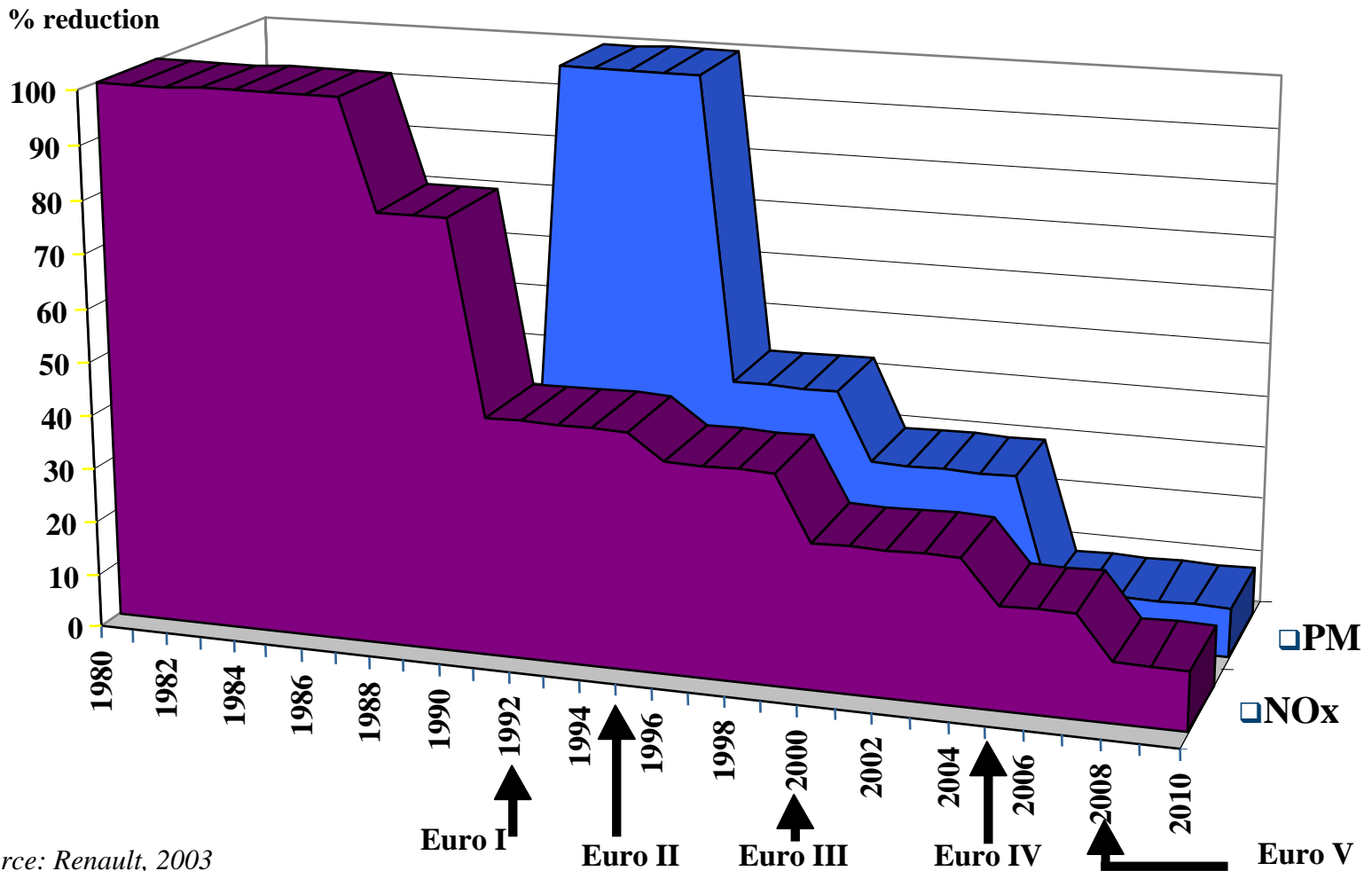
EU Emission Limits for Petrol Vehicles



Source: Renault, 2003



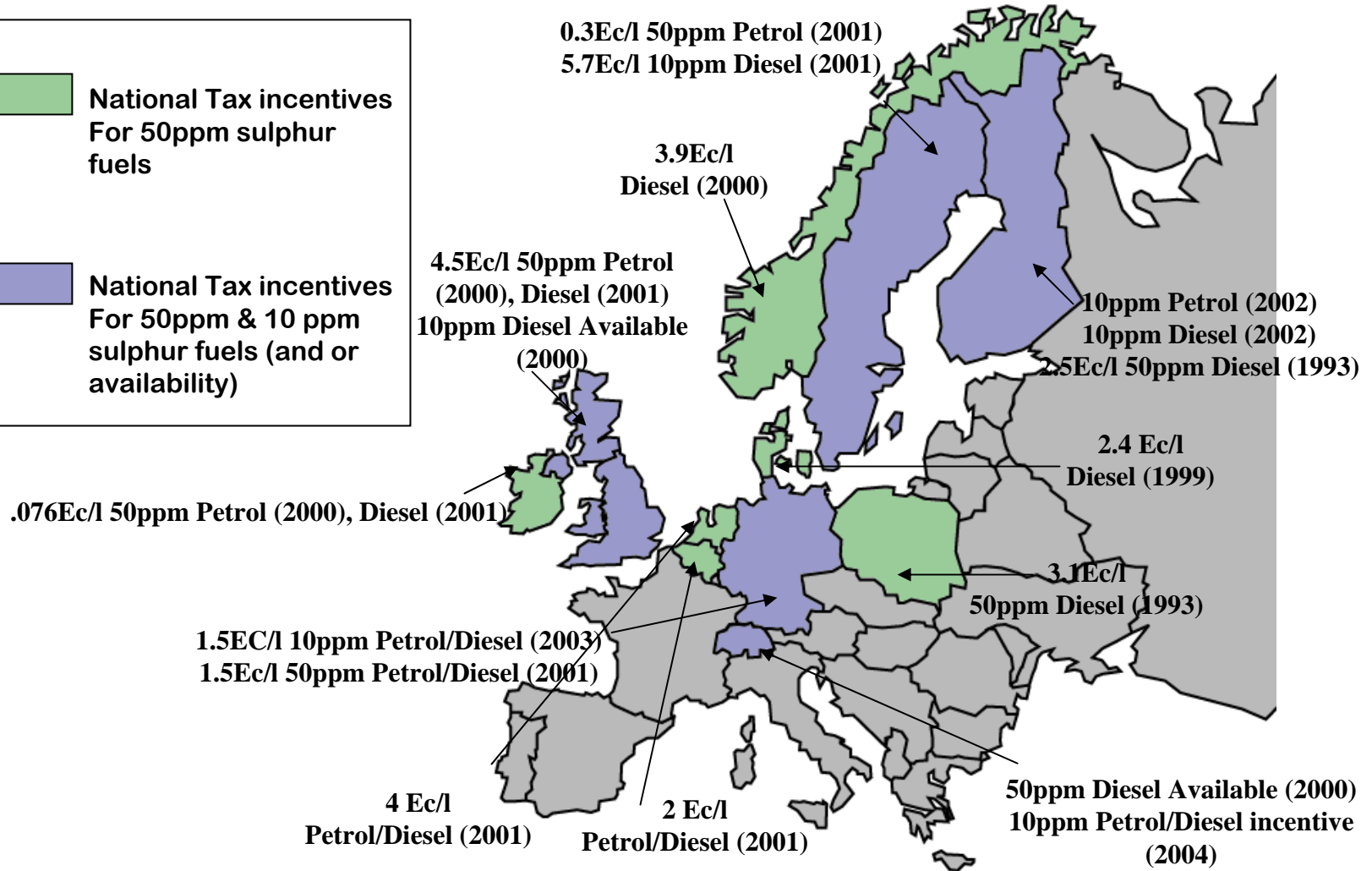
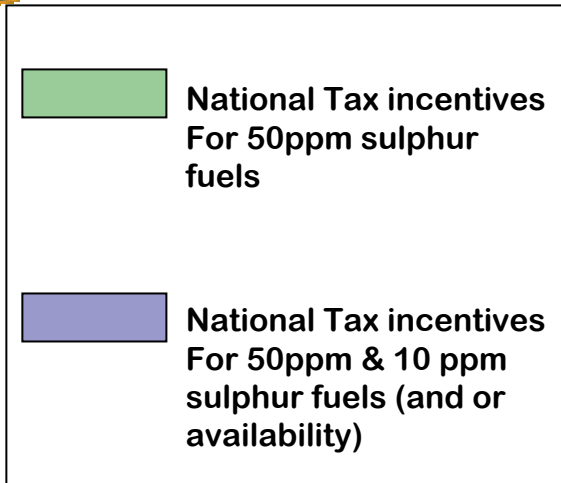
EU Emission Limits for HDV's



Source: Renault, 2003



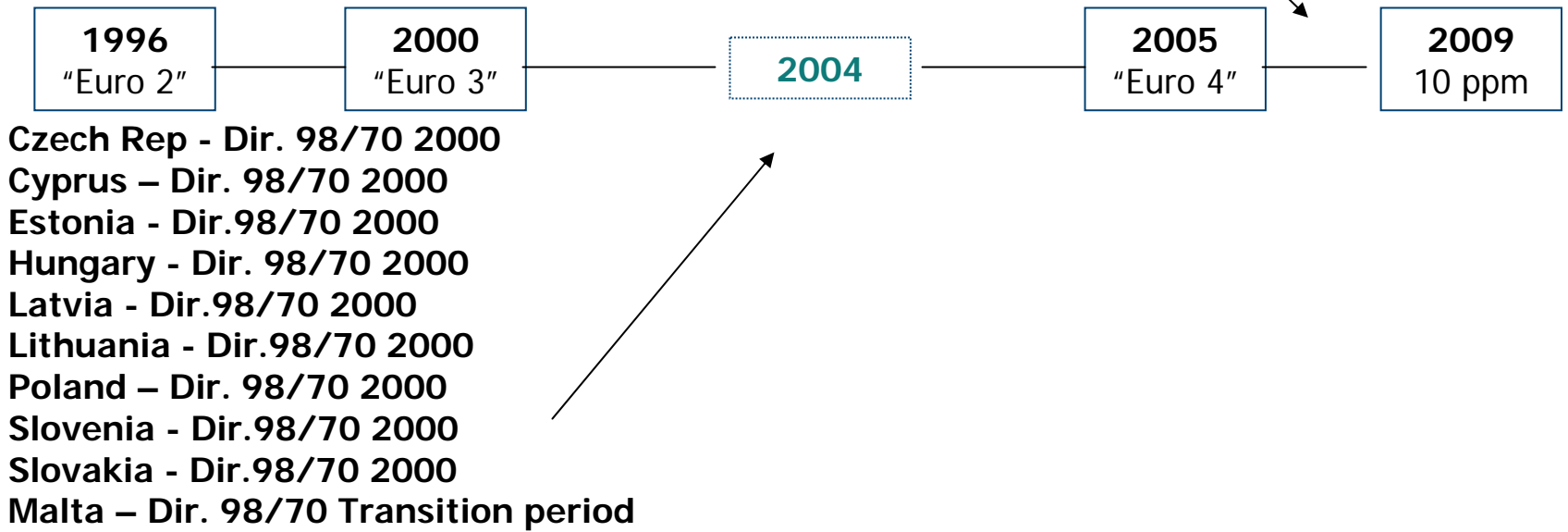
EU Low/Zero Sulphur Tax Incentives





Enlargement & Fuel Quality

Bosnia&Herzegovina - CEN 1993 & CEN 1999
Bulgaria - CEN 1993 & CEN 1999
Croatia - CEN 1993 (Full CEN 1999 by 1/1/06)
Macedonia – CEN 1993 (Full CEN 1999 by 1/1/05)
Romania – CEN 1993 & CEN 1999
Serbia&Montenegro – CEN 1993 & CEN 1999
Turkey - CEN 1993 (Full CEN 1999 by 1/1/05)



Source: IFQC's A Summary of Worldwide Automotive Fuels Specifications, January 2003



Enlargement & Lead Phase Out

- ❑ Unleaded gasoline market share Eastern European examples:
 - Slovakia: Leader at 100% in 1995
 - Hungary: 40% in 1994, 100% in 1999
 - Slovenia and Poland 100% in 2003
 - Bulgaria: 6% in 1996, 85% in 2003, phase out 1/1/04
 - Croatia: 57% in 1999, 80% in 2002, phase out 1/1/06
 - Macedonia: 10% in 1996, 45% in 2003, phase out 1/1/08
- ❑ Debate with car manufacturers regarding octane replacement choices e.g. ethanol and metallic additives



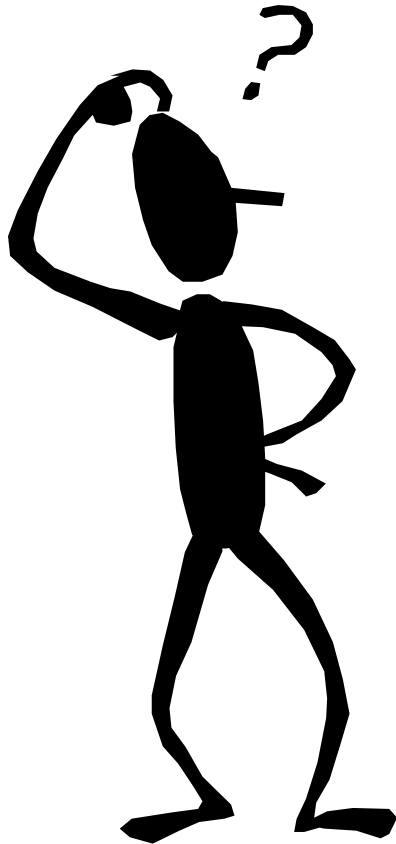
Conclusions: EU fuel policy 2004-...

- ❑ 10ppm sulphur conventional fuels (98/70/EEC) by 2005/2009 (diesel to be confirmed); Other parameters e.g. PAH, Metallic additives, RVP etc.. after 2005 Review
- ❑ Non-Road 10/50ppm sulphur diesel by 2009 [?]
- ❑ Accession countries part of EU 1 May 2004
- ❑ New Fuels Quality Monitoring and Sampling Requirements under 98/70/EC, 14274 & 14275 CEN standards
- ❑ Bio fuels market penetration resulting from new directives
- ❑ Fiscal Incentives for low and ultra low sulphur fuels and bio fuels will increase with new Mineral Oil Taxation Directive
- ❑ On the horizon: Heating oil and marine bunker fuels with lower than 1,000ppm sulphur
- ❑ ***Energy Security and Climate Change will continue to be the main external drivers....***



Thank You !

- Any Questions ?



Sandrine Dixson-Decleve
Director, Europe and Africa
email: sdixson@chemweek.com

International Fuel Quality Center
www.IFQC.org