EU Policy on Clean Vehicles

- Policy drivers
- Policy support to clean vehicles
  - Research and technological development
  - Market introduction
  - Market regulation

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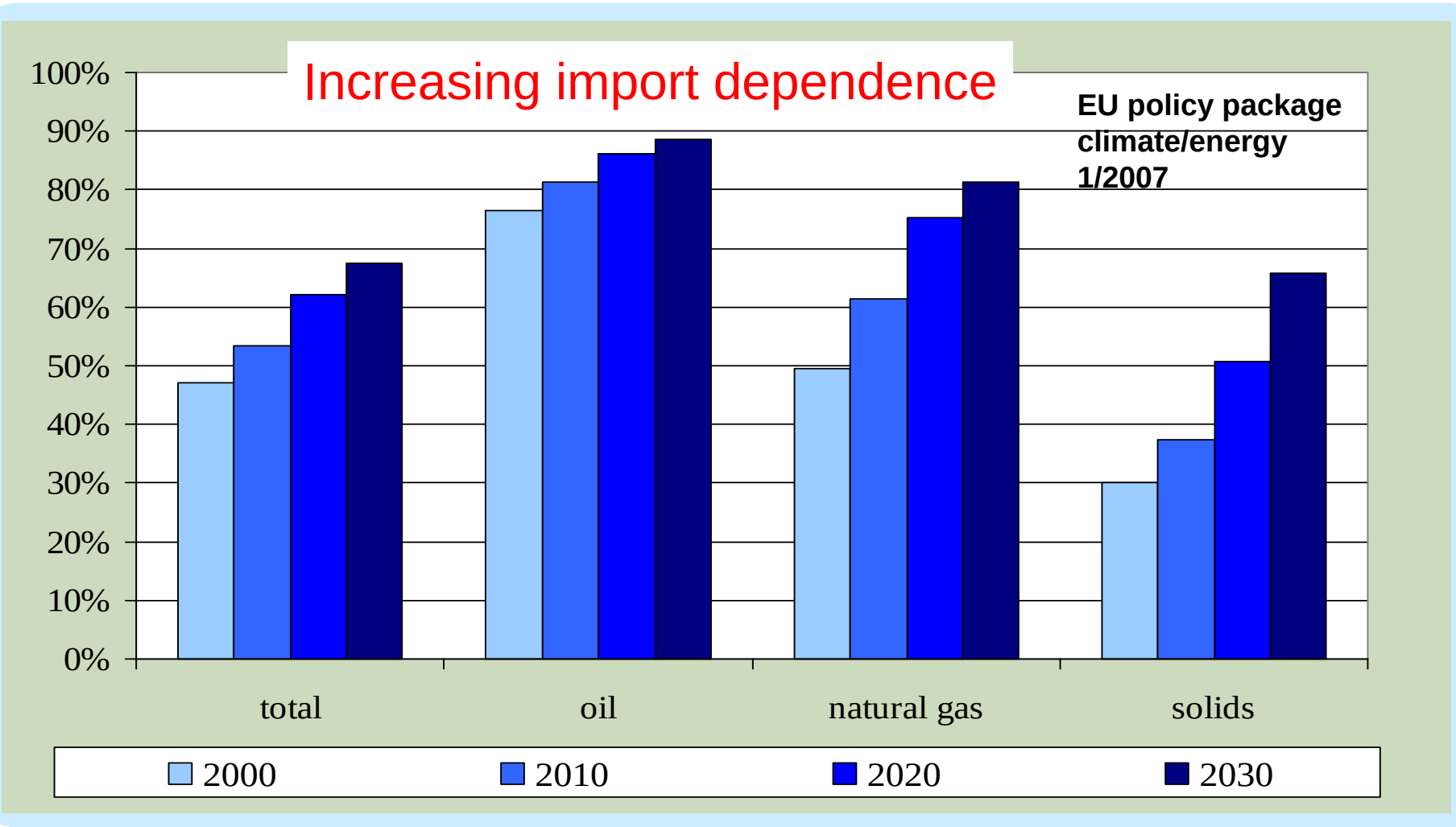
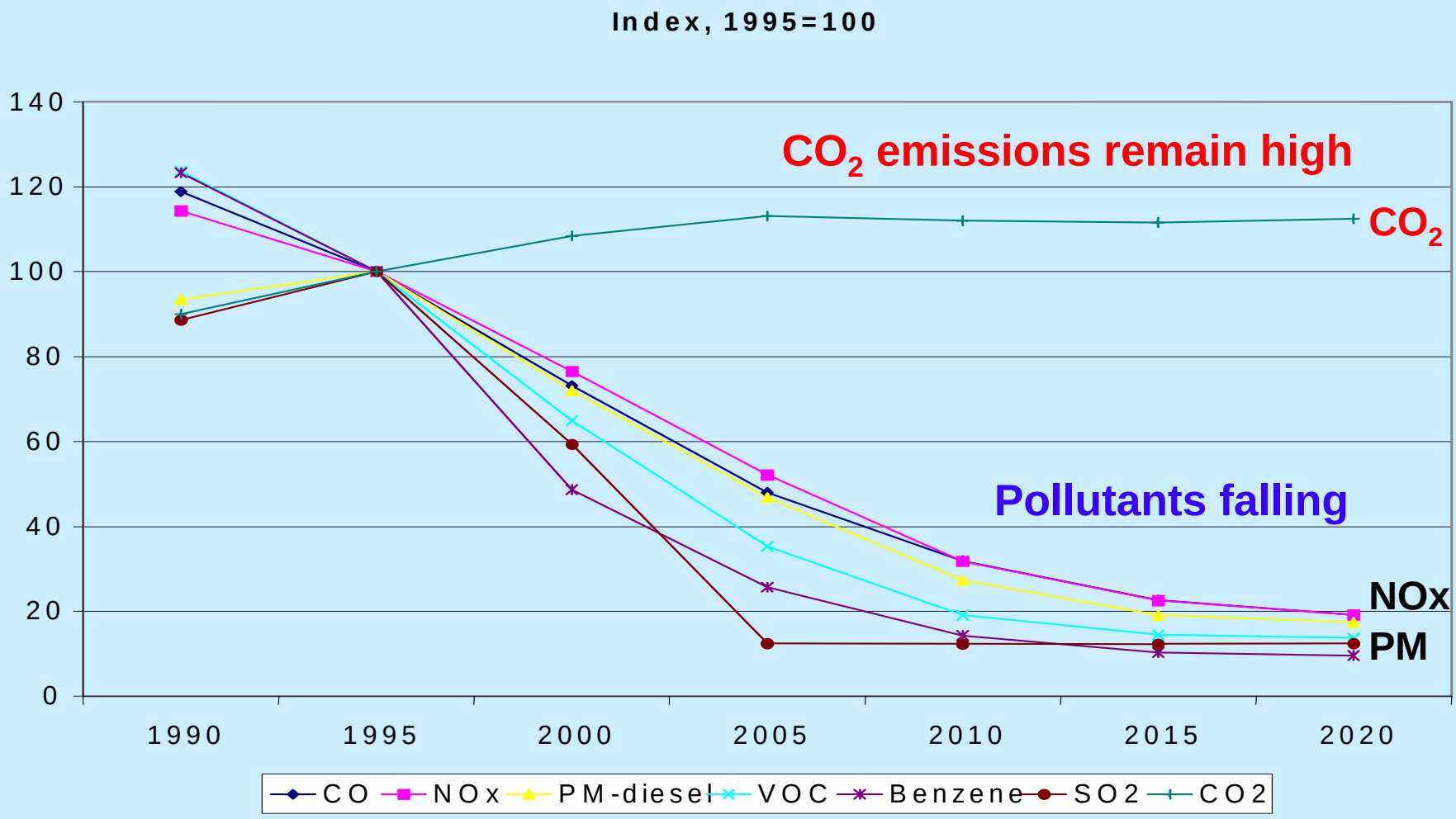
EU Energy Import



Trends in EU Transport Emissions



Policy Support to Clean Vehicles

- **Research and Technological Development**
- **Market Introduction**
- **Market Regulation**

Research and Technological Development

- Improvement of conventional technologies
  (vehicle technologies; public transport systems)
- Development of new technologies
  (biofuels, natural/biogas, hydrogen, electric; hybrid)
- Transport and energy research projects of the EU R+D Framework Programme
- Integrated deployment through the urban mobility initiative CIVITAS

Perspectives of Alternative Fuels

Market share

Full substitution of oil in the long term

➔ Consistent step-up process required

Biofuels: Domestic resource base; mature for the broad market

Broadening of resource base with 2nd generation biofuels

➔ Political support, economic incentives, pilot plants

Hydrogen: Diversification of resource base as energy carrier

Improvement of energy efficiency with fuel cells

➔ Research + development, demonstration projects

Electricity: Diversification of resource base as energy carrier

Improvement of energy efficiency with electric motors

➔ Demonstration, early markets, common standards

EU-Activities on Alternative Fuels

- **Communication on alternative fuels (11/2001)**
  Biofuels, natural gas, hydrogen
- **Directive on the market share of biofuels (5/2003)**
  Market share 2% in 2005, rising to 5.75% in 2010
- **Directive on the taxation of energy products (10/2003)**
  Lower taxation of alternative fuels enabled
- **Renewable Energy Directive**
  Binding target: 10% share by 2020 (April 2009)
- **Technology Platforms, Joint Technology Initiatives**
  Hydrogen/fuel cells(TP:2004; JTI:2008), Transport(2004), Biofuels(2005)
- **Green Cars Initiative of European Economic Recovery Plan**
  Focus on electromobility projects (first calls in July 2009)

Biofuel Demonstration Projects

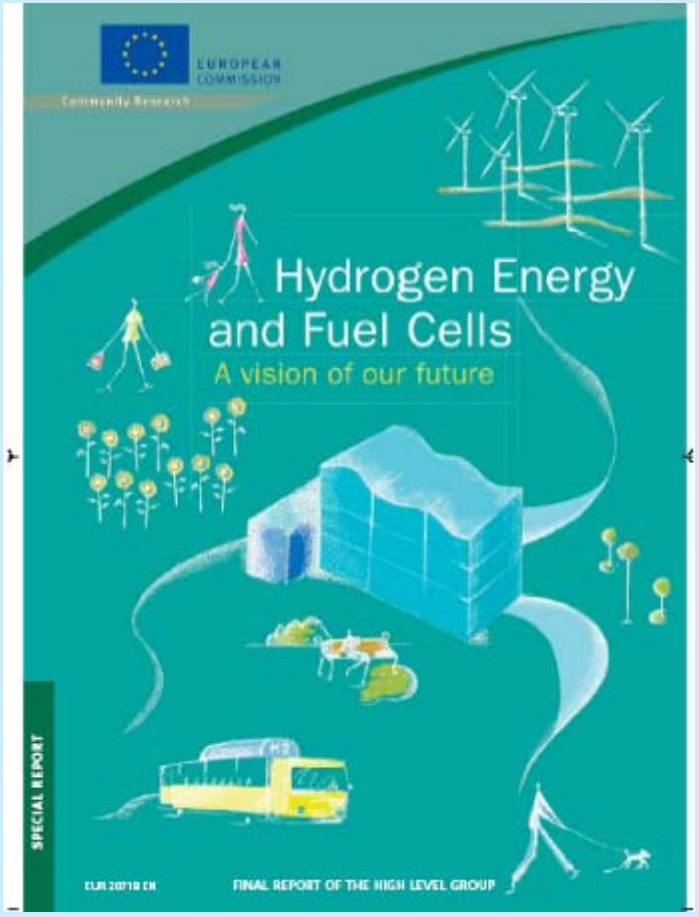
Funding from EU Research Framework Programmes:

- **Bioethanol market development through strategic build-up of infrastructure and urban and regional vehicle fleets**
  (BEST project)
- **Biogas production, quality assurance, distribution, storage, and test in vehicles**
  (BIOGASMAX project)
- **2nd generation biofuels production from vegetable oils and test in vehicles with advanced hybrid engines**
  (2nd Veg Oil project)

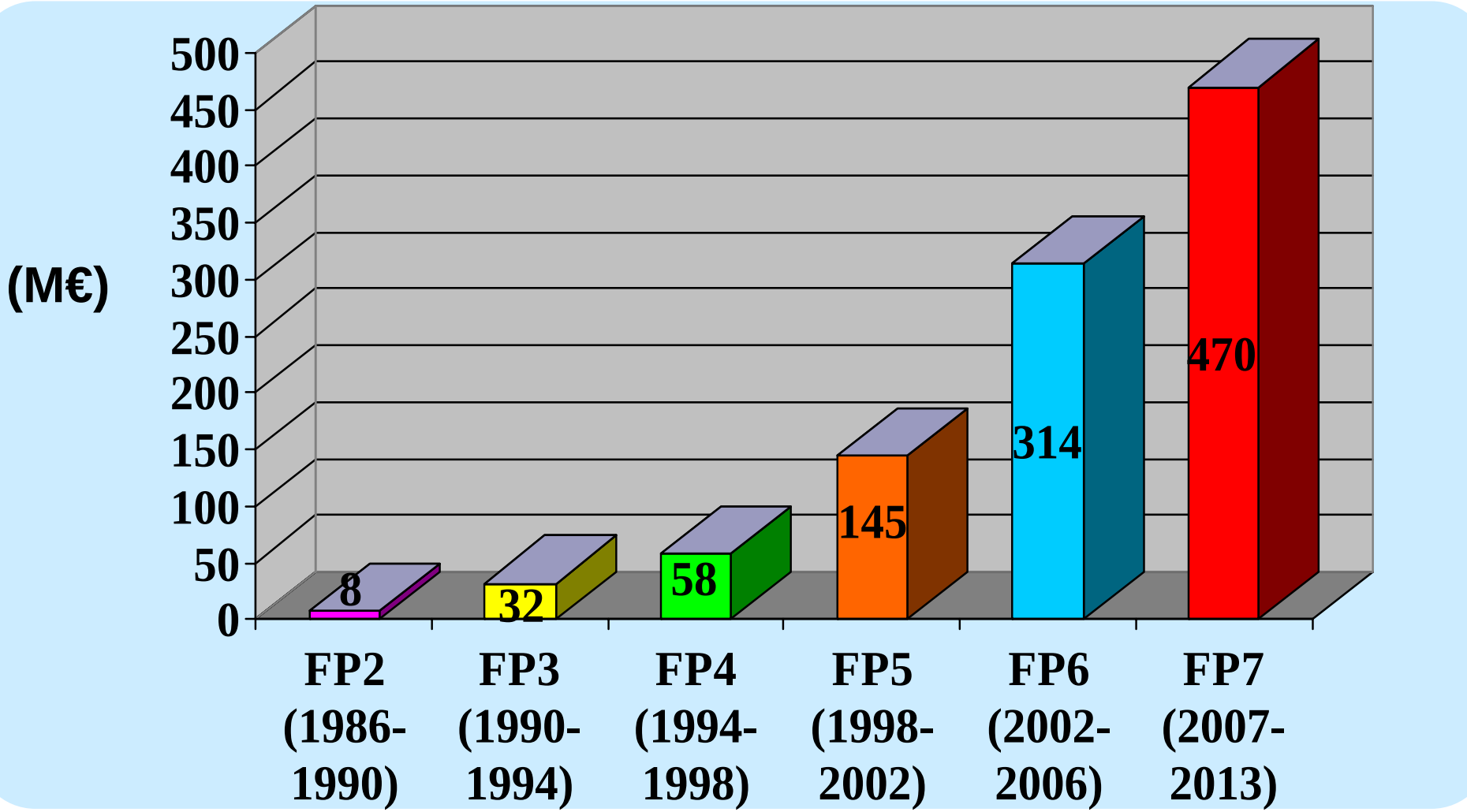
Total cost of the 3 projects: 38 M€ (EU contribution: 18 M€)

Milestones of a European Strategy for Hydrogen and Fuel Cells

- **High Level Group** (2002-2003)
  Vision report : *"Hydrogen energy and Fuel Cells – A vision of our future"*
- **President Prodi's Communication**
  proposing European Hydrogen Partnership
  (September 2003)
- **European Technology Platform**
  on Hydrogen and Fuel Cells
  (January 2004)
- **Strategic documents** of the Platform
  "*Strategic Research Agenda*"
  "*Deployment Strategy*"
  "Strategic Overview"
  (March 2005)
  "Implementation Plan"
  (January 2007)
- **Joint Technology Initiative**
  on Fuel Cells and Hydrogen (June 2008)



EU-Support to Hydrogen and Fuel Cells



European Green Cars Initiative

- Support economic recovery with public-private partnership on clean vehicle technologies
- Focus on electric vehicles and improvement of the internal combustion engine
- Financial envelope of €5 billion (€1 billion from FP-7; €4 billion EIB loans)
- First calls in July 2009 (overall budget of €108 million)
- New calls in July 2010

Electromobility Demonstration Project

Part of Green Cars Initiative

(European Economic Recovery Plan)

- **Vehicles**
- **Infrastructure**
- **Standards**

Call closed on 14 January 2010

EU contribution: 23 M€ (46 M€ total budget)

Market Introduction

- **Promotion of clean and energy efficient vehicles through public procurement**

  Directive requiring to include energy consumption, CO_2, and pollutant emissions in the purchase decision

- **Support to joint procurement**

  Development of schemes for public authorities through EU funded projects (COMPRO, PROCURA)

- **Urban mobility actions**

  CIVITAS programme; Urban Mobility Action Plan

Clean Vehicle Directive

Monetisation of Lifetime Costs

Examples for vehicles with emission standards EURO IV (bus), EURO 4 (car)

Vehicle type		Bus (lifetime 800.000 km)		Diesel Car (lifetime 200.000 km)	
Vehicle price		**150.000 €**	**100%**	**17.000 €**	**100%**
Lifetime costs	Fuel	282.150 €	188%	6.188 €	36%
	CO_2	24.168 €	16%	530 €	3%
	NOx	70.224 €	47%	220 €	1%
	NMHC	2.098 €	1%	10 €	0,1%
	Particulate matter	7.934 €	5%	435 €	3%
Vehicle price + lifetime costs		**536.574 €**	**358%**	**24.383 €**	**143%**

Clean Vehicle Directive

Support for Innovation with Lifetime Monetisation

Lower pollutant emission costs less:

➔ **Euro V bus ~ 100.000 € cheaper than Euro III bus:**
New vehicle cheaper than second hand vehicle

➔ **CNG bus at 0 pm emissions ~8.000 € cheaper than Euro V diesel bus:** **compensation for ~ 50% of higher cost of CNG technology**

Lower energy consumption costs less:

➔ **Electric car ~ 5.000 € cheaper than petrol car:**
compensation for ~ 50% of additional cost of the battery

Competitive advantage for cleaner technology

Market Regulation

- **Regulation of pollutant emissions**
  Reduction of pollutant emissions through EURO standards
- **Regulation of CO_2 emissions**
  Cars: 130g/km by 2015; 95g/km by 2020
  Light Duty Vehicles: 175 g/km by 2017
- **Renewable energy Directive**
  10% share of renewable energy sources in motor fuels by 2020
- **Fuel quality Directive**
  Reduction of CO_2 intensity of fuels by 6 % by 2020
- **Greening Transport**
  Internalisation of external costs into vehicle operation through distance related and differentiated charging

Summary

- **Need for oil substitution in transport**
  - Concerns on security of energy supply
  - Decarbonisation of transport for climate protection
- **Policy support to clean vehicles**
  - Support to R&D; fostered by the Green Cars Initiative
  - Promotion of market introduction; public procurement
  - Market regulation (targets on energy and CO_2)
- **Role of clean and energy efficient vehicles**
  - Improvement of energy efficiency in transport
  - Staged oil substitution with combination of new fuels (biofuels, natural gas, hydrogen, electricity)