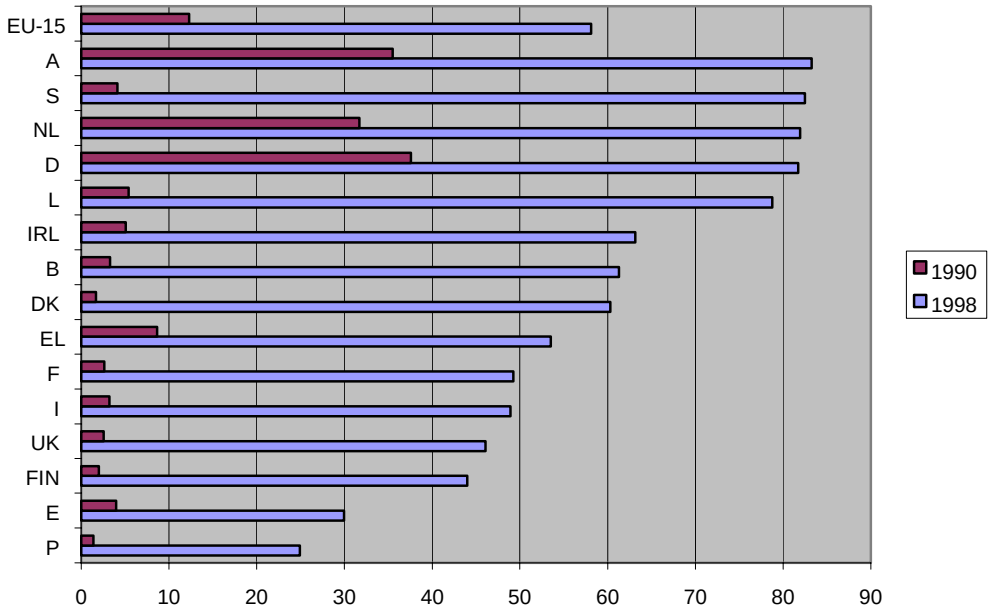
Proportion of the vehicle fleet meeting certain emission standards

The rate of penetration of new technologies is highly correlated with the average life-time of vehicles and the average age of the fleet. Estimates based on the numbers of cars fitted with catalytic converter suggest that it takes at least ten years for a new technology to penetrate the entire car fleet. The proportion of trucks and aircraft that comply with new higher emission standards is even lower than for cars, mainly because of the relatively high life-times of these vehicles.

Figure 1: Estimated share of petrol cars fitted with catalytic converter (EU)



***Source**: Eurostat, 2001*

Objective

Increase the share of the vehicle fleet that meets the most recent (and stringent) emission standards for new vehicles.

Definition

- Share of the motor vehicle fleet that meets EU emission standards (EURO I and EURO II).
- Share of aeroplane fleet that complies with ICAO noise standards (Chapters I, II and III).

The findings of this fact sheet are linked with #Specific emissions, #Vehicle ownership and #Average age of the vehicle fleet.

Policy and targets

EU legislation on emissions from new motor vehicles has been in force since 1970. Since 1993 this has been mandatory for Member States. EU standards depend on vehicle type (passenger cars, light commercial cars, heavy duty trucks) and fuel used (petrol, diesel). There is, however, no EU legislation or target relating to the fraction of the vehicle fleet that should meet these standards.

Passenger cars and light-duty vehicles	Petrol vehicle standards relate to CO, HC, and NO_x. PM is also included for diesel. Standards requiring the use of catalytic converters on petrol cars first came into force in 1993 with EURO I (Directive 91/441/EEC[1]) and were replaced by Directive 94/12/EC[2], introducing the EURO II standards in 1997. Emission limits for light commercial vehicles, being subject to less stringent standards than passenger cars, were aligned with these more stringent limit values by Directive 93/59/EEC[3] and Directive 96/69/EC[4] respectively. Even stricter standards have been agreed, with EURO III and EURO IV (Directive 1998/69/EC[5]), coming into force in 2001 and 2006 for passenger cars and in 2002 and 2007 for light commercial vehicles.
Heavy-duty vehicles	For heavy-duty vehicles, standards relate to emissions of CO, HC, NO_x, and PM. The first standards came into force in 1990 with EURO 0 (Directive 88/77/EEC[6]), which was replaced in by EURO I and II in 1993 and 1996 (Directive 91/542/EEC[7]). More stringent emission standards, EURO III, IV and V for 2001, 2006 and 2009 have recently been adopted by Directive 1999/96/EC[8].
Motorcycles	Current emission limits for motorcycles and mopeds are defined in Directive 97/24/EC[9] and have been mandatory for new EU type approvals since June 1999. The Commission has recently adopted a proposal (European Commission, 2000) to amend this Directive. The proposal determines a set of emission limits (both for 2-stroke and 4-stroke motorcycles) for carbon monoxide, hydrocarbons and oxides of nitrogen to be applied for type approval of motorcycles from January 2003 for new vehicle types and from January 2004 for all new vehicles. The proposal envisages a second stage of emission limits to further reduce motorcycle emissions from 2006.
ICAO	Aeroplanes are classified according to ICAO noise norms ('chapters'): Chapter II is the standard on noise applicable to jet-powered aircraft designed before October 1997 and Chapter III is a more stringent standard to those designed after that date. Chapter I aeroplanes have been forbidden in Europe since 1988, while chapter II aircraft will have to be phased out by April 2002. However, the latest significant revision of the noise stringency rules within ICAO dates back to 1977, when the Chapter 3 noise standard was introduced. It no longer represents state of the art engine and aircraft design technology (European Commission, 1999a). The Commission will therefore actively participate in the work

[1] Official Journal L 242, 30/08/1991 p. 1 - 106
[2] Official Journal L 100, 19/04/1994, p. 42 - 52
[3] Official Journal L 186, 28/07/1993 p. 21 - 23
[4] Official Journal L 282, 01/11/1996 p. 64 - 67
[5] Official Journal L 350, 28/12/1998 p. 1 - 57
[6] Official journal L 036, 09/02/1988, p. 33 - 61
[7] Official Journal L 295, 25/10/1991, p. 1 - 19
[8] Official Journal L 044, 16/02/2000 p. 1 - 155
9 Official Journal L 226, 18/08/1997 p. 1 - 454

	programme on the introduction of a new noise certification standard and transitional rules for phasing-out the noisiest of the current Chapter 3 aircraft. A target date for a decision is 2001.
Council Regulation (EC) No 925/1999 (European Commission, 1999b)	The objective of this regulation is to lay down rules to prevent deterioration in the overall noise impact in the Community of recertificated civil subsonic jet aeroplanes while at the same time limiting other environmental damage.

At Member State level:

France	French legislation requires that 20 % of new cars purchased by public bodies employ cleaner technologies.
Italy	Public administrations in Italy are obliged to gradually replace their M1 and N1 vehicles (passenger vehicles with maximum 9 seats) with LPG, methane or electric vehicles. By 2003 50% of the vehicles in their fleets should, theoretically, use such cleaner, alternative fuels.
Spain	From January 2001, Spanish owners of petrol-driven cars that require leaded fuel are to receive a tax reduction of around 700 Euros when they purchase a new vehicle. The initiative is designed to speed up the phase-out of leaded petrol, since the exemption to comply with the EU Directive ends in 2002.

Findings

Passenger cars

EU legislation on emissions from passenger cars applies only to new vehicles. Until the whole fleet is renewed, therefore, the overall effect of legislation will depend on phasing-out cars that do not comply with the new standards.

A factor that limits the benefits of new technologies has been the slow market penetration of new cars; the average age of passenger cars in the EU has increased (see #Average age of the vehicle fleet). This development can be partly explained by the fact that new cars are bought, but old cars are kept (indeed, the number of cars per household has increased (see #Size of the vehicle fleet), confirming that new technologies need a long time to penetrate fully. Moreover, new models may be of better quality – i.e. a longer life – than less recent vehicles.

One sub-indicator that can be used to show the rate of penetration of new technologies is the share of cars fitted with catalytic converters. For passenger cars, it takes more than ten years for substantial share of cars to incorporate new technologies.

- In 1998, 58 % of petrol-driven cars had catalytic converters, with wide variations between Member States. The lowest shares are in Portugal (25 %) and Spain (30 %), the highest in Germany, the Netherlands and Austria (all above 80 %).

Trucks

For heavy and light-duty trucks, the situation is even worse. The average life of a truck is longer than that of a passenger car. It can therefore be expected that the share of trucks complying with the highest emission standards and the

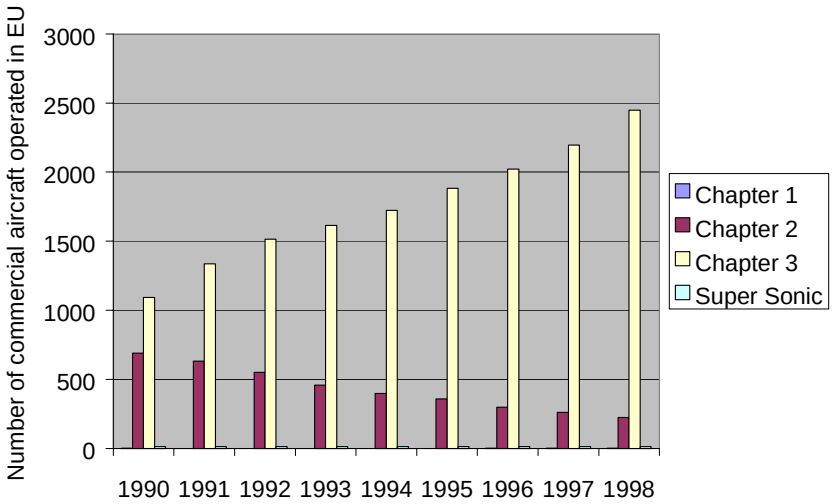
corresponding rate of penetration of new technologies is relatively low.

- In 1995, 70 % of diesel-driven cars, but only 23 % of heavy-duty trucks, complied with EURO I (EEA, 2000).

Aircraft

In 1998, Chapter III aeroplanes made up over 90 % of the EU fleet, Chapter II about 8 %, Chapter I only 0.1 % (two aircraft) and supersonic aircraft (Concorde) 0.5 %. Most of the aeroplane fleet thus complies with the most stringent EU noise standards. The phase-out of Chapter II aircraft will further improve the average noise performance of the fleet.

Figure 2: Number of commercial aircraft by noise certification operated in the EU, 1990-1998



***Source**: European Commission, 1999a*

Note: Chapter 1: aircraft types certified before 1970
Chapter 2: aircraft types certified between 1970 and 1978
Chapter 3: aircraft types certified after 1978

Future work

- More work is needed to provide better data on the number of vehicles meeting emission standards such as EURO I and II, and on fleet compositions of other transport modes.
- Data on vehicle maintenance and control programmes and their enforcement should be included.

Data

Table 1: Estimated share of petrol-engined cars fitted with catalytic converter in EU
Unit: %

	EU-15	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK
1990	13	3	2	38	9	4	3	5	3	5	32	36	1	2	26	3
1991	17	7	4	45	18	5	5	14	6	12	40	38	3	5	31	5
1992	21	11	6	52	29	7	8	21	9	17	47	40	5	7	35	7
1993	28	20	12	57	35	11	15	27	15	30	56	49	9	12	39	14

1994	35	29	23	63	39	15	23	34	21	41	62	56	13	17	43	20
1995	41	37	32	68	43	18	30	40	27	52	68	63	16	23	46	27
1996	46	45	41	72	46	22	38	48	33	62	73	71	19	29	51	33
1997	52	53	50	77	50	26	43	56	41	70	78	77	22	37	56	40
1998	58	61	60	82	54	30	49	63	49	78	82	83	25	44	61	46

***Source**: Eurostat, 2001*

Meta data

Technical information

Data sources:
Eurostat Statistical Compendium 2001 (Eurostat, 2001).

Description of data:
Estimated share of petrol-engine cars fitted with catalytic converter, based on the estimated age distribution.

File: Emission standards.xls

Original measure units:
–

Original purpose:
–

Geographical coverage:
EU-15 (Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the United Kingdom).

Temporal coverage:
1990-1998

Methodology and frequency of data collection:
The estimates of cars fitted with a catalytic converter are based on vehicle stocks at 31 December for all countries. For this reason, these estimates may differ slightly from published figures for countries which use a different reference date.

Methodology of data manipulation:
None

Qualitative information

Strength and weakness (at data level):
–

Reliability, accuracy, robustness, uncertainty (at data level):
–

Further work required (for data level and indicator level):
The data on numbers of cars complying with certain emission standards should be based on registration data rather than being a result of estimating the fleet composition and, in turn, its age distribution.

An homogeneously defined de-registration procedure would be needed to know more precisely the actual share of the fleet complying with given emission standards in different EU

countries.

References

EEA, 2000: *Are we moving in the right direction?* Indicators on transport and environment integration in the EU, TERM 2000, European Environment Agency. Copenhagen, Denmark, February 2000.

European Commission, 1999a: *Air Transport and the Environment - Towards meeting the challenges of Sustainable Development.* COM (1999) 640 final. Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee of the Regions. Commission of the European Communities. Brussels, Belgium, December 1999.

European Commission, 1999b: Council Regulation (EC) No 925/1999 of 29 April 1999 *on the registration and operation within the Community of certain types of civil subsonic jet aeroplanes which have been modified and recertificated as meeting the standards of volume I, Part II, Chapter 3 of Annex 16 to the Convention on International Civil Aviation, third edition (July 1993).* COM (1999) 925. Commission of the European Communities. Office for Official Publications of the European Communities, Luxembourg, Luxemburg.

European Commission, 2000: *Proposal for a Directive of the European Parliament and of the Council amending Directive 97/24/EC on certain components and characteristics of two or three-wheel motor vehicles (presented by the Commission).* COM (2000) 314 final. Commission of the European Communities. Brussels, Belgium, June 2000.

Eurostat, 2001: *Transport and Environment: Statistics for the Transport and Environment Reporting Mechanism (TERM) for the European Union, data 1980-1999*. European Commission in cooperation with Eurostat, Luxembourg 2001. {Version September 2000}