

COMMISSION OF THE EUROPEAN COMMUNITIES

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**REPORT FROM THE COMMISSION TO THE COUNCIL ON THE IMPLEMENTATION
OF DIRECTIVE 87/219/EEC, ON THE APPROXIMATION OF
THE LAWS OF THE MEMBER STATES RELATING TO THE SULPHUR
CONTENT OF CERTAIN LIQUID FUELS**

SUMMARY

On 1 January 1989 Directive 87/219/EEC concerning the sulphur content of gasoil came into force. This Directive reduced the permissible sulphur content from 0.5% to not more than 0.3% by weight, and in zones where the protection of the environment, the national heritage or the health of the population needed to be increased, gasoil with a sulphur content of 0.2 % could be required.

The situation at present is that Belgium, Denmark, Germany (excluding the former territory of the GDR), Luxembourg and the Netherlands require 0.2 % sulphur and the remaining seven Member States require not more than 0.3 % sulphur in gasoil.

Since 1980, although the total consumption of gasoil has remained more or less constant, there has been a significant increase in its use as diesel fuel at the expense of heating oil and this trend is expected to continue in the future.

SO₂ emissions in general in the Member States, including those arising from the use of gasoil, have fallen by some 30 % since 1980. Although at the moment SO₂ emissions from gasoil in Member States form a relatively small part of total SO₂ emissions (average of 5 % in the EC), they have a relatively greater effect on urban air because they are emitted at ground level (motor vehicles) or at roof level (space heating).

Further reductions in SO₂ emissions in general, and sulphur emissions from gasoil in particular, are necessary because :

- The SO₂ limit values for air pollution are still being breached, particularly in a number of urban areas, and the guide values - which are intended as targets to aim for - are frequently exceeded.
- The Commission is putting forward a two-stage proposal for the reduction of emissions of gaseous and particulate pollutants from diesel engines. The first stage in 1992/93 does not require a sulphur content lower than 0.2 %. For the second stage in 1995/96 more stringent pollutant limits, especially for particulates, will require a lower sulphur content in diesel fuel in line with that being introduced in the USA.

In the light of these developments, the Commission is proposing:

- to draw a distinction between gasoil for heating, industrial and bunker gasoil, on one hand and gasoil for use in diesel engines on the other;
- to reduce the sulphur content of gasoil of both types to not more than 0.2 % by weight one year after the entry into force of the Directive (01 October 1994);
- to reduce the sulphur content of diesel fuel to not more than 0.05% by weight three years after the entry into force of the Directive (01 October 1996);
- to reduce the sulphur content of gasoil for heating, industrial and bunker gasoil to not more than 0.1% by weight six years after the entry into force of the directive (01 October 1999)

to stimulate Member States to introduce in 1992 a tax incentive for 0.05 % sulphur diesel to encourage its earliest possible introduction on the market in the same year.

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I. Introduction

Article 6 of the Council Directive of 30 March 1987 on the approximation of the laws of the Member States relating to the sulphur content of certain liquid fuels (87/219/EEC) (Commission 1987) states that:

"The Commission shall monitor the effects of applying this Directive. Three years after the notification of this Directive, in the light of any new information available on the atmospheric sulphur dioxide pollution levels recorded, on progress towards defining air quality objective, on the state of the environment and on the harmful effects of air pollution, and on conditions on the gasoil market, the Commission shall submit a report to the Council accompanied by an appropriate proposal with a view to the establishment of a single value.

The Council, acting in accordance with the provisions of the Treaty, shall decide on the Commission proposal before 1 December 1991".

In preparation for this report the Commission departments drew up a questionnaire, in order to collect relevant information from Member States. This questionnaire was sent to Member States in June 1989.

The answers from Member States, together with other relevant information (e.g. on the implementation of Directive 80/779/EEC concerning air quality limit values for SO₂, reports from local authorities, energy statistics, etc.), were evaluated in order to obtain a comprehensive picture of the situation.

It should be mentioned that the Directive required the sulphur content of gasoil to be 0.3 or 0.2% from 1 January 1989 and a report to be presented to the Council only 16 months later. Not all effects of this change towards lower sulphur levels are apparent; for example, SO₂ pollution levels are published by Member States with a delay of one or two years and the latest energy statistics are not always available. The Commission believes, however, that the following report can provide a useful picture of the situation.

II. The present situation

II.1. Implementation of Directive 87/219/EEC

Directive 87/219/EEC is an amendment to Directive 75/716/EEC and concerns the approximation of the laws of the Member States relating to the sulphur content of certain liquid fuels.

Directive 87/219/EEC provides, inter alia, that

- as from 1 January 1989 the sulphur content of gasoil shall not exceed 0.3 % by weight (expressed in sulphur) throughout the Community (Article 2);

- Member States may require the use of gasolls with a sulphur content equal to 0.2 % under the following conditions:

- * within the zones they have determined under Article 4 of Council Directive 80/779/EEC of 15 July 1980 on air quality limit values and guide values for sulphur dioxide and suspended particulates; as last amended by the Act of Accession of Spain and Portugal;
- * wherever Article 5 of the same Directive is applicable;
- * where damage to the environment or to the national heritage caused by total sulphur dioxide emissions requires the sulphur content of gasoll to be fixed at a lower value than that provided for in Article 2.¹

Moreover, the marketing of gasoll with a sulphur content of less than 0.2 % may not be prohibited.

In practice these provisions result in a division between countries requiring a sulphur content of 0.3% by weight and those requiring 0.2 % by weight.

Since the adoption of the Directive, the present situation in Member States appears to be :

In Belgium the sulphur content of gasoll used for heating was reduced to 0.3 % up to 31 December 1988 and to 0.2 % thereafter by the "Arrêté royal relatif à la dénomination, aux caractéristiques et à la teneur en soufre du gasoll-diesel pour les véhicules

1 Article 4 of Directive 80/779/EEC states:

- "1. In the zones in which the Member State concerned considers it necessary to limit or prevent a foreseeable increase in pollution by sulphur dioxide and suspended particulates in the wake of development, the Member State shall, taking the guide values in Annex II as a reference point, fix values which must be lower than the limit values in Annex I.
2. In zones on its territory which the Member State concerned considers should be afforded special environmental protection, the Member State shall fix values which are generally lower than the guide values in Annex II.
3. Member States shall inform the Commission of the values, deadlines and timetables they have laid down for the zones referred to in paragraphs 1 and 2, and of any appropriate measures they have taken."

Article 5 of the same Directive reads:

"In addition to the provisions referred to in Article 3 (1) and Article 4 (1), Member States shall, with the object of taking further precautions for the protection of health and the environment, endeavour to move towards the guide values in Annex II wherever the measured concentrations are higher than these values."

routiers" and "Arrêté royal relatif à la dénomination, aux caractéristiques et à la teneur en soufre du gasoil de chauffage", both of 19 October 1988. Belgium explained that it applies Article 5(1) of the gasoil Directive, but did not give specific reasons for this decision.

In Denmark the sulphur content of gasoil used for heating is limited to 0.2 % by Law n° 562 of 22 September 1988. Denmark explained that it applies Article 5(1), third indent, of Directive 87/219/EEC in order to protect the environment and the national heritage and to reduce transboundary air pollution.

In the Federal Republic of Germany the sulphur content of gasoil had already been reduced to 0.15% by a government decision of 26 October 1984 (Umwelt 1984). In application of Article 5(1), third indent, national legislation has required on 4.12.1987 that since 1 March 1988 gasoil should contain not more than 0.2 % sulphur.

In France the sulphur content of gasoil has been fixed at 0.3 % since 1 September 1980 by "Arrêtés interministériels du 28.3.1980 relatifs à la modification des caractéristiques du gazole et du fioul domestique" and "Arrête du 29.10.1987 fixant des caractéristiques du gasoil grand froid".

With regard to Greece no official information is available. In practice it seems that the sulphur content of gasoil is about 0.3% by weight. The Commission has opened an infringement procedure concerning the non-communication of its national execution measures.

In Ireland the Air Pollution Act of 1987, in conjunction with Regulation no. 168 of 1989, requires a sulphur content in gasoil of 0.3 %. In practice, however, the average sulphur content has been below 0.2 % for many years.

In Italy the sulphur content of gasoil was fixed at 0.3 % by "Legge no. 615" of 17 March 1966 and "DPCM no. 240" of 4.6.1988. The situation, however, remains unclear as Italy has indicated in reply to the questionnaire that it applies Article 5(1) of the Directive which allows it to reduce the sulphur content to 0.2 %, while in practice the law appears to require 0.3 %. The Commission has opened infringement proceedings concerning the non-communication of its national execution measures.

In Luxembourg the sulphur content of gasoil has been limited to 0.2 % since 1 January 1989 (prohibition of import) and 1 July 1989 (prohibition of sale), respectively, by "Règlement grand-ducal du 22 août 1988 relatif à la teneur en soufre de gas-oils". That means that Luxembourg applies Article 5(1) of the Directive. However, at this moment there is a procedure of infringement for non-conformity of the above-mentioned legislation.

In The Netherlands the "Besluit 408 van 26.8.1988, houdende wijziging van het Besluit zwavelgehalte brandstoffen" requires a sulphur content in gasoil of 0.2 %. In the general considerations to the "Besluit" it is explained that all three possible reasons set out in Article 5(1) of Directive 87/219/EEC apply to the Netherlands.

In Portugal the "Portaria no. 124/89" of 18 February 1989 requires a sulphur content of 0.3 %.

In Spain the sulphur content of gasoil is laid down in "Real Decreto 2482/1986" of 4.12.1986 and "Real Decreto 1485/1987" of 25 September 1987 (BOE no. 291 of 5 December 1987) which require a maximum sulphur content of 0.3 % by weight.

In the United Kingdom the Fuel Oil Regulations and the Motor Fuel Regulations of 1976 lay down the sulphur content of gasoil. They are amended by 1989 regulations which came into force on 14 June 1990, requiring a level of 0.3 % by weight. However, in practice the average Sulphur content of gasoil has been below 0.3 % for many years.

11.2. Air quality: atmospheric sulphur dioxide pollution

In general, SO₂ pollution levels in the large urban areas of Western Europe have been decreasing for some time. However, there are signs that this trend was halted in the mid-eighties and that SO₂ levels have started to level off.

Notwithstanding these reductions from the originally high pollution levels, SO₂ levels in urban areas are still mainly between the guide values and the limit values of Directive 80/779/EEC. Also the limit values fixed in this Directive are quite high in comparison with WHO guideline values (see annex 7).

There are still cities and areas which do not comply with the SO₂ limit value of Directive 80/779/EEC. The major problem for many of these areas is the episodic nature of the increases in levels, causing the 98 percentile limit and/or the "three consecutive days rule" of the Directive to be breached.

11.3. Sources of pollution and resulting air quality levels

SO₂ emissions from gasoil are directly related to the consumption of gasoil and its sulphur content. The 1987 consumption level was still slightly below that of 1980, but in recent years consumption has been on the increase (see annex 2).

Gasoil is mainly consumed in two sectors:

- heating of buildings and houses (± 52 % in the Community in 1987),
- in diesel engines (± 41 % in the Community in 1987).

In addition, a small quantity is consumed by industry (± 7% in EC 1987). There has been a significant increase in diesel fuel consumption at the expense of heating oil since 1980 (see annex 3). A comparison of SO₂ emissions due to gasoil consumption shows that they have decreased in most countries and in the Community as a whole (see Annex 4) and account for about 5 % of total SO₂ emissions in the Community. For the future, Annex 5 suggests that in the transport sector the quantities of SO₂ emissions will increase unless further measures are taken. This forecast increase would be mainly due to an increase in the consumption of gasoil in diesel engines used in motor vehicles, while the consumption of gasoil for domestic heating is expected to decline.

The increase in the transport sector has obvious implications for urban air quality. The emissions occur near the ground, unlike those from larger installations which are emitted from stacks of varying heights, and therefore have a greater impact on urban air quality. The statistics for Stuttgart (Federal Republic) illustrate this point. There 81 % of the emissions of SO₂ are caused by industry, 12% by domestic heating and 7% by traffic, but their respective impact on ambient air quality is 39%, 27% and 34%. Despite the low figure for "domestic heating" and "traffic", their importance for ambient air quality has to be multiplied by a factor of between 2 and 5.

Similar principles apply to domestic heating but the importance of gasoil used for heating is declining because of its replacement by natural gas.

Annex 5 also shows that the bulk of SO₂ emissions (around 85 %) comes from sources other than gasoil, some of which are not controlled by legislation at the present moment. For example, Directive 89/609/EEC regulates emissions from large-scale firing plant with a thermal capacity of over 50 MW but not from installations with a thermal capacity of less than 50 MW and sulphur limits do not apply to oil products like bunker fuels.

11.4 New findings relating to the state of the environment and the harmful effects of air pollution

To evaluate these new findings relating to the state of the environment and harmful effects of air pollution, the following aspects have been considered:

- I) new information concerning effects on human health,
- II) new information concerning effects on nature,
- III) new information concerning effects on materials.

With regard to the effects of SO₂ on human health, the WHO has published a new set of guideline values. (WHO, 1987). For details see Annex 7.

When considering a reduction in the sulphur content of diesel fuel it is useful to remember that sulphate particles (as emitted by diesel engines, together with SO₂) are detrimental to human health. The irritant potency of various sulphate species varies, but H₂SO₄ is more irritant than any of the sulphate salts in terms of increased airway potent. The WHO in its recent report concluded with regard to sulphate particles (acid aerosol) that:

"while the currently available data are insufficient to establish a numerical guideline, they do raise serious concern that acidic aerosol could account for past associations between particulate air pollution and exacerbation and development of chronic bronchitis,"

and that:

"the association shown in Japan (Yokkaichi) between H₂SO₄ aerosols and respiratory morbidity gives support to the hypothesis that acid aerosol is an important component of urban air pollution.

There is also consistency with this hypothesis in the results of cross-sectional studies of daily mortality in major cities in the USA which indicate that it is a better predictor of mortality than any of the non-specific gravimetric indices that have been used."

In the light of the assumed adverse effects of particulates and the fact that the operation of diesel engines with sulphur-containing fuel has to be considered as an important low-height source of such particulates and SO₂, the US Environmental Protection Agency (EPA) is considering establishing an appropriate sulphate emission standard for diesel vehicles.

Effects on nature will concern vegetation in general and forest decline and acidification of lakes in particular.

With regard to vegetation, the WHO published general guideline values for the first time in 1987. Moreover, guideline values were agreed upon at the ECE Critical Loads Workshop of 1988 (UN-ECE 1988). Specific guideline values for the protection of forests have been recommended by the International Union of Foresting Research Organisations. It should be noted that all these values are substantially lower than the SO₂ limit values of Directive 80/779/EEC. Those for the protection of vegetation and forests are also lower than the guide values given in that Directive.

With regard to forest decline, a 1987 publication by the Ministry of Food, Agriculture and Forestry in Germany - one of the Member States most affected - explains :

"After five successive annual surveys of forest damage the development shows a strong increase in damage between 1983 and 1984, further slight increases of nearly 2 % each in 1985 and 1986 and a slight decrease in damage in 1987."

This statement also applies for the 1988 survey, which means that the forest decline phenomenon has not changed very much relative to the 1987 situation. In the meantime data have become available for other European countries as well showing that they are affected even more seriously than Germany.

Very recently the Commission has published some additional data on forest decline in the Community which confirm the trend shown above (see Annex 8). The examination of the reasons for the forest decline has not so far led to any definite conclusions.

On the other hand, there is no doubt about the effects of SO₂ and its contribution to the acidification of lakes.

With regard to the effects of air pollutants, including SO₂, on monuments, a recent International symposium provided some insight into the state of the art of this very complex issue (Commission 1989).

Although further evidence of the important contributory role played by air pollutants, and in particular those deriving from SO₂ emissions; in the decay of monuments was presented, the overall assessment of the situation is not very different from that of 1987. Most relevant seems to be the fact that many scientists attending this meeting emphasized

the need to define air quality standards for the protection of monuments and the cultural heritage in addition to those already available for the protection of human health and nature (vegetation, surface waters).

In short, while no major new findings have emerged since 1987 there has been a growing recognition of the adverse effects of SO₂ and SO₂-related emissions on the environment. This has led to more stringent guideline values being proposed and agreed as a basis for the setting of clear policy objectives.

11.5. Air quality objectives in the Member States

With regard to Member States' air quality objectives it is appropriate to distinguish between objectives at international, national and local level.

I) International level

The European Council held in Hannover on 27 and 28 June 1988 concluded, inter alia, with regard to the protection of the environment:

"The European Council expressed its concern about the danger to the environment in general and in particular that caused by the pollution of air and water. It noted the recent positive results of the work of the Environment Council and invited the Commission and the Council to intensify efforts to improve the means to combat and prevent air and water pollution."

Nor should it be forgotten that the guide values laid down in Directive 80/779/EEC, which are still exceeded in many urban areas of the Community,

"are intended to serve as long-term precautions for health and the environment,"

or that Article 5 of the same Directive requires that

"Member States shall ... endeavour to move towards the guide values in Annex II wherever the measured concentrations are higher than these values."

II) National level

There is a tendency to consider the SO₂ limit values of Directive 80/779/EEC as upper limits and to apply lower limits at national level.

With regard to SO₂ limit values only, in practice the situation would seem to be:

| | | |
|----------------|---|---|
| Belgium |) | |
| France |) | |
| Greece |) | |
| Ireland |) | Full application of the limit values of Annex I |
| Luxembourg |) | of Directive 80/779/EEC |
| Portugal |) | |
| Spain |) | |
| United Kingdom |) | |

| | | |
|-----------------------------|---|---|
| Denmark |) | Application of lower SO ₂ limit values of |
| Italy |) | Annex I to Directive 80/779/EEC |
| The Netherlands | | Application of SO ₂ limit values which are at least as stringent but in most of the cases more stringent than those of Annex I to Directive 80/779/EEC |
| Federal Republic of Germany | | With regard to SO ₂ , application of a system which is somewhere between Annex I and IV (Dir. 80/779/EEC). In practice, it would appear to be generally more stringent than the limit values in Annex I to this Directive as regards the long-term limit value, and in most cases equally stringent as far as the short-term limit values are concerned. |

According to Article 5 of Directive 87/219/EEC Member States are allowed to require the use of gasoils with a sulphur content equal to 0.2 % by weight only under certain circumstances. Belgium, Denmark, Germany, Luxembourg and The Netherlands make use of the provisions of Article 5. The reasons for requiring the lower sulphur content, officially notified to the Commission in the answers to the questionnaire, are shown in Annex 10.

III) Local level

The main objective of local authorities is to comply with the ambient air limit value in force. Different strategies are applied in order to achieve that objective; for instance, some towns and cities tend to use more natural gas for domestic and commercial heating instead of other, more polluting, fuels.

Moreover, the local authorities of European cities (e.g. Paris), having achieved compliance with the limit values, increasingly consider the EC guide values as air quality goals, being fully in line with Article 5 of Directive 80/779/EEC. Finally, responsible local authorities in many countries are also willing to contribute to the overall reduction of SO₂ emissions within the limits of their powers.

11.6. Conditions on the gasoil market

The actual retail price of gasoil is dictated to a large extent by national taxes (Annex 11). The market price for diesel fuel including VAT is about two or three times higher than the price excluding tax. Overall, the market price of gasoil products depends on many parameters, in particular crude oil price and taxes, but only very little on additional costs due to desulphurization requirements. Taking into account the effects on the prices since the Gulf crisis, the future prospects are difficult to predict.

III. Assessment of the draft proposal with a view to setting a single value for the sulphur content of gasoil

III.1. Action required by Article 6 of Directive 87/219/EEC

This section assesses the information provided in the previous chapters with a view to preparing the Commission's proposal which must accompany the report, taking into account, as required by Article 6 of Directive 87/219/EEC:

- A) atmospheric sulphur dioxide pollution levels
- B) progress towards defining air quality objectives
- C) the state of the environment and harmful effects of air pollution
- D) conditions on the gasoil market.

Ad A) As far as the atmospheric sulphur dioxide pollution is concerned according to data reported prior to 1989:

- I) pollution levels in urban areas in 1988 were largely below the SO₂ limit values, but only in a few cases below the SO₂ guide values of Directive 80/779/EEC;
- II) SO₂ limit values were still being exceeded in some cities. The problem is frequently episodic in nature, being due to combinations of unfavourable weather conditions and increased heating during cold spells (see annex 6).
- III) the forecast increase in the use of transport fuels and the resulting increase in SO₂ emissions from such fuels will have a detrimental effect on urban air quality. This is to some extent compensated by the replacement of heating gasoil by natural gas.

ad B) As far as progress towards defining air quality objectives is concerned:

- I) In the Community and in all the Member States policies have been developed which seek a substantial reduction in SO₂ emissions. However, as a rule these policies do not specifically deal with urban air quality;
- II) local plans to improve ambient air quality by reducing sulphur content below that required in Directive 87/219/EEC can have serious implications for the creation of the Single Market;
- III) the limit values of the Directive 80/779/EEC, which is now ten years old, have to be updated to current world standards.

ad C) With regard to the state of the environment and the harmful effects of air pollution:

- I) no significant improvement of the situation of forests and surface waters has so far been reported;
- II) available information on effects led to proposals from recognized international working groups for new and additional guide values for the protection of nature

(vegetation) in general, and forests and surface waters in particular. These values are generally lower than SO₂ concentrations measured in many parts of the Community.

ad D) Leaving aside any possible effect of the Gulf crisis, total consumption of gasoil has not changed significantly in recent years but there has been a very clear increase in diesel fuel consumption at the expense of heating oil which is increasingly being replaced by natural gas.

Article 6 clearly states that the Commission shall submit a proposal

"with a view to the establishment of a single value for the sulphur content of gasoil."

As described in Chapter II.1, Implementation of Directive 87/219/EEC, a number of countries have 0.3 % sulphur as a maximum and the northern countries, in the main, apply 0.2 %. This means that there is a need to establish a single value and in view of the continuing need to improve urban air quality, it seems to be logical that the maximum level for the Community should be not more than 0.2 % sulphur by weight as a first step. In order to come to a further improvement of the quality of life in urban areas, as a second step a sulphur content of 0.1 % by weight is foreseen. Further steps can be expected based on the development of the air quality.

III.2. Recent development in emission legislation

A proposal for the reduction of gaseous pollutants from diesel engines (COM (90)174 final, Syn. 272 of 15.6.90) is currently under discussion. It comprises two stages: the first in 1992/93 and the second in 1995/96. The proposed limit values for the first stage correspond to those of the US regulation for model year 1991, transposed in the European test procedure, and are identical to those which come into force in Austria and Switzerland on 1 October 1991. These standards do not yet require a sulphur content lower than 0.2 % by weight.

For the second stage (1995/96) more stringent limits have been adopted (Common Position of Environmental Council - 18/3/91) in line with those in the USA for the year 1994. In order to achieve a further reduction in particulate emissions, it will be necessary not only to improve engine technology, but also to revise fuel properties. One of the most relevant of these properties is the sulphur content of diesel fuel.

Trials with the most recent diesel engines have shown that reduction of sulphur content in diesel fuel from 0.2 % to 0.05 % leads to a small but significant reduction in measured particulate emissions. In the USA agreement has been reached to reduce diesel fuel sulphur to a maximum of 0.05 % which, together with improved diesel engine designs, will enable the second-stage emission levels to be met. Similar action is likely to be necessary in Member States by 1995/96. These considerations only apply to diesel fuel and therefore it seems appropriate to distinguish between the requirements for diesel fuel on the one hand and those for heating, industrial and bunker gasoil on the other.

The early announcement of this forthcoming reduction has the following advantages :

- a) It will counteract the adverse effects of the growing consumption of diesel fuel and the consequent effects on urban air quality;
- b) It will give the oil industry time to build the necessary installations;
- c) the investments needed in southern Europe and in the former German Democratic Republic in order to reduce the sulphur content to the level of 0.2% for domestic, industrial and automotive use, can be made in preparation for the eventual reduction to 0.05%;
- d) the motor industry can take this factor into account in developing new heavy duty diesel engines and catalytic converters designed for this low sulphur content;
- e) as a result of c) above, the use of oxidation catalysts can give additional reductions in emissions which could obviate the need to limit other properties of diesel fuels.
- f) In order to speed up the introduction of 0.05 % sulphur diesel fuel, there is a case for introducing a tax incentive for consumers of such diesel fuel, where possible by 1992. If the technology of d) will also be made available for cars in the coming years, this will increase the need to come with a quick availability on the market.

Early 1991, the Commission adopted a proposal for a Council Directive fixing certain rates and target rates of excise duty on mineral oils (COM(91)43 final) and on the harmonization of the structures of excise duty on mineral oils (COM(91)434 final). In these documents a diesel or automotive gasoil of 0.05 % sulphur by weight is not yet foreseen.

In the proposal concerning the fixing of certain rates and targets of excise duty on mineral oils in article 3 is stated that the excise duty in diesel shall be not less than 245 ECU or more than 270 ECU per 1,000 litres. This gives a rate band of 25 ECUs. As is stated in paragraph III.4, the calculation of the additional costs of production for the 0.05 % sulphur by weight level varies from US \$ 4.5 to \$ 14 pro ton which is equivalent to 3.2 ECU to 9.9 ECU pro 1,000 litres. The average will probably be around 5-6 ECU pro 1,000 litres. This means that the proposed band is sufficient to incorporate by Member States a tax incentive for diesel with a low sulphur content.

III.3. Timetable

A significant proportion of gasoil (more than 50 %) already contains 0.2 % or less sulphur. Reducing the sulphur content of all gasoil to 0.2 % should be a relatively simple matter and is expected to take one year to implement (i.e. one year from the incorporation of the Directive in national law and two years after approval by the Council).

Reducing the sulphur content of diesel fuel to 0.05 % will require a significant new plant construction program in the refining industry. A period of three years from the incorporation of the Directive in national law has been allowed for this purpose.

Reducing the sulphur content of gasoil for heating industrial and bunker gasoil to 0,1 % will be required 5 years after the incorporation of the Directive in national law.

At this moment there is a tendency in the neighbouring EFTA countries to come to a further reduction of the sulphur content in gasoil for other uses like heating. For instance Austria applied for 0.1% sulphur for heating oil. This means that in the second half of the nineties the 0.2% sulphur for heating etc. will be relatively high level in the Community.

The overall timetable could look like this:

| | |
|--|-----------------|
| Council approval | 01 October 1992 |
| Incorporation in national law | 01 October 1993 |
| Stage 1 (0.2 % sulphur) | 01 October 1994 |
| Stage 2 (0.05 % sulphur in diesel fuel) | 01 October 1996 |
| Stage 3 (0,1 % sulphur in gasoil for heating, industrial use and bunker) | 01 October 1999 |

This would just tie in with the proposal for the second-stage reduction of gaseous pollutants from diesel engines in 1995/96.

III.4. Possible effects on the gasoil market

The provided time is allowed for petroleum refineries to add or modify facilities for the reduction of the gasoil sulphur content, no significant effect on gasoil availability is expected.

The removal of sulphur is a technically well-proven process, even down to very low levels where it entails costs and additional energy consumption.

Studies carried out by A.D. Little in 1988 on behalf of the German Umweltbundesamt and by CONCAWE in 1989 show that the cost of reducing sulphur in gasoils depends to a large extent on the assumptions used and on the individual national situations. This makes it very difficult to have a general cost picture. However A.D. Little estimated that to go to the 0.05 sulphur level additional costs would come to US \$ 4.5/t and correspond to an increase of the off-tax market price by about 1.3 % and of the tax-included market price of about 0.7 % (see annex 12 and 13). CONCAWE however came to a price of US \$ 11-17/ton, which means additional costs of US \$ 11-14/ton (see annex 14 and 15).

So in the most pessimistic assumptions, the increased cost is small compared with the price of the product to the consumer which is heavily influenced by national taxes and duties (see annex 11-2).

The production of a 0.2 % wt sulphur heating oil and a 0.05 % wt sulphur diesel fuel will in some cases require additional infrastructure in refineries and distribution facilities but is not expected to create significant problems. This additional energy consumption would lead to some 2.5 to 3 million tonne/year emissions, which represents 0.1 % of the actual annual CO₂ emissions pro year in the EC.

IV. Recommendations

The Commission's proposals in this report are :

- . to distinguish in the Directive between
 - heating, industrial and bunker gasoils and
 - automotive diesel gasoils.
- . to fix the upper limit of the sulphur content at 0.2 % by weight for both types of gasoil one year after the date on which the Directive comes into force (01 October 1994).
- . to reduce the sulphur content of diesel fuel to not more than 0,05 % by weight three years after the entry into force of the Directive (01 October 1996).
- . to reduce the sulphur content of gasoils for heating, industrial and bunker gasoil more than 0,1 % by weight six years after the entry into force of the directive (01 October 1999).
- . because of the need for certain type of diesels for cars and heavy duty to use the low sulphur content fuel (0.05 %) in order to meet with the required standards, this low level should be available on the market in a balanced way as soon as possible, but the latest at 1.10.1995.
- . the Member States will be encouraged to create a tax incentive after the approval of the Directive by the Council in 1992 for the introduction of diesel fuel containing not more than 0.05 % sulphur.
- . with regard to automotive gasoils it has to be remembered that the Commission will present a report to the Council by the end of 1993 with a proposal concerning the quality requirements for automotive gasoil with a view to achieving the required pollutant reductions as proposed in COM(90)174 final of 15 June 1990 (heavy duty diesels).

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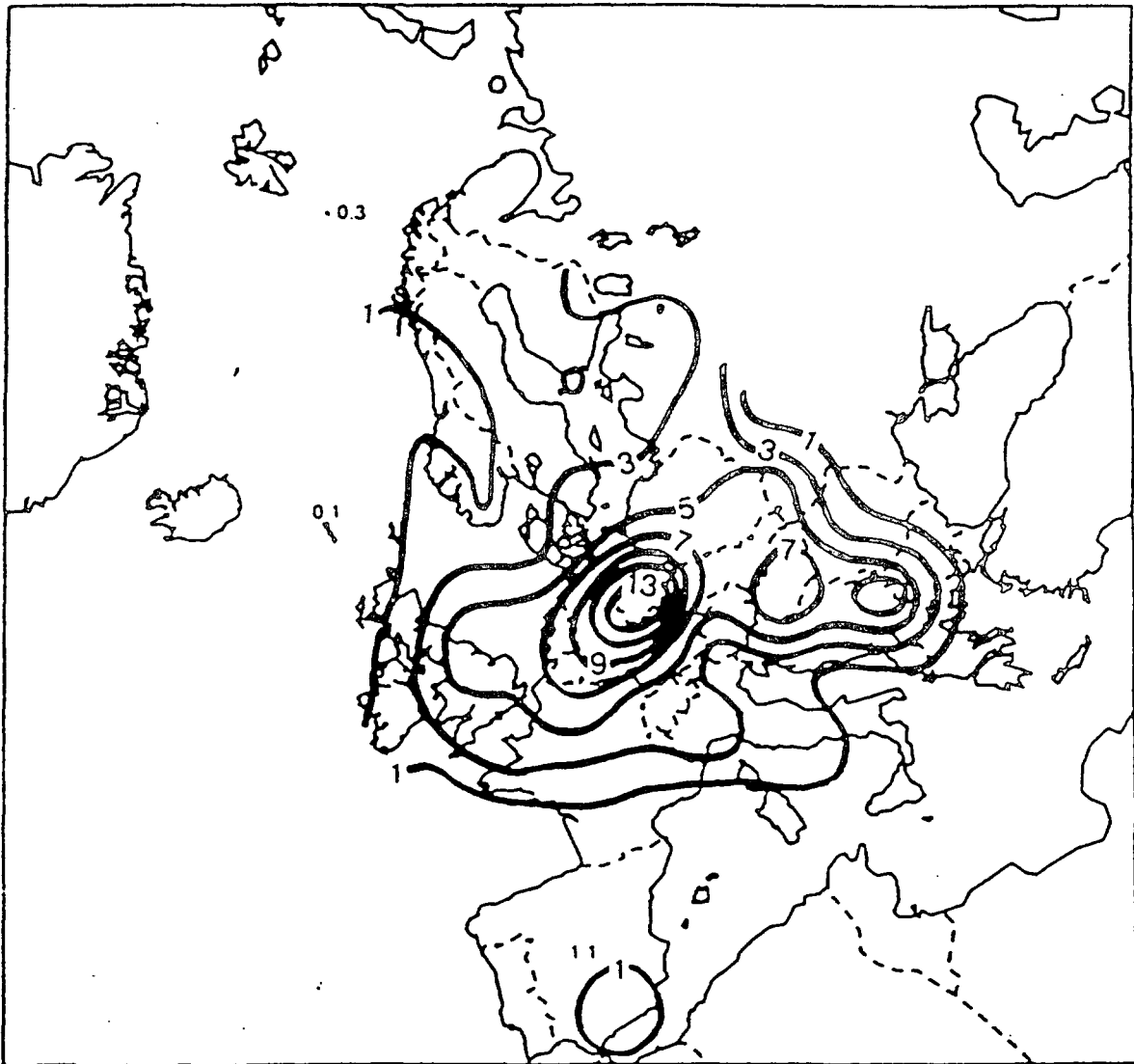
Ranges of SO₂ pollution levels in Member States in recent years, expressed in [µg/m³] (24 h means).

Annex 1-1

| Country | Urban areas | | Rural areas | |
|---------|----------------------|------------------------|---------------------|---------------|
| | Annual mean | 98 percentile | Annual mean | 95 percentile |
| B | 15 - 70 | 40 - 300 | 15 - 20 | 50 - 60 |
| DK | 10 - 30 | 30 - 90 | 0.2 - 10 | 1 - 30 |
| FRG | 20 - 100 | 80 - 350 | 5 - 40 | 20 - 120 |
| F | 20 - 100 | 100 - 400 | 4 - 10 | 14 - 40 |
| GR | 40 - 60 ¹ | 100 - 250 ¹ | 5 - 10 ¹ | 15 - 25 |
| IRE | 10 - 40 ² | 70 - 150 ² | 1 - 3 | 5 - 10 |
| I | 20 - 120 | 80 - 400 | 2 - 15 | 10 - 40 |
| LUX | 15 - 30 | 40 - 200 | n.a. | n.a. |
| NL | 10 - 40 | 40 - 150 | 5 - 30 | 20 - 120 |
| POR | 15 - 120 | 70 - 350 | 3 - 10 | 5 - 40 |
| SP | 50 - 100 | 150 - 500 | 2 - 10 | 5 - 30 |
| UK | 20 - 90 | 40 - 200 | 5 - 15 | 5 - 50 |

¹ Athens ² Dublin

Sulphur Dioxide In Rural Areas 1987. Annual Mean Concentrations In ($\mu\text{g}/\text{m}^3$) (Schaug et al. 1989)



Productos petroliferos
Suministros interiores

Mineralölerzeugnisse
Inlandslieferungen

1 000 t

| | EUR 12 | EUR 10 | Belgique Belgie | Danmark | BR Deutsch- land | Elalaba | España | France | Ireland | Italia | Luxem- bourg | Neder- land | Portugal | United Kingdom |
|------|--------------------|---------|--------------------|---------|------------------------|---------|--------|---------------------------------------|---------|--------|-----------------|----------------|----------|-------------------|
| | Gasóleo diesel oil | | | | | | | Dieselkraftstoff und Destillatherzole | | | | | | |
| 1980 | 171 499 | 160 246 | 8 424 | 5 505 | 54 745 | 3 739 | 9 517 | 38 888 | 1 258 | 24 014 | 528 | 5 920 | 1 736 | 17 625 |
| 1981 | 154 142 | 141 842 | 6 739 | 4 615 | 47 640 | 3 386 | 10 426 | 32 988 | 1 176 | 24 271 | 489 | 4 702 | 1 874 | 15 836 |
| 1984 | 156 252 | 143 662 | 6 868 | 4 738 | 48 249 | 3 344 | 10 763 | 32 767 | 1 209 | 25 057 | 485 | 4 615 | 1 827 | 16 330 |
| 1985 | 163 840 | 150 981 | 7 640 | 5 137 | 51 781 | 3 685 | 11 033 | 33 080 | 1 302 | 26 172 | 528 | 4 658 | 1 826 | 16 998 |
| 1986 | 170 863 | 157 843 | 8 552 | 4 778 | 56 185 | 3 617 | 11 136 | 33 772 | 1 491 | 26 450 | 569 | 5 014 | 1 884 | 17 415 |
| 1987 | 170 040 | 156 587 | 8 368 | 4 986 | 54 083 | 4 112 | 11 421 | 33 383 | 1 400 | 27 707 | 594 | 4 843 | 2 032 | 17 111 |

Consumption of gas oil in the Community and in EC Member States in recent years.

(EUROSTAT 1988)

Consumption of gas oil in the sectors industry, traffic and heating in recent years in [1 000 t].

(EUROSTAT 1988)

| | | 1980 | 1983 | 1984 | 1985 | 1986 | 1987 |
|----------------|----------|-------|-------|-------|-------|-------|-----------|
| EUR 12 | Industry | 17772 | 10155 | 11288 | 11351 | 11245 | 11408 7% |
| | Traffic | 50665 | 54193 | 56999 | 60107 | 65446 | 69084 41% |
| | Heating | 99021 | 85662 | 83368 | 87427 | 90430 | 85480 52% |
| EUR 10 | I | 17108 | 9621 | 10784 | 10835 | 10703 | 10802 |
| | T | 44489 | 47242 | 49911 | 52686 | 57343 | 60692 |
| | H | 94750 | 80961 | 78540 | 82583 | 86137 | 81069 |
| Belgium | I | 580 | 457 | 432 | 342 | 357 | 351 |
| | T | 2050 | 2339 | 2417 | 2642 | 2942 | 3041 |
| | H | 5766 | 3937 | 4016 | 4640 | 5235 | 4969 |
| Denmark | I | 686 | 472 | 549 | 640 | 564 | 536 |
| | T | 878 | 1030 | 1167 | 1335 | 1301 | 1721 |
| | H | 4017 | 3107 | 3015 | 3156 | 2908 | 2719 |
| F.R. Germany | I | 5333 | 2381 | 3228 | 3139 | 3146 | 3285 |
| | T | 10980 | 11838 | 12168 | 12684 | 13641 | 14127 |
| | H | 38028 | 32450 | 32122 | 35151 | 38581 | 35227 |
| Greece | I | 228 | 247 | 241 | 246 | 289 | 301 |
| | T | 1250 | 1411 | 1212 | 1488 | 1519 | 1560 |
| | H | 1436 | 1608 | 1719 | 1833 | 1676 | 2022 |
| France | I | 5471 | 2029 | 2636 | 2468 | 2489 | 2338 |
| | T | 9848 | 10396 | 10840 | 11080 | 11994 | 12922 |
| | H | 22705 | 19433 | 18317 | 18337 | 18853 | 17513 |
| Ireland | I | 257 | 401 | 332 | 385 | 346 | 333 |
| | T | 421 | 388 | 397 | 568 | 509 | 496 |
| | H | 578 | 378 | 472 | 344 | 568 | 563 |
| Italy | I | 461 | 603 | 507 | 554 | 503 | 649 |
| | T | 8865 | 10102 | 10937 | 11880 | 13463 | 13859 |
| | H | 13708 | 13042 | 12640 | 13000 | 11765 | 12390 |
| Luxembourg | I | 63 | 47 | 46 | 45 | 47 | 42 |
| | T | 122 | 154 | 166 | 193 | 207 | 249 |
| | H | 343 | 288 | 273 | 285 | 315 | 303 |
| Netherlands | I | 446 | 118 | 240 | 317 | 281 | 510 |
| | T | 2600 | 2657 | 3176 | 2992 | 3178 | 3248 |
| | H | 2147 | 1406 | 858 | 862 | 1432 | 980 |
| Portugal | I | 131 | 145 | 128 | 132 | 142 | 156 |
| | T | 1188 | 1338 | 1312 | 1259 | 1303 | 1392 |
| | H | 356 | 381 | 375 | 427 | 429 | 482 |
| Spain | I | 533 | 389 | 376 | 384 | 400 | 450 |
| | T | 4988 | 5613 | 5776 | 6162 | 6800 | 7000 |
| | H | 3915 | 4320 | 4453 | 4417 | 3864 | 3929 |
| United Kingdom | I | 3583 | 2866 | 2573 | 2699 | 2581 | 2457 |
| | T | 7475 | 6927 | 7431 | 7824 | 8587 | 9469 |
| | H | 6022 | 5312 | 5108 | 4975 | 4804 | 4383 |

Total SO₂ emissions of EC countries in recent years in [1 000 t].

| Country | Total SO ₂ emissions | | | Difference in [%] 1980 / 1987 | Share of SO ₂ emission due to gas oil consumption* in [%] |
|---------|---------------------------------|-------------------|-------------------|-------------------------------------|--|
| | 1980 ¹ | 1983 ² | 1987 ³ | | |
| B | 800 | 559 | 488 ³ | - 39 | 7 |
| DK | 438 | 360 | 310 ³ | - 29 | 6 |
| FRG | 3200 | 2687 | 2044 ³ | - 36 | 7 |
| F | 3558 | 1909 | 1846 ³ | - 48 | 10 |
| GR | 400 | 573 | 360 ³ | - 10 | 6 |
| IRE | 220 | 178 | 168 ³ | - 24 | 3 |
| I | 3800 | 2693 | 2504 ³ | - 34 | 6 |
| LUX | 22 | 13 | 12 ³ | - 45 | 18 |
| NL | 488 | 304 | 282 | - 42 | 7 |
| POR | 266 | 305 | 323 ³ | - 13 | 4 |
| SP | 3250 | 2543 | 3162 ³ | - 3 | 2 |
| UK | 4670 | 3679 | 3680 | - 21 | 2 |
| EUR 12 | 21112 | 15749 | 15088 | - 29 | 5 |
| EUR 10 | 17596 | 12901 | 11694 | - 34 | 6 |

¹ EMEP data (source: Acid Magazine no. 8)

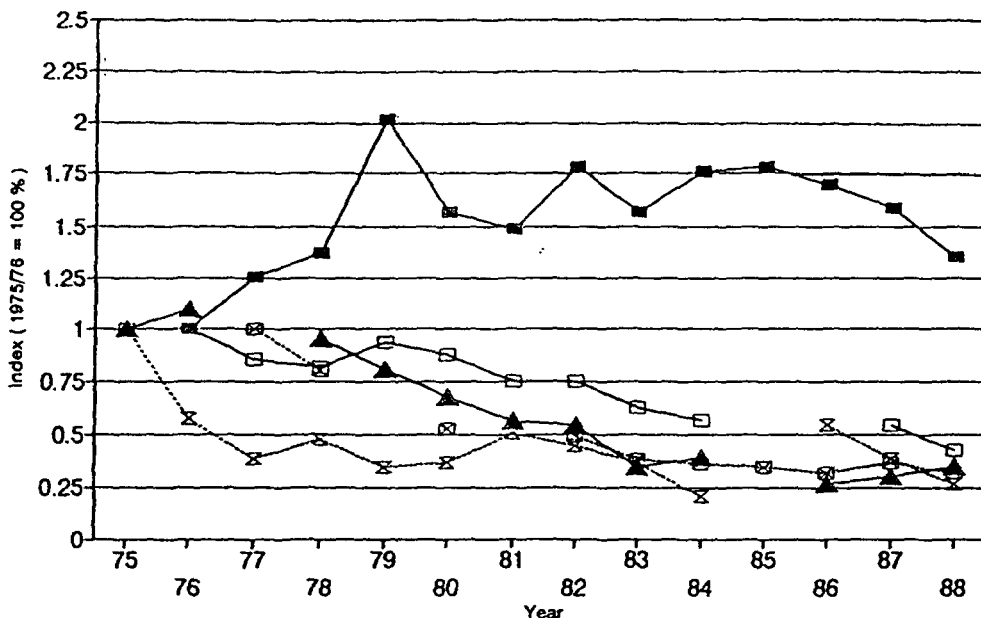
² Citepa 1989 a

³ estimated by EMEP (MSC-W/CCC)

⁴ Broad estimate only. Obtained by dividing the estimates for 1989 shown in Table IV-7 by the total SO₂ emission for 1987.

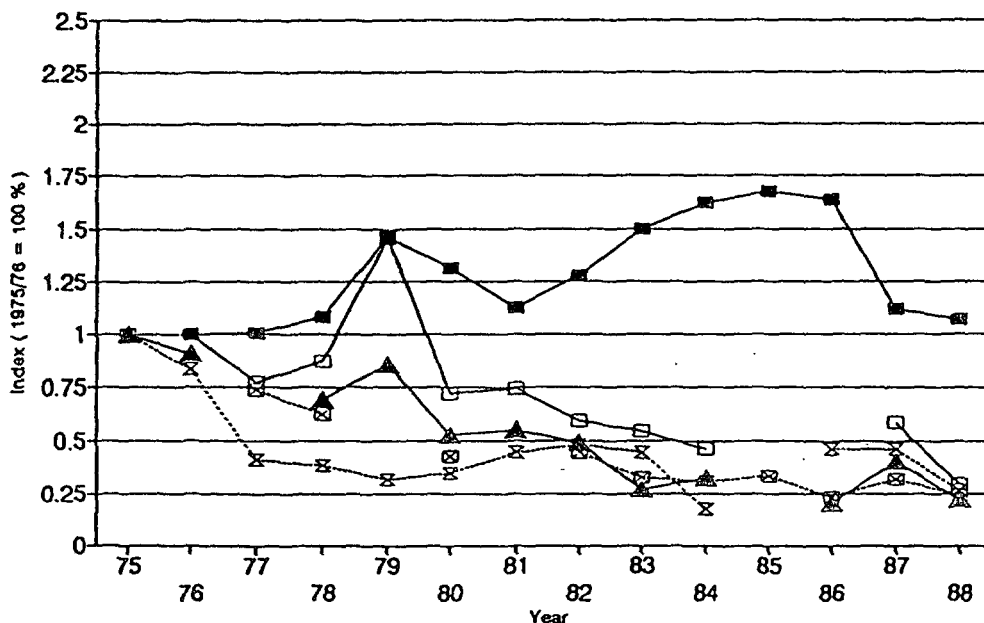
SO₂ concentration levels since 1975 for five cities in the Community, based on the Eol (Exchange of Information on air pollution, decision 82/459/EEC) decision.

Eol - Median



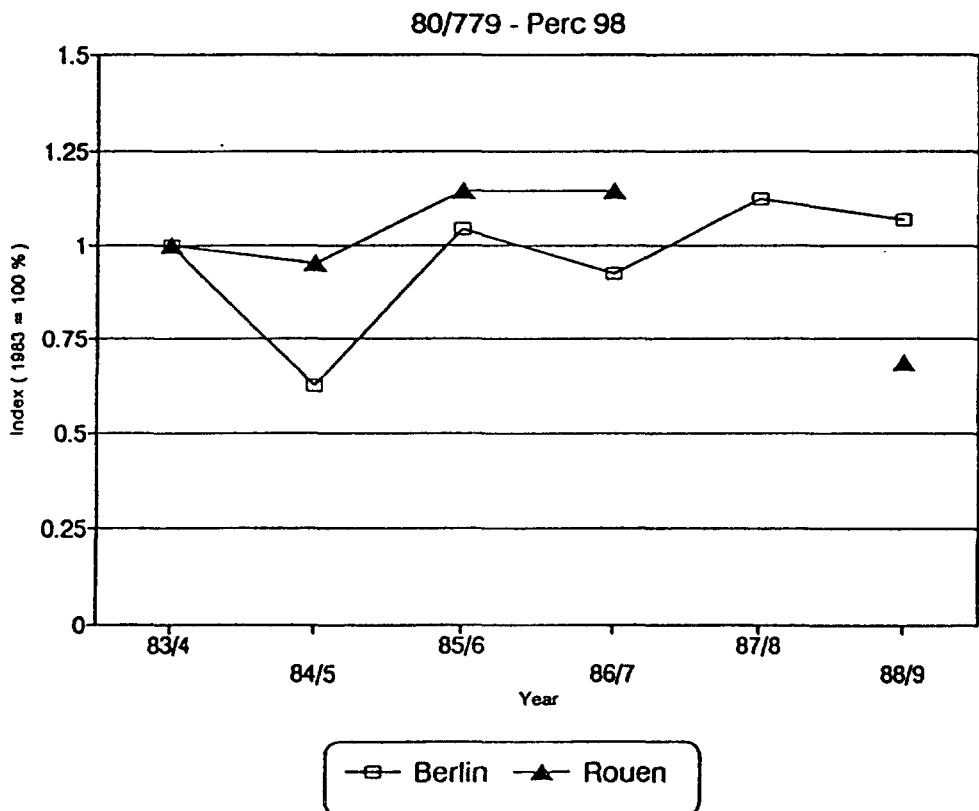
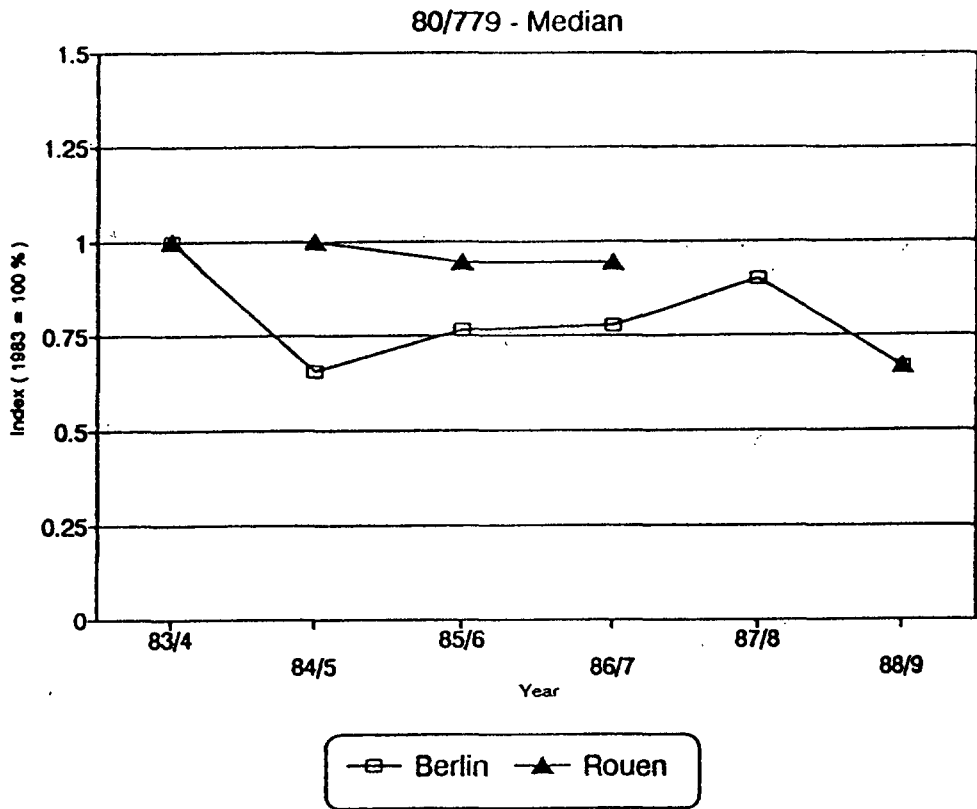
- Rotterdam (SO2) —▲— Bruxelles —■— Antwerpen
- x— Dublin —⊠— Gr Manchester

Eol - Perc 98



- Rotterdam (SO2) —▲— Bruxelles —□— Antwerpen
- x— Dublin —⊠— Gr Manchester

SO₂ concentration levels since 1983/84 for two cities in the Community based on the 80/779/EEC regulation standard.



Forecast of SO₂ emissions due to energy consumption in the Community.
(Commission 1989.2)

| Year | Estimated SO ₂ emissions for EUR 12 in [kt] from | | | | Contribution from Transport to Total in [%] | Contribution from Residential/Commercial to Total in [%] | Contribution from Oil Consumption to Total in [%] |
|------|---|---|-----------------------|--------------------------|---|--|---|
| | Oil consumption of sector Transport ¹ | Oil consumption of the sector Residential / Commercial ² | Total oil consumption | Total energy consumption | | | |
| 1986 | 559 | 794 | 5594 | 13400 | 4 | 6 | 42 |
| 1990 | 669 | 685 | 6194 | 13288 | 5 | 5 | 47 |
| 1995 | 719 | 675 | 6083 | 11546 | 6 | 6 | 53 |
| 2000 | 750 | 616 | 5148 | 8705 | 9 | 7 | 59 |
| 2010 | 790 | 526 | 3706 | 5232 | 15 | 10 | 71 |

¹ Should be mainly gas oil because other types of liquid fuels are used for ships only.

² Should include a substantial contribution of other types of liquid fuels than gas oil, e.g. residential heating systems operated with fuel oil.

Identified reasons for breaches of the limit values of
Directive 80/779/EEC.

(Zierock 1988, 1989)

| M. State | Zone | Brief description of reasons for breaches |
|----------|----------------------|---|
| B | Antwerp | 1) Long range transport of SO ₂ → 2) Heating of buildings 3) Emissions from large combustion installations |
| | Brussels | 1) Long range transport of SO ₂ → 2) Heating of buildings 3) Emissions from large combustion installations |
| | Gent | 1) Long range transport of SO ₂ → 2) Heating of buildings 3) Emissions from large combustion installations |
| | Liège | 4) Emissions from local chemical plant Long range transport of SO ₂ |
| FRG | Berlin (West) | 1) Emissions from GDR → 2) Domestic heating 3) Power plants |
| F | Aggl. Grenobloise | 1) Power plants → 2) Domestic heating |
| | Aggl. Lyonnaise | 1) Industrial emissions 2) Power plants |
| | Aggl. Marseillaise | 1) Power plant of Gardanne 2) Industrial sources → 3) Domestic heating |
| | Aggl. Parisienne | 1) Large combustion installations 2) Several industrial sources |
| | Aggl. Rouenaise | 1) Emissions from a large refinery 2) Emissions from other industries, mainly due to high S-content of fuels |
| | Aggl. Strasbourg | 1) Industrial emissions → 2) Domestic heating 3) Long range transport of pollutants |
| | Carling | 1) Chemical industries 2) Large combustion installations 3) Coke ovens |
| | Chauny | 1) Sulphuric acid plant 2) Power plant 3) Waste incineration |
| | Fos l'Etang-de-Berre | Emissions from petrochemical industries |
| | Lens | Industrial sources, in particular a sulphuric acid plant |

| M. State | Zone | Brief description of reasons for breaches |
|-----------------|---|--|
| F | Montbéliard | 1) Large combustion installations → 2) Domestic sources |
| | Roubaix-Lille- Tourcoing Saulnes Thann Viviez Zone Havaise | → Domestic heating Several industrial sources Industrial emissions, in particular from one sulphuric acid plant Emissions from steel industries 1) Emissions from several industrial sources, in particular a refinery 2) Emissions from domestic sources |
| I | Milano | → 1) Power plants 2) Domestic heating 3) Industrial plants 4) Traffic 5) Transport from neighbouring regions |
| LUX | Colmar-Berg | Power plants |
| UK ¹ | Barnsley Bassetlaw Belfast Doncaster Mansfield | → Domestic heating → Domestic heating → Domestic heating → Domestic heating → Domestic heating |

¹ for the indicated UK areas coal is the main fuel used for domestic heating.

Limit and guidelines values for SO₂, proposed after the adoption of Directive 87/219 by other organisations than the EC.

A. Human Health

| | | |
|------------------|-----------------------|---------------------------------------|
| WHO ¹ | 50 µg/m ³ | annual arithmetic mean ^{4,5} |
| | 125 µg/m ³ | 24-hours maximum value ^{4,5} |

B. Vegetation

| | | |
|---------------------|-------------------------|--------------------------------|
| WHO ¹ | 30 µg/m ³ | annual arithmetic mean |
| | 100 µg/m ³ | short-term exposure |
| UN-ECE ² | 20-30 µg/m ³ | annual mean value ⁶ |
| | 70 µg/m ³ | 24-hours mean value |

C. Forests

| | | |
|--------------------|-----------------------|--|
| IUFRO ³ | 50 µg/m ³ | annual arithmetic mean for forests |
| | 150 µg/m ³ | 97.5 % of 30 minutes mean values in the growing period of forests |
| | 25 µg/m ³ | annual arithmetic mean for forests at extreme locations |
| | 75 µg/m ³ | 97.5 % of 30 minutes mean values in the growing period of forests at extreme locations |

¹ World Health Organization

² United Nations - Economic Commission for Europe

³ International Union of Forestry Research Organizations

⁴ Valid only in conjunction with proposed guideline values for suspended particulate matter

⁶ For comparison, the guideline values recommended in 1979 are:

40 - 60 µg/m³ annual arithmetic mean
 100 - 150 µg/m³ 24-hours max. value

⁶ Above the annual mean value of 20 µg/m³, symptoms occur in sensitive plants, but it is unclear whether these symptoms lead to growth declines or long-term changes in plant vigour.

Above an annual mean value of 30 µg/m³, growth declines are detected in sensitive cultivated plants.

Forest damage in 1988 within the European Community
(Commission 1989.3)

| | Percent of observed trees showing | |
|----------|-----------------------------------|----------------|
| | defoliation ^a | discolouration |
| none | 65.8 | 86.8 |
| slight | 24.0 | 10.7 |
| moderate | 9.0 | 2.0 |
| severe | 1.0 | 0.3 |
| dead | 0.2 | 0.2 |

^a In order to compare with the 1987 situation, a common 1987/88 tree sample has to be taken. The picture then looks as follows:

| | 1987 | 1988 |
|----------|------|------|
| none | 58.7 | 57.7 |
| slight | 26.6 | 29.4 |
| moderate | 13.6 | 11.4 |
| severe | 1.0 | 1.1 |
| dead | 0.1 | 0.4 |

SO₂ reduction goals of EC Member States, as given in the frame of the UN-ECE talks on long-range transboundary pollution.
(Source : National Swedish Environment Protection Board)

| Country | Promised reduction in comparison to 1980 |
|----------------|---|
| Belgium | 50 % by 1995 |
| Denmark | 50 % by 1995 |
| F.R. Germany | 65 % by 1993 |
| France | 50 % by 1990 |
| Greece | --- |
| Ireland | --- |
| Italy | 30 % by 1993 |
| Luxembourg | 58 % by 1990 |
| Netherlands | 50 % by 1995 |
| Portugal | --- |
| Spain | --- |
| United Kingdom | 30 % by 1999 |

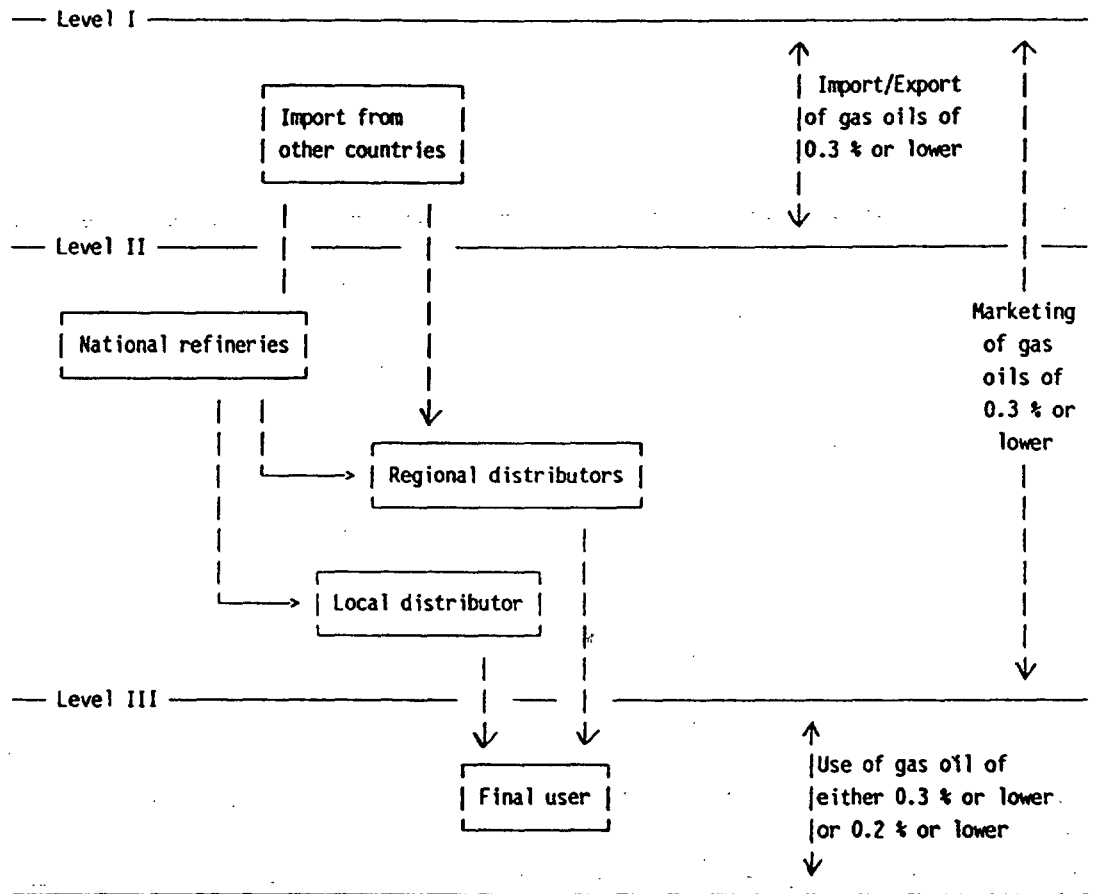
Reasons given by Member States which apply the lower S-content of gas oil (0.2 %).

| Country | Reason given |
|--------------|---|
| Belgium | The whole country has been declared as zone which falls under Article 4 of Directive 80/779 ¹ |
| Denmark | Damage to the environment or to the national heritage caused by total sulphur dioxide emissions |
| F.R.-Germany | Damage to the environment or to the national heritage caused by total sulphur dioxide emissions ² |
| Luxembourg | Damage to the environment or to the national heritage caused by total sulphur dioxide emissions |
| Netherlands | i) The whole country falls under Article 4 of Directive 80/779 ii) Application of Article 5 of Directive 80/779 iii) Damage to the environment to the national heritage caused by total sulphur dioxide emissions |

¹ Answer is not very clear to the author because Article 4 of Directive 80/779 requires to lay down lower limit values for SO₂ concentrations in ambient air than those given in Annex I of the Directive. Belgium, however, applies the limits of Annex I and therefore cannot be considered as a zone which falls under Article 4.

² In the reply of F.R. Germany to question 9 it is stressed that the short-term SO₂ guideline values of Directive 80/779/EEC were breached in nearly all urban areas of Germany by a factor of 1.5-4, while the long-term guideline could be observed in many of them. Moreover, it is said that damages of the environment (in particular forests) and the cultural heritage were identified throughout the country: Although these effects are sometimes caused by the parallel influence of several pollutants, German experts believe that a reduction of SO₂ emissions by 50-90 % - in comparison to 1983 values - is necessary in order to improve the situation.

Links between Importers, exporters, refineries, distributors and final users.

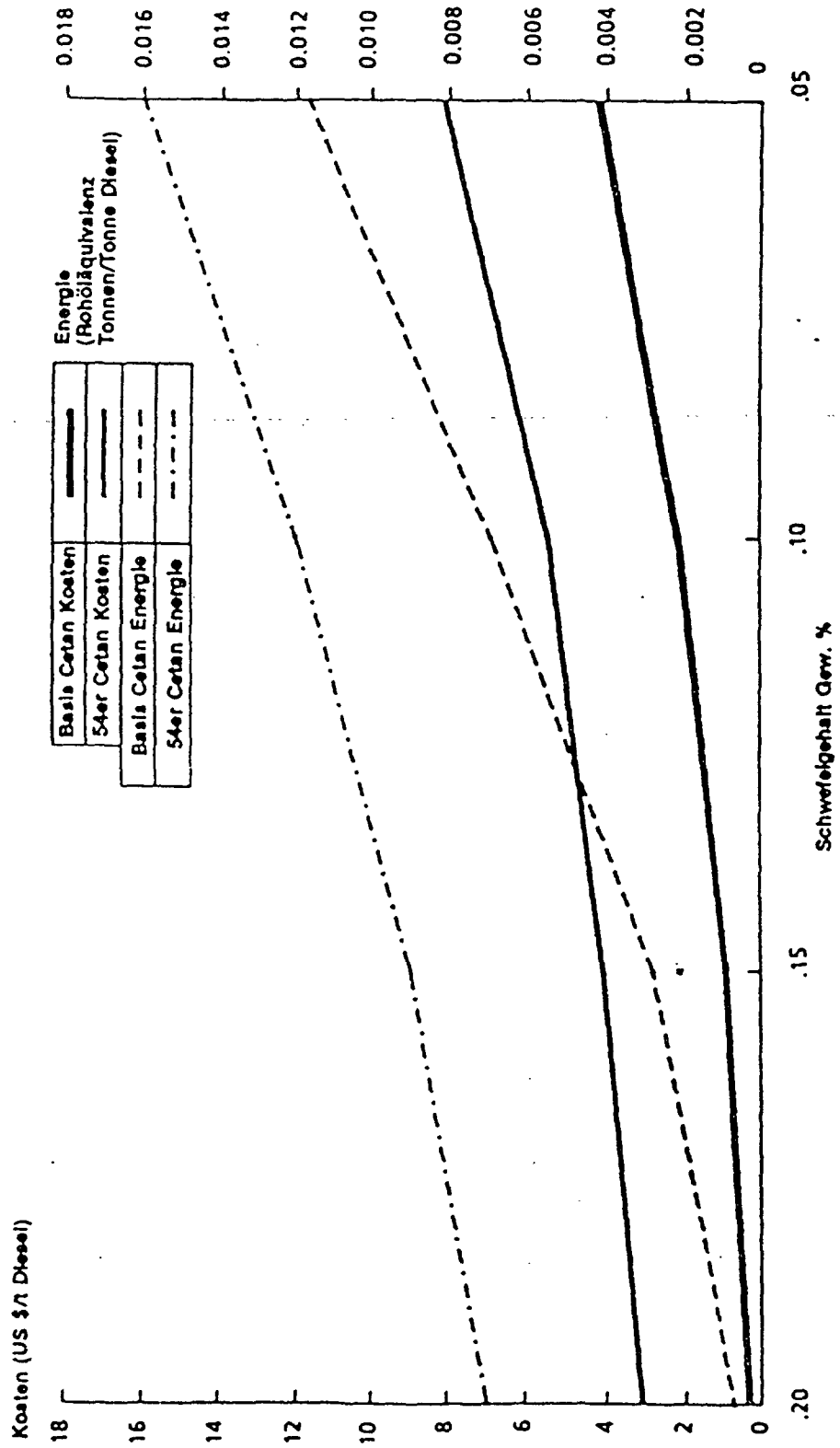


Influence of national taxes on the market price for diesel fuel.

| Country | (Market Price) - (Off-Tax Price) | | 100 |
|---------|----------------------------------|----------|-----|
| | (Off-Tax Price) | | |
| | 1987 [%] | 1989 [%] | |
| B | 100 | 108 | |
| DK | 149 | 151 | |
| FRG | 135 | 99 | |
| F | 154 | 166 | |
| GR | 107 | 88 | |
| IRE | 172 | 170 | |
| I | 138 | 156 | |
| LUX | 77 | 75 | |
| NL | 92 | 106 | |
| POR | 139 | 105 | |
| SP | 118 | 117 | |
| UK | 149 | 159 | |

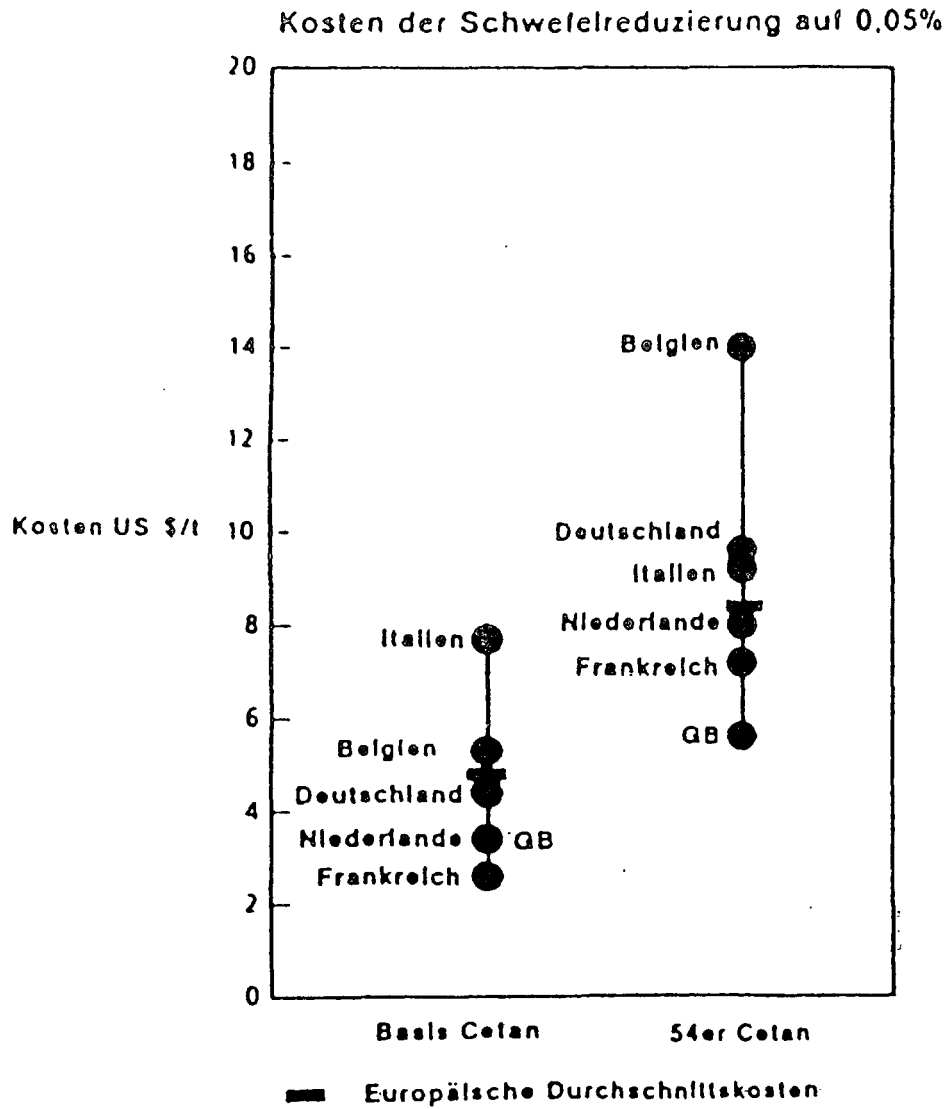
Estimated effects of the production of low-sulphur diesel fuel on costs and energy consumption in Europe 1990.

(A.D. Little 1988)



Estimated effects of the production of low-sulphur diesel fuel in single countries.

(A.D. Little 1988)



| | 0.26/0.20 | | | 0.26/0.15 | | | 0.26/0.10 | | | 0.26/0.05 | | |
|--|-----------|-------------|--------|-----------|-------------|--------|-----------|-------------|--------|-----------|---------------|--------|
| | REF. CASE | CASE A | CASE B | REF. CASE | CASE A | CASE B | REF. CASE | CASE A | CASE B | REF. CASE | CASE A | CASE B |
| CAPEX (\$ x 10 ⁶) | | | | | | | | | | | | |
| New HDS | Nil | 144 | 317 | 490 | 634 | 864 | 893 | 1094 | 1296 | 2484 | 2870 | 2770 |
| New H ₂ Purification | Nil | 6 | 18 | 27 | 33 | 48 | 51 | 63 | 78 | 75 | 96 | 90 |
| TOTAL | Nil | 150 | 335 | 517 | 667 | 912 | 944 | 1157 | 1374 | 2559 | 2966 | 2860 |
| MANUFACTURING COSTS (\$ x 10 ⁶ /yr) | | | | | | | | | | | | |
| Existing HDS (a) | 10 | 11 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| New HDS | Nil | 49 | 107 | 165 | 214 | 292 | 301 | 369 | 437 | 837 | 964 | 931 |
| New H ₂ Purification | Nil | 5 | 14 | 21 | 26 | 38 | 40 | 49 | 61 | 59 | 75 | 71 |
| TOTAL | 10 | 65 | 132 | 198 | 252 | 342 | 353 | 430 | 510 | 908 | 1051 | 1014 |
| - \$/t Diesel Fuel | 0.1 | 0.7 0.8* | 1.7 | 2.5 | 2.8 3.2* | 4.4 | 4.5 | 4.8 5.5* | 6.5 | 11.6 | 11.7 13.5* | 13.0 |
| - \$/t S Removed | - | - | - | 5100 | 4800 | 8800 | 5000 | 4900 | 7300 | 8300 | 7900 | 9300 |

NOTE : (a) Variable operating costs

Ref. Case - See Table 2

Case A - Plus 12 Mt/yr diesel fuel

Case B - Minus 20 Mt/yr low sulphur crude

Case * - Assuming 12 Mt/yr heating oil cannot be segregated

| | 0.20/0.20 | | | 0.20/0.15 | | | 0.20/0.10 | | | 0.20/0.05 | | |
|---|------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|-------------|
| | REF. CASE | CASE A | CASE B | REF. CASE | CASE A | CASE B | REF. CASE | CASE A | CASE B | REF. CASE | CASE A | CASE B |
| CAPEX (\$ x 10⁶) | | | | | | | | | | | | |
| New HDS | 576 | 576 | 806 | 1066 | 1152 | 1411 | 1469 | 1584 | 1930 | 2736 | 3660 | 3072 |
| New H ₂ Purification | 33 | 33 | 45 | 63 | 69 | 84 | 90 | 99 | 117 | 99 | 150 | 117 |
| TOTAL | 604 | 609 | 851 | 1129 | 1221 | 1495 | 1559 | 1683 | 2047 | 2835 | 3810 | 3189 |
| MANUFACTURING COSTS (\$ x 10⁶/yr) | | | | | | | | | | | | |
| EXISTING HDS (a) | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | - 31 | - 7 |
| New HDS | 194 | 194 | 272 | 360 | 389 | 476 | 496 | 535 | 651 | 920 | 1224 | 1031 |
| New H ₂ Purification | 26 | 26 | 35 | 50 | 54 | 66 | 71 | 78 | 92 | 78 | 118 | 92 |
| TOTAL | 223 | 223 | 310 | 413 | 446 | 545 | 570 | 616 | 746 | 998 | 1311 | 1116 |
| - \$/t Diesel Fuel | 2.8 | 2.5 2.8* | 4.0 | 5.3 | 4.9 5.7* | 7.0 | 7.3 | 6.8 7.9* | 9.5 | 12.8 | 14.6 16.8* | 14.3 |
| - \$/t S Removed | 4700 | 4700 | 6600 | 4800 | 4800 | 6300 | 4900 | 4800 | 6400 | 6400 | 7600 | 7200 |

NOTE : (a) Variable operating costs

Ref. Case - See Table 2

Case A - Plus 12 Mt/yr diesel fuel

Case B - Minus 20 Mt/yr low sulphur crude

Case * - Assuming 12 Mt/yr heating oil cannot be segregated

II

(Acts whose publication is not obligatory)

COUNCIL

COUNCIL DIRECTIVE

of 24 November 1975

on the approximation of the laws of the Member States relating to the sulphur content of certain liquid fuels

(75/716/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof;

Having regard to the proposal from the Commission;

Having regard to the Opinion of the European Parliament⁽¹⁾;

Having regard to the Opinion of the Economic and Social Committee⁽²⁾;

Whereas the laws, regulations or administrative provisions in force in the Member States lay down limits with respect to the sulphur content of liquid fuels; whereas these provisions differ from one Member State to another;

Whereas the differences in these laws oblige Community oil companies to adjust the maximum sulphur content of these products, depending on which Member State is being supplied; whereas the aforementioned differences thus constitute a barrier to trade in these products, thereby directly influencing the establishment and functioning of the common market;

Whereas certain Member States have notified the Commission of projects to limit and progressively reduce the sulphur content of fuels so as to achieve a reduction in sulphur dioxide emissions;

Whereas, in view of the considerable effect of the sulphur content of some liquid fuels on public health and the environment and with account being taken of the aforementioned projects, the sulphur content of gas oils must be progressively and significantly reduced at Community level;

Whereas this Directive is a first step towards reducing the sulphur content of liquid fuels and applies to gas oils only;

Whereas, to take account of the technical and economic consequences of reducing and limiting the sulphur content of gas oils and the local circumstances prevailing in the Member States, it will be necessary to define as from 1 October 1976 two types of gas oil, one for general use and the other for use restricted to zones which may be defined by the Member States;

Whereas a simplified procedure should be set up for revising the sulphur content for the two types of gas oil laid down as from 1980 in order to take account of any appreciable developments over the next few years in environmental requirements or desulphurization technology, or of substantial changes in the economic situation in the Community as regards the supply of crude oil; whereas, however, such revision could take place only before 1 October 1977 as the industry must know several years in advance the sulphur content which shall apply in order to draw up its programmes for desulphurization plant;

⁽¹⁾ OJ No C 76, 3. 7. 1974, p. 46.

⁽²⁾ OJ No C 16, 23. 1. 1975, p. 6.

Whereas a sudden change in crude oil supplies leading to an increase in its average sulphur content may, in view of the available desulphurization capacity, jeopardize supplies to consumers in a Member State; whereas it would therefore seem advisable to authorize that Member State to derogate under certain conditions from the sulphur content limits laid down in respect of its own market;

Whereas the second stage of the programme for reducing the sulphur content of gas oil raises particular technical and economic problems for Ireland; whereas an exemption for Ireland of limited validity ought not to have a depressing effect on trade in gas oil, since at the present time the refinery installations in Ireland do not cover more than part of its internal needs for gas oil and any exports by Ireland to another Member State in the future must comply with the provisions of the Directive applicable in that Member State; whereas a five-year exemption should be granted to Ireland before it passes on to the second stage;

Whereas checks should be carried out to ascertain the sulphur content of gas oils placed on the market; whereas a uniform method should be adopted for the purpose,

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. For the purposes of this Directive:

(a) *gas oil*:

shall mean any petroleum product falling under subheading 27.10 C 1 of the Common Customs Tariff (1 January 1974 edition) or any petroleum product which, by reason of its distillation limits, falls into the category of middle distillates intended for use as fuel and of which at least 85 % by volume, including distillation losses, distills at 350° C;

(b) *type A gas oil*:

shall mean any low sulphur gas oil not subject to restrictions on use in the Member States;

(c) *type B gas oil*:

shall mean any gas oil intended for use in zones:

- where ground-level concentrations of atmospheric sulphur dioxide pollution are sufficiently low, or
- where gas oil accounts for an insignificant proportion of atmospheric sulphur dioxide pollution.

2. Paragraph 1 shall not apply to gas oil:

- used in power stations,
- used by shipping,
- contained in the fuel tanks of inland waterway vessels or of motor vehicles travelling from one zone to another or crossing a frontier between a non-member state and a Member State.

Article 2

1. Member States shall take all necessary steps to ensure that:

- type A gas oil can be marketed in the Community only if its sulphur compound content, expressed in sulphur, does not exceed 0.5 % by weight as from 1 October 1976 and 0.3 % by weight as from 1 October 1980,
- type B gas oil can be marketed in the Community only if its sulphur compound content, expressed in sulphur, does not exceed 0.8 % by weight as from 1 October 1976 and 0.5 % by weight as from 1 October 1980.

2. Should environmental requirements or the state of desulphurizing technology change appreciably or should the economic situation in the Community as regards the supply of crude oil change substantially, the Commission may, on its own initiative or at the request of a Member State, propose amendments to the sulphur content indicated in paragraph 1 for the period beginning 1 October 1980. The Council may decide on such amendments, by a qualified majority, not later than 1 October 1977.

3. If, because of a sudden change in crude oil supplies, changes should occur in the sulphur content of the oil such as to jeopardize supplies to consumers in view of the shortage of available desulphurization capacity, a Member State may allow onto its territory gas oils which do not conform to the specifications laid down in paragraph 1. It shall forthwith notify the Commission, which shall, after consulting the other Member States decide within three months on the duration and details of the derogation.

4. The application of paragraph 1 for the second stage of the programme for reducing the sulphur content in gas oil may be deferred until 1 October 1985 by the Government of Ireland.

Article 3

The Member States may implement the provisions of Article 2 (1) more rapidly than is provided for therein.

Article 4

As from the dates of application laid down in Article 2, due account being taken of Article 3, the Member States may not prohibit, restrict or impede the marketing of gas oils, on the grounds of sulphur content, provided they comply with the requirements of this Directive.

Article 5

Member States shall determine the zones in which the use of type B gas oil is permitted. They shall inform the other Member States and the Commission of their decisions and of their reasons for taking them.

Article 6

The Commission shall monitor the effects of applying this Directive, with particular reference to Articles 2 and 5 and will, as appropriate, depending on new information available on atmospheric sulphur dioxide pollution levels recorded and progress towards determining Community air quality objectives, draw up suitable proposals not later than 1 October 1980.

Article 7

1. Member States shall take the necessary measures to check by sampling the sulphur content of gas oils which are marketed.
2. The reference method adopted for determining the sulphur content of gas oils which are marketed is defined by European Standard EN 41, (first edition November 1975).

Pending the entry into force of European Standard EN 41, the checks and statistical interpretation of the results of these checks will be made according to the standard in use in the country in whose territory the gas oils are marketed.

Failing a national standard, the statistical interpretation of the results of the checks made to determine the sulphur content of the gas oils marketed shall be made according to standard BS 4306/1968 'Application of precision data to specifications for petroleum products'.

Article 8

1. Member States shall implement the necessary laws, regulations and administrative provisions for compliance with this Directive within nine months of its notification and shall forthwith inform the Commission thereof.
2. Member States shall ensure that the text of national legislation which they adopt in the field covered by this Directive is communicated to the Commission.

Article 9

This Directive is addressed to the Member States.

Done at Brussels, 24 November 1975.

For the Council

The President

B. VISENTINI

II

(Acts whose publication is not obligatory)

COUNCIL

COUNCIL DIRECTIVE

of 30 March 1987

amending Directive 75/716/EEC on the approximation of the laws of the Member States relating to the sulphur content of certain liquid fuels

(87/219/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community and in particular Articles 100 and 235 thereof,

Having regard to the proposal from the Commission ⁽¹⁾,

Having regard to the opinion of the European Parliament ⁽²⁾,

Having regard to the opinion of the Economic and Social Committee ⁽³⁾,

Whereas Directive 75/716/EEC ⁽⁴⁾ obliges Member States to take all necessary steps to ensure that gas oils can be marketed in the Community only if their sulphur content does not exceed certain limits;

Whereas the said Directive provides that the Commission may, as appropriate, draw up suitable proposals, in particular to amend the sulphur content limits of gas oils, as a function, *inter alia*, of the levels of air pollution due to sulphur dioxide;

Whereas successive action programmes of the European Communities on the environment ⁽⁵⁾ stress the importance of preventing and reducing air pollution;

Whereas, in addition, the Community became, by virtue of Decision 81/462/EEC ⁽⁶⁾ a contracting party to the Convention on long-range transboundary air pollution, which provides in particular for the development of strategies and policies to limit and, as far as possible, gradually reduce and prevent air pollution;

Whereas, in view of the damaging effects on the environment of sulphur dioxide emissions including those arising from the use of gas oil, there is an urgent need to reduce these emission levels wherever this can be achieved;

Whereas it is appropriate to fix a new maximum level for the sulphur content of gas oils as laid down in Directive 75/716/EEC;

Whereas Member States should also be able to require a specified level lower than the maximum provided for in certain defined circumstances;

Whereas the operation of this Directive should be reviewed after an appropriate period of time;

Whereas reducing pollution by sulphur serves to further one of the Community's objectives regarding the protection and improvement of the environment; whereas, however, the necessary powers for this purpose are not expressly provided for in the Treaty and Article 235 must therefore also be invoked,

⁽¹⁾ OJ No C 205, 14. 8. 1985, p. 3.

⁽²⁾ OJ No C 283, 10. 11. 1986, p. 108.

⁽³⁾ OJ No C 344, 31. 12. 1985, p. 22.

⁽⁴⁾ OJ No L 307, 27. 11. 1975, p. 22.

⁽⁵⁾ OJ No C 112, 20. 12. 1973, p. 1, OJ No C 139, 13. 6. 1977, p. 1 and OJ No C 46, 17. 2. 1983, p. 1.

⁽⁶⁾ OJ No L 171, 27. 6. 1981, p. 11.

HAS ADOPTED THIS DIRECTIVE:

Article 1

Directive 75/716/EEC is amended as follows:

(1) Articles 1 and 2 are replaced by the following:

Article 1

1. For the purposes of this Directive, gas oil shall mean any petroleum product falling under subheading 27.10 C I of the Common Customs Tariff (10 December 1984 edition) or any petroleum product which, by reason of its distillation limits, falls into the category of middle distillates intended for use as fuel and of which at least 85 % by volume, including distillation losses, distils at 350 °C.

2. Paragraph 1 shall not apply to gas oils:

- used by shipping,
- contained in the fuel tanks of inland waterway vessels or of motor vehicles travelling from one zone to another or crossing a frontier between a third country and a Member State,
- intended for processing in the refining industry.

Article 2

1. Member States shall take all necessary steps to ensure that gas oils can be marketed in the Community only if their sulphur compound content, expressed in sulphur, does not exceed 0,3 % by weight as from 1 January 1989.

2. Should environmental requirements or the state of desulphurization technology change appreciably or should the economic situation in the Community as regards the supply of crude oil change substantially, the Commission may, on its own initiative or at the request of a Member State, propose amendments in accordance with the conditions laid down by the Treaty, to the sulphur content indicated in paragraph 1.

3. If, as the result of a sudden change in the supply of crude oil or petroleum products, it becomes difficult for a Member State to apply the limit on the maximum sulphur content of gas oil, that Member State may, after informing the Commission, authorize a higher limit within its territory for a period of four months. The Council, acting by a qualified majority on a proposal from the Commission, may extend this period.

(2) Articles 4 to 7 are replaced by the following:

Article 4

Without prejudice to Article 5, the Member States may not, as from the date of application laid down in Article 2, due account being taken of Article 3, prohibit, restrict or impede the marketing of gas oils,

on the grounds of sulphur content, provided they comply with the requirements of this Directive.

Article 5

1. Member States may require the use of gas oils with a sulphur content equal to 0,2 % by weight:

- within the zones they have determined under Article 4 of Council Directive 80/779/EEC of 15 July 1980 on air quality limit values and guide values for sulphur dioxide and suspended particulates⁽¹⁾; as last amended by the Act of Accession of Spain and Portugal,
- wherever Article 5 of the same Directive is applicable,
- where damage to the environment or to the national heritage caused by total sulphur dioxide emissions requires the sulphur content of gas oil to be fixed at a lower value than that provided for in Article 2.

2. Member States shall inform the other Member States and the Commission of any measures which they contemplate taking in respect of paragraph 1 and of their grounds for taking them.

Marketing of any gas oil with a sulphur content of less than 0,2 % may not be prohibited.

Article 6

The Commission shall monitor the effects of applying this Directive.

Three years at the latest after the notification⁽²⁾ of this Directive, in the light of any new information available on the atmospheric sulphur dioxide pollution levels recorded, on progress towards defining air quality objectives, on the state of the environment and on the harmful effects of air pollution, and on condition on the gas oil market, the Commission shall submit a report to the Council accompanied by an appropriate proposal with a view to the establishment of a single value.

The Council, acting in accordance with the provisions of the Treaty, shall decide on the Commission proposal before 1 December 1991.

Article 7

1. Member States shall take the necessary measures to check by sampling the sulphur content of gas oils which are marketed.

2. The reference method adopted for determining the sulphur content of gas oils which are marketed is defined by method IP 336. The statistical interpretation of the results of the checks made to determine the sulphur content of the gas oils marketed shall be made according to standard ISO 4259 (1979 edition).

⁽¹⁾ OJ No L 229, 30. 8. 1980, p. 30.

⁽²⁾ This Directive was notified to the Member States on 2 April 1987.

Article 2

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive not later than 31 December 1988. They shall forthwith inform the Commission thereof.
2. Member States shall communicate to the Commission the texts of the provisions of national law which they adopt in the field governed by this Directive.

Article 3

This Directive is addressed to the Member States.

Done at Brussels, 30 March 1987.

For the Council

The President

P. DE KEERSMAEKER