CONCAWE Review

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CONCAWE *is the oil companies' European organization for environment, health and safety. The emphasis of its work lies on technical and economic studies relevant to oil refining, distribution and marketing in Europe.*

CONCAWE *was established in 1963 in The Hague, and in 1990 its Secretariat was moved to Brussels.*

concawe

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Foreword

Dear Reader,

The past year has seen a dramatic fall in the price of crude oil, resulting in a number of high-profile mergers, and further cost-cutting and staff reduction programmes in the oil industry. At the same time, public concerns about the environment continue to grow, as do the range and complexity of environmental, health and safety issues facing us. Overall, this adds up to one of the most challenging periods in our history.

The impact of these changes has been felt strongly at CONCAWE through ever-growing demands for its expertise, further-tightening of company resources to work on the issues, and budget constraints. CONCAWE is responding to these challenges.

We have recently conducted a strategic review of working practices, taking a hard look at the way we operate. The result, I believe, will be an organization which is even more cost-effective, better at communicating and sharing information, and highly focused on the key environmental, health and safety issues.

By implementing the review outcomes, I feel sure that we will be able to continue to give our member companies excellent value for money, while retaining our hard-earned reputation for promoting technically sound, cost-based legislation, fostering the oil industry's image for responsible conduct, and helping to improve understanding of the industry's impact on health and the environment.

This May, I will be stepping down as Chairman. I have enjoyed immensely my three years with CONCAWE. It has been very rewarding, I have learned a great deal, and I have made many new friends.

I am confident that the work which has been done in these years by all who contribute to CONCAWE has positioned us well to face the many challenges which still lie ahead for the oil industry. CONCAWE has an outstanding record of achievement. I hope that the oil industry and legislators in Europe will continue to rely on the sound technical data that CONCAWE produces.

My best wishes for the future to all our readers.

Peter J. Gill
Chairman, CONCAWE.

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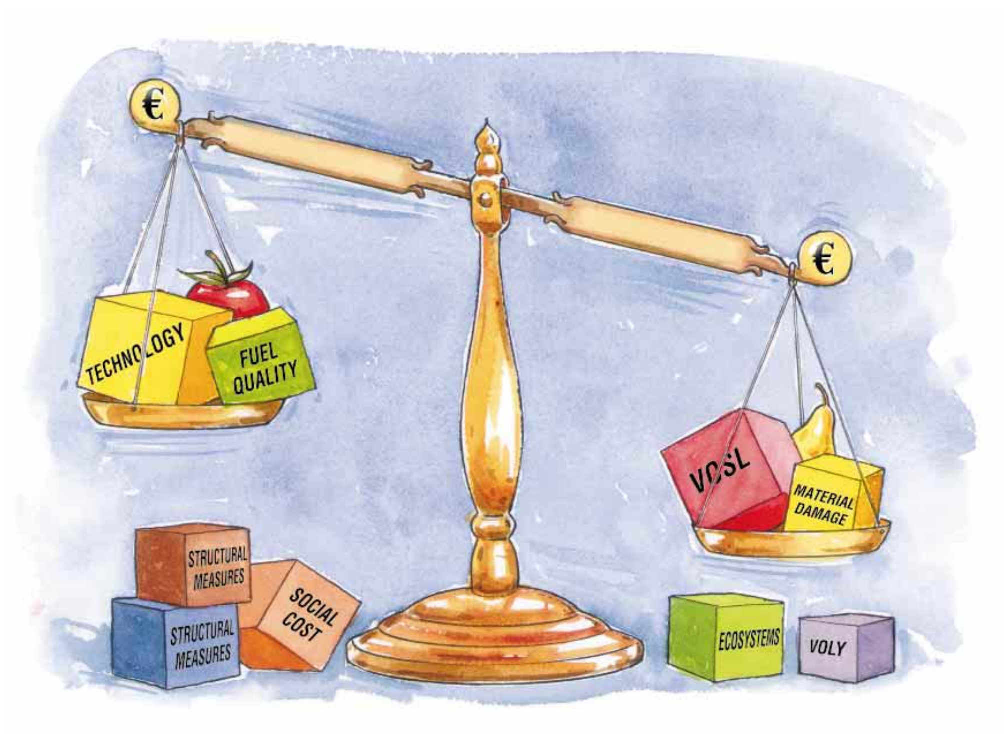
Assessing the monetary benefit of improving air quality

Can decision-makers trust these monetary benefit figures?



The European Commission and some Member States have recently carried out studies to estimate the monetary benefits of proposals to improve air quality and reduce adverse effects on the environment. Early studies suggested extremely high monetary benefits arising from relatively small changes to air quality, and this provoked considerable debate between those who wanted to believe such figures and those who felt the estimates were unrealistically high. It continues to be a difficult and sensitive debate but there has been a perceptible shift in opinion towards more modest benefit evaluations.

Typically monetary benefits from improving air quality can arise from:

- reduced adverse impacts on human health (short-term and long-term);
- reduced adverse impacts on crops and ecosystems;
- reduced material damage and soiling of buildings etc; and
- improved visibility (reduction of pollution-related haze).

A satisfactory monetary method for assessing benefits to ecosystems remains elusive and hence such benefits are 'left out' of the monetary evaluations. This is most regrettable from a scientific point of view but, politically, provides ready ammunition to those who wish to argue that the current monetary benefit evaluations are underestimates. Their omission has also been used by some as a reason to dismiss concerns that certain of the other benefits are overestimated.

CONCAWE notes this omission of ecosystem benefits in recent monetary evaluations but urges that economic methodologies are developed and applied in this difficult area, and that those other benefits which are currently evaluated should be assessed as accurately as possible. CONCAWE also urges that the various uncertainties are made transparent to the decision makers. This is particularly important when the aggregated monetary benefits evaluation covers a wide range of diverse adverse effects.

Recent reports by the Commission's cost/benefit consultancy (AEA Technology) have made good progress in this regard, including a ranking system which attempted to display the reliability of the monetary valuations applied to each of the effects. In addition, results were displayed with and without one of the large but highly uncertain benefits. However, still greater transparency is needed to ensure that the estimates of monetary benefit take full account, not only of the reliability of the monetary value placed on each benefit, but also of the probability that the pollutant actually causes the effect *and* that it does so at the ambient air concentrations in question. This article concentrates on these two areas of uncertainty, but it should not be forgotten that there are many other sources of error and uncertainty which could affect substantially the monetary evaluations. These include emission projections, modelling, exposure calculations, the number of people at risk, plant responses to drought which reduce ozone damage, significance of ecosystem damage, etc.

The following text describes in further detail the monetary evaluation of benefits to human health, as it is these effects that are given the highest priority for abatement across the range of stakeholders.

Human health effects are classified as either 'acute' (effects arising from short-term exposure), or 'chronic' (effects arising from longer-term exposure). Such effects have been identified through controlled exposure experiments or are suggested through statistical associations identified in epidemiology studies. The effects range from small changes to lung function (ozone), hospital admissions and even mortality (both suggested for SO_2, PM and ozone). In general, uncertainty as to whether an effect is actually caused by a pollutant is greatest for chronic effects, typically for those effects suggested by statistical associations in epidemiology studies. Effects observed in controlled experiments of short-term exposure are more reliable (and can differ from those determined in epidemiology studies).

So far, the most dominant of the monetary human health benefit figures come from reducing the risk of mortality, in particular that associated with exposure to secondary particulate matter. The statistical association between mortality and particles is open to considerable speculation, and most significantly, key scientists believe that secondary particles are not likely to cause such effects. Nevertheless these figures have been included as if exposure to secondary particles is causally linked to mortality. Notwithstanding this uncertainty a high monetary value is then placed on reducing the risk of mortality.

In recent studies two methods have been applied to mortality risks:

- the traditional 'value of statistical life' (VOSL) method; and
- the newer 'value of life years lost' approach (VOLY).

Economists have developed the VOSL approach over the last 25 years for use in public decision making. VOSL estimates use various sources of information to determine the general public's 'willingness to pay' to reduce the risk of mortality. Typically, VOSL numbers are in the range of 2–5 million Euros which means that the benefit of reducing the risk of a single pollution-related death across the whole of the EU-15 is assigned a monetary benefit of 2–5 million Euros.

What remains highly questionable is whether these estimates of VOSL should be applied to risks such as those posed by air pollution. It is generally believed that deaths associated with air pollution would occur mainly in the elderly with advanced lung or heart disease and that such deaths may be brought forward only by weeks or months, but not years (though the reduction of life expectancy is not known precisely). In addition, air pollution acts as an aggravating, rather than a causal, factor and this has implications when judging the importance of effects.

Most VOSL studies are based on information derived from average healthy and happy populations. However, at the individual level, a poor quality of life may lead to a low 'willingness to pay' to prolong life. It can thus be concluded that, if a particular mortality risk is primarily associated with a group of individuals already suffering a degraded quality of life, then standard estimates of VOSL may be inappropriate. Most experts now conclude that the VOSL method is more suitable for use in connection with indiscriminate risks to the whole population, e.g. the risk of death in a traffic accident, than with risks that tend to affect a specific subset of the population, such as is considered to be the case for air pollution.

Recent work on the VOLY approach recognizes this issue and is based upon the concept that when mortality risk is reduced, death is not avoided but its expected time of arrival is delayed and life expectancy increased. Evaluations based on assessing life extension have yielded valuations of as low as 0.06 million Euros per life year. The methodology developed in a recent UK Department of Health report[1] suggests a range of GBP 32 000 (EUR 48 000) to GBP 110 000 (EUR 165 000) for avoiding one premature mortality by one year. This is in sharp contrast to the value of 2–5 million Euros used in other estimates and brings into question the economic merits of proceeding with a number of present air quality initiatives. Whatever the monetary value assigned, the VOLY-based monetary evaluation generally produces much lower monetary benefits than evaluations using the VOSL approach.

There are a number of other issues of concern. For instance, emission control costs are derived on a quite different basis from monetary benefit estimates. Recent estimates of costs are based on actual expenditure on emission control technologies. However, monetary benefit figures are based on a 'willingness to pay' approach. Is it really justified to compare these two sets of figures? Is the comparison between monetary benefits and costs not like comparing apples with pears?

In conclusion, there are many questions still unanswered concerning the valuation of benefits arising from improving air quality, and there is an urgent need for additional studies in this important area of public policy. The wide range of uncertainties affecting the outcome of such studies are of particular concern and lead us to conclude that the results from such studies are unreliable in their aggregated form.

Other questions surround the responsibility which society in general, and Government in particular, has for the wise and cost-effective use of finite resources. For instance, is the reduction in risk resulting from the allocation of scarce resources to reduce emissions of a particular air pollutant worth more than the societal benefit which would be derived if those resources were utilized elsewhere? In particular, are there other more cost-effective ways of improving the health and well-being of the general population rather than by reducing air pollution?

[1] Economic Appraisal of the Health Effects of Air Pollution

What will European air quality be like in the future?

Decisions on legislation for the future need to be based on the situation then, not on what it is now.

The community of official stakeholders (Commission personnel, Members of Parliament and Parliament Staff, Member State civil servants, academics, industry specialists and environmentalists alike) are all aware, through their own day-to-day experiences, media reports, and measurement data that 'we need to do something' to address current levels of air pollution. This view that 'something needs to be done' has existed for some considerable time. However, the legislators have not been idle, indeed they have been working extremely hard to alter the current situation. As a result, a number of initiatives and pieces of legislation aimed at improving air quality are already in place, and their mitigating impact can be seen now. In addition, other pieces of legislation have been approved but their effects are not yet apparent. The benefits that will result from these need to be considered before decisions are taken on further legislation to improve air quality.

IMPLEMENTED LEGISLATION

Legislation which is already having an effect includes the introduction of unleaded petrol, the 1988 emission ceilings stipulated in the Large Combustion Plant Directive (88/609/EEC), the requirements of the Sulphur in Liquid Fuels Directive (93/12/EEC), and the various controls on vehicle emissions introduced in the 1970s, 1980s and 1990s. Indeed significant improvements in air quality are already being reported, particularly reductions in measured sulphur dioxide, black smoke, particulates, carbon monoxide and lead concentrations. However, for certain pollutants (e.g. nitrogen oxides) the impact of 'past' initiatives has been somewhat masked by other changes, such as traffic growth.

LEGISLATION THAT IS YET TO BE IMPLEMENTED

So what else has been done to improve air quality in recent years, given this motivation that 'something must be done'? In fact a great deal is already committed to. Key initiatives currently being implemented include:

- the Large Combustion Plant Directive (88/609/EEC)—2003 SO_x and NO_x emission ceilings;
- directives on hazardous waste and municipal waste incinerators (94/67/EC, 89/369/EEC and 89/429/EEC);
- the UN-ECE VOC Protocol (Geneva 1991);
- the UN-ECE 2nd Sulphur Protocol (Oslo 1994);
- the Stage I Directive (94/63EC)—VOCs from petrol storage and distribution;
- the Integrated Pollution Prevention and Control Directive (96/61/EC); and
- national legislation at Member State level.

Perhaps more impressive is the number of legislative initiatives that are currently emerging from the Parliamentary approval stages and which *have yet to be implemented*, namely:

- Auto-Oil directives on emissions from passenger cars, light commercial and heavy-duty vehicles, and on the quality of vehicle fuels;

- Off-Road Vehicles Directive;
- Solvents Directive;
- revisions to the Sulphur in Liquid Fuels Directive; and
- revisions to the Large Combustion Plant Directive.

Numerous national legislative initiatives are also in the process of being implemented.

WHAT WILL THIS 'LEGISLATIVE PIPELINE' MEAN FOR FUTURE ATMOSPHERIC EMISSIONS?

Over the past few years, a great deal of work has been done to try to predict just this. The most recent work has been done by the International Institute of Applied Systems Analysis (IIASA) acting as consultants to Directorate General XI of the European Commission. Their work relies on input from a wide range of groups, and air quality modelling by EMEP (UN-ECE's 'Cooperative programme for monitoring and evaluation of air pollutants in Europe'). IIASA have produced what is called the 'Reference Scenario' which takes into account future energy projections, existing and emerging legislation and where the emissions reductions will be made.

The table compares the emission reductions in 1990 with those predicted to occur in 2010 for each EU-15 country in IIASA's latest report for the UN-ECE (March 1999). The predicted emission reductions are impressive, at least for SO_x, NO_x and VOCs, where the overall EU reductions are predicted to be 71 per cent, 48 per cent and 49 per cent respectively. Ammonia emission reductions, mainly from agriculture, are predicted to reduce by 12 per cent overall.

Reference scenario emissions: 2010 compared with 1990

country	*% emission reductions* SO_x	NO_x	*VOC*	NH_3
Austria	57	46	42	13
Belgium	43	46	48	1
Denmark	51	53	53	6
Finland	49	45	48	23
France	64	54	49	4
Germany	89	56	64	25
Greece	-8	0	21	8
Ireland	63	38	50	1
Italy	66	45	44	6
Luxembourg	71	55	63	0
Netherlands	64	48	52	42
Portugal	50	15	32	6
Spain	65	27	34	0
Sweden	44	44	43	21
United Kingdom	74	58	49	10
EU-15	71	48	49	12

CONCAWE's own predictions of the emissions from traffic only in 2010 (after implementation of Auto-Oil I) indicate that, compared with 1990 and for the EU-15 as a whole, there will be:

- 70 per cent reduction in NO_x emissions;
- 75 per cent reduction in CO emissions;
- 80 per cent reduction in VOC emissions;
- 85 per cent reduction in benzene emissions; and
- 75 per cent reduction in particulate emissions from diesel.

This is all the more impressive when we consider that road transport over this period is predicted to grow by 30 per cent.

Emissions are expected to decrease further, beyond 2010 as existing legislation takes further effect, e.g. greater penetration of Auto-Oil I vehicle measures into the car fleet. Nevertheless, 2010 does provide a useful snapshot of a generally improving situation.

WHAT WILL THIS LEGISLATIVE PIPELINE MEAN FOR FUTURE AIR QUALITY?

At the regional level

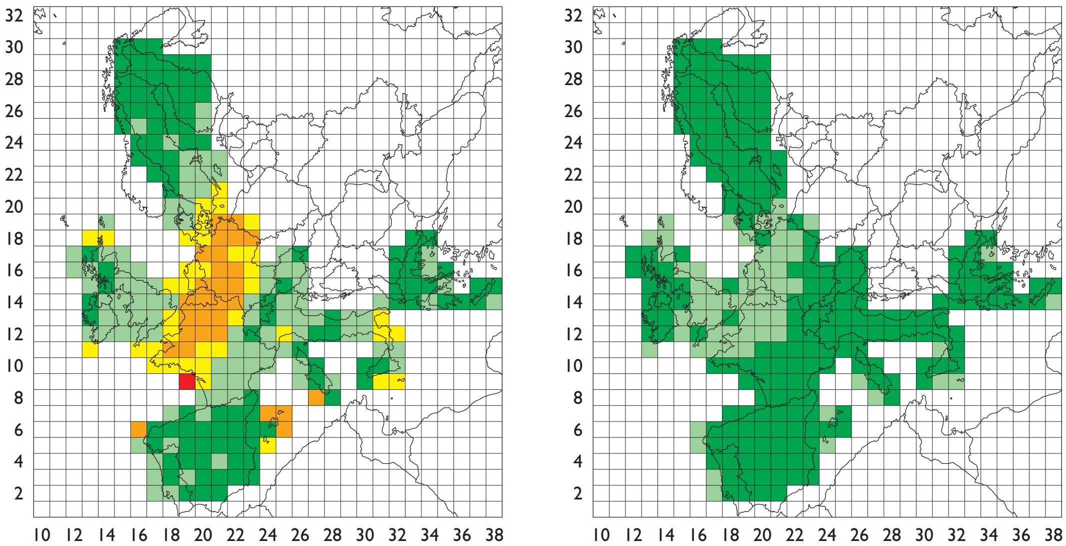
Predicted 2010 emissions (the IIASA Reference Scenario) have been run through the EMEP model to determine their impact on acidification, regional ozone air quality, secondary particulate matter and eutrophication. The results suggests that, on a regional scale, the Reference Scenario will:

- deliver an estimated 63 per cent reduction in overall human exposure to ozone compared with 1990;
- deliver an estimated 42 per cent reduction in overall vegetation exposure to ozone compared with 1990;
- reduce the area unprotected from acidification from 24.7 per cent in 1990 to 4.3 per cent in 2010; and
- reduce the area unprotected from eutrophication from 55.3 per cent in 1990 to 40.2 per cent in 2010.

This situation can be compared to standards in other countries. For example, it is predicted that by 2010, all of Europe would be in compliance with the new US ozone air quality standard proposal.

These quantified improvements are illustrated in Figures 1 to 5. There are, however, other improvements that have not been quantified and published for the Reference Scenario. Given

FIGURE 1: COMPLIANCE WITH US HEALTH-BASED OZONE STANDARD (left: 1990 emissions; right: 2010 REF scenario)

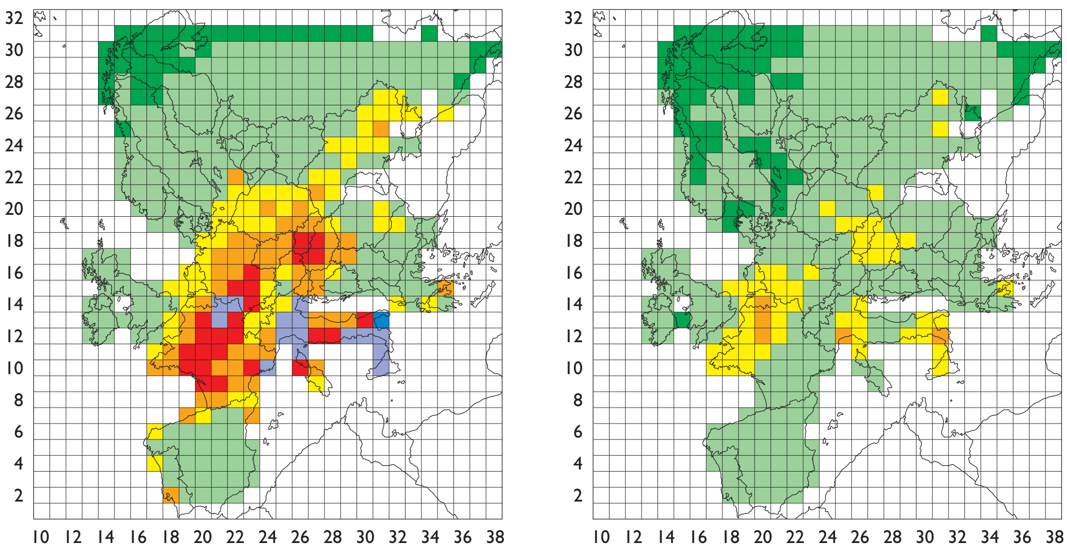


Number of days with ozone above 160 μg/m³, emissions of 1990 (8-hour values) and 1990 meteorology*

**Using 1990 meteorology generally leads to higher ozone predictions than using meteorology from the other years.*

Number of days with ozone above 160 μg/m³, 2010 REF scenario (8-hour values)

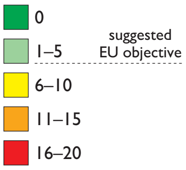
FIGURE 2: NUMBER OF DAYS WITH OZONE ABOVE 120 μg/m³ (left: 1990 emissions; right: 2010 REF scenario)

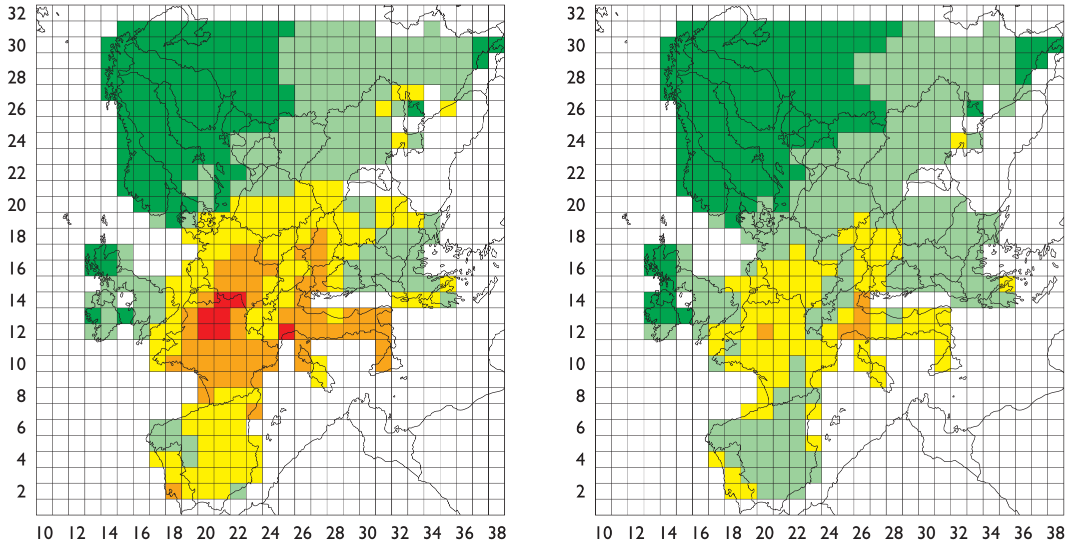


Number of days with ozone above 120 μg/m³, emissions of 1990; maximum of the three years moving average over the five meteorological years.

Number of days with ozone above the WHO guideline value for the emissions of the REF scenario; maximum of the three years moving average over five meteorological years.

FIGURE 3: EXCESS AOT40 ABOVE THE CRITICAL LEVEL OF 3 PPM.HOURS (left: 1990 emissions; right: 2010 REF scenario)

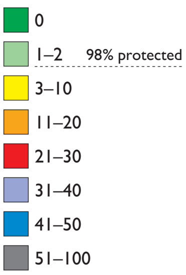


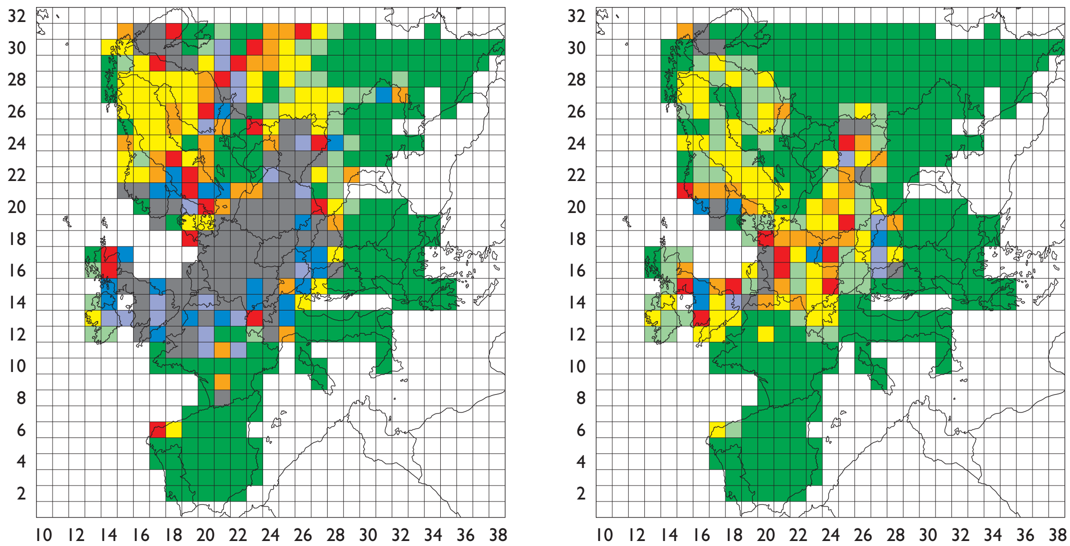


Excess AOT40 (above the critical level of 3 ppm.hours) for the emissions of 1990, in ppm.hours.

Excess AOT40 (above the critical level of 3 ppm.hours) for the emissions of the REF scenario, in ppm.hours.

FIGURE 4: PERCENTAGE OF ECOSYSTEMS WITH ACID DEPOSITION ABOVE THEIR CRITICAL LOADS FOR ACIDIFICATION (left: 1990 emissions; right: 2010 REF scenario)

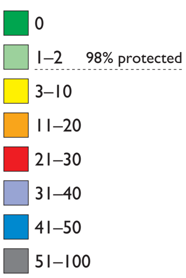


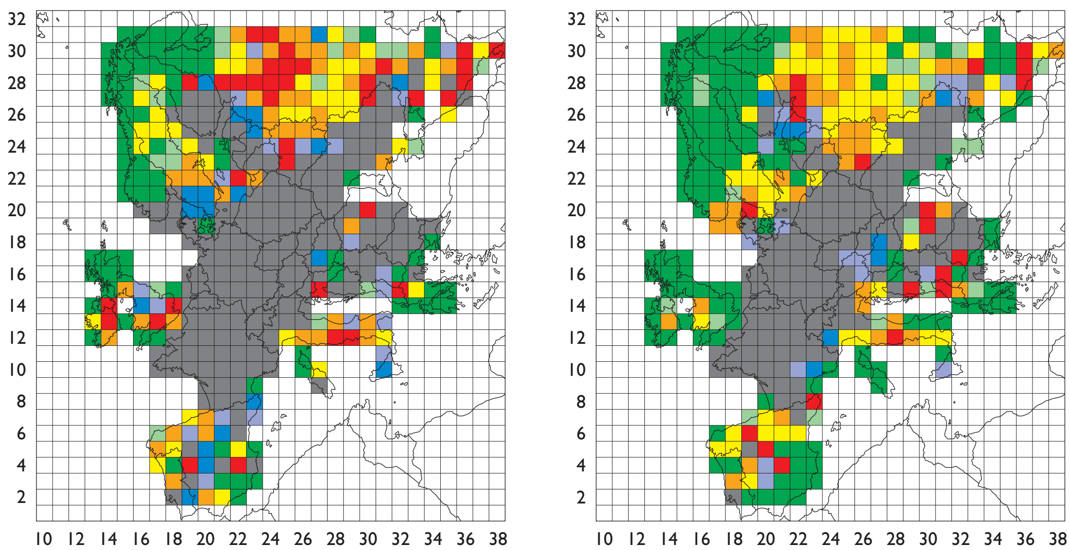


Percentage of ecosystems with acid deposition above their critical loads for acidification, 1990.

Percentage of ecosystems with acid deposition above their critical loads, REF case.

FIGURE 5: PERCENTAGE OF ECOSYSTEMS AREA WITH NITROGEN DEPOSITION ABOVE THEIR CRITICAL LOADS FOR EUTROPHICATION (left: 1990 emissions; right 2010 REF scenario)





Percentage of ecosystems area with nitrogen deposition above their critical loads for eutrophication, for the emissions of 1990

Percentage of ecosystems area with nitrogen deposition above their critical loads for eutrophication, for the emissions of the REF scenario.

the improvements listed above, it is logical to expect the Reference Scenario would also deliver significant reductions in ambient SO_x, NO_x, VOC (including Benzene) and secondary particulate matter concentrations compared with 1990.

It is important to note that the results of the IIASA work are uncertain and that, for a number of reasons, IIASA and EMEP were unable to take into account in their analyses the anticipated improvements in air quality due to:

- the Integrated Pollution Prevention and Control Directive (96/61/EC);
- the Nitrates Directive (91/676/EEC);
- controls needed to meet EU Directives stipulating air quality standards/targets for SO_x, NO_x, PM, Pb, CO, Benzene, Ozone, Nickel, Cadmium, Mercury, and polyaromatic hydrocarbons;
- the implications of Common Agricultural Policy reforms and livestock reductions on NH_3 emissions; and
- EU measures to reduce CO_2 emissions in response to the Kyoto protocol.

If these measures were also taken into account, future air quality would be predicted to be even better.

At the city level

Predictions of air quality in European cities were carried out as part of the Auto-Oil I programme and indicated significant improvements in air quality at the local scale for all pollutants, and compliance with stringent air quality targets for CO, Benzene, PM and NO_x. Further predictive air quality modelling (including the modelling of so called 'hot spots') is being carried out as part of the Auto-Oil II programme, again under the auspices of DGXI and its consultants. The results of this modelling work are due shortly but early indications (even for hot spots) are very positive.

CONCLUDING COMMENTS

It is hoped that this article will reinforce growing recognition that the focus should be on 'what *still* needs to be done', rather than 'something needs to be done'. It is also hoped that the information above offers a significant basis for optimism about air pollution in the future—optimism which is expected to be substantiated by air quality measurements over the coming years.

It is important to note that the Reference Scenario does not come cheap. IIASA's estimates suggest a figure of Euros 58.75 billion per year. From anyone's perspective, this is an enormous figure, but one that the European Union will be facing over the next 10 years or more.

In this context, industry in general is concerned that, without careful consideration, new initiatives may be poorly directed at greatly diminishing returns. This has come to light particularly in relation to recent discussions concerning binding National Emission Ceilings for SO_x, NO_x and VOCs, which would increase costs to 64.45 billion Euros *per year*. Indeed, it is easy to deduce from the recent cost-benefit analyses that costs will outweigh the benefits of such proposals, especially when taking into account the uncertainties, particularly the lack of evidence to support fundamental assumptions in the benefits calculations (see the article on Monetary Benefits on page 3).

Society's limited resources need to be allocated wisely. Consideration should now be given to switching the main focus of legislative initiatives away from air quality to areas which may be more pressing in 2010.

Energy use and CO_2 emissions in refinery operations

Processing requirements increase while energy efficiency improves.

Increasing the complexity and severity of refinery operations to meet new product specifications, necessarily leads to an increase in energy use. This can be (partially) offset by improved energy efficiency. What options are available to reduce overall CO_2 emissions?

Reducing CO_2 emissions would be a challenge to the oil industry and its customers. Some of the main trends that can be expected for the oil industry are:

- Impact of recent legislation regarding environmental product specifications. Individual refineries' responses may include solutions that rely on crude quality (e.g. increased use of low-sulphur crude), investment in new processing plants and abandoning part of the market.
- Improving energy efficiency both inside refineries and with customers. The overall effect aimed for is a reduced demand for fossil fuels. Member States may follow different strategies in terms of passenger car taxation, influencing the mix of fuels in the market and substitutions to gas or other alternative energy sources.
- Fuel switching in markets from coal to oil to gas, driven by considerations of SO_x, NO_x and CO_2 emissions. We may see a further increase in the use of natural gas replacing both heating oil and inland fuel oil.

Options for efficiency improvements that have already been implemented to a degree are:

- increasing heat integration inside process plants or across processes;
- combining activities so that process streams need less heating and cooling, e.g. combining desulphurization with distillation, or adding dewaxing capability to HDS catalyst system; and
- CHP (Combined Heat and Power) combining power generation with process heat needs.

The product demand effects are rather unclear; the political aim is to reduce CO_2 emissions (greenhouse gas) while limiting adverse effects on GDP growth. Generic options, with the potential to reduce specific carbon emissions, are the promotion of higher efficiency equipment (e.g. low energy use vehicles, light bulbs, etc.) or improving systems' efficiency. Creative thinking is required to develop cost-effective ways of contributing to the often-conflicting goals that society sets out to achieve.

Shifting to energy sources with a higher heating value/carbon content ratio may also contribute, and options include shifting from coal use to oil and gas. Reducing the carbon content of petroleum fuels by hydrogenation is not a viable option to reduce CO_2 emissions. The extra CO_2 emissions from hydrogen production will exceed the reductions in vehicle emissions. Alternative fuels are mostly not economic in themselves, therefore their contribution to the total energy supply will be determined primarily by fiscal measures, which distort competition.

In conclusion, the efforts to reduce energy use and shifts between fuel types will make the product demand mix hard to predict.

CONCAWE issues guidelines on gasoline volatility aspects for year 2000 EN 228 standard

CONCAWE studied the impact of environmental gasoline specifications and car parc change on hot weather driveability performance.

Gasoline volatility specifications are defined in volatility classes in the European Standard EN 228. CEN member countries have selected up to three volatility classes to satisfy the driveability requirements for their market based on regional climatic variations over the year.

The new EU Fuels Directive 98/70/EC defines the environmentally relevant specifications and thus affects fuel composition. Consequently, other specifications, especially volatility classes, have also to be reviewed. To accommodate new legal specifications and other technical aspects, CEN is revising the year 2000 EN 228 specifications accordingly, which were established for the first time as a European gasoline standard in 1993.

CONCAWE has reviewed the volatility specifications related to hot weather driveability (or HFH[1]), i.e. RVP[2], E70[3] and VLI[4]. As a result CONCAWE has proposed revisions to the volatility specifications based on extensive knowledge of hot weather driveability performance and its assessment, accumulated by member companies over many years. A document providing details of the calculations and technical background was made available to the technical experts' working group in CEN/TC19 (WG21) and will be published soon as a CONCAWE report (99/51).

VOLATILITY SPECIFICATIONS ENSURE SATISFACTORY HOT WEATHER DRIVEABILITY

If there is a mis-match between the maximum ambient temperature in which a vehicle is expected to operate and the volatility of the fuel it uses, then hot weather driveability (or hot fuel handling) malfunctions can be experienced. These problems are caused by overheating in the vehicle fuel system leading to the formation of vapour bubbles in the fuel line system, interrupting the flow of liquid fuel or causing foaming of gasoline in the carburettor bowl. This can cause problems in fuel pumps and metering systems (injectors or carburettors) which are designed to handle liquid fuel and cannot cope with vapour. The problems which affect fuel systems can result from an over-rich mixture in carburetted engines or over-lean mixtures in fuel pumps/injection equipped engines, making it hard or impossible to restart the engine.

Modern electronic fuel injection (EFI) engines are much less prone to hot fuel handling problems than carburetted engines. Therefore, modern vehicles are far more tolerant of hot conditions and high volatility fuels, and very few HFH problems occur in the market.

[1] *HFH = Hot Fuel Handling*
[2] *RVP = Reid Vapour Pressure*
[3] *E70 = % of gasoline evaporated at a temperature of 70 °C*
[4] *VLI (Vapour Lock Index) = 10 x RVP (kPa) + 7 x E70 (% v/v)*

Adequate volatility specifications including RVP, E70 and VLI will avoid the problems described and ensure satisfactory hot weather driveability performance.

NEW EU FUEL DIRECTIVE AFFECTS OTHER SPECIFICATIONS SUCH AS VOLATILITY

Gasoline volatility characteristics will change after year 2000 due to the impact of the new EU Fuels Directive. In particular, restrictions on maximum content of olefins (18% v/v), aromatics (42% v/v) and benzene (1% v/v) will require changes in refinery processing. There will be a need for increased use of lower boiling blending components, such as isomerate and MTBE. CONCAWE studies show that, because of these changes to gasoline production, the current limit on maximum E70 (45–47% v/v) will be constraining after year 2000.

Therefore, the needs of the car populations in the different European countries have been analysed for year 2000. These car parc responses to fuel volatility have shown that current E70 and VLI limits can be modified whilst maintaining problem-free hot fuel handling performance and still retaining refinery blending flexibility. CONCAWE's proposal for volatility classes showing the key properties is given in the table. The requirements for a VLI are discussed below.

Proposed gasoline volatility classes for summer and other seasons (key properties)

	Summer		*Other seasons*			
Class	*A*	*B*	*C*	*D*	*E*	*F*
RVP kPa	45–60	45–70	50–80	60–90	65–95	70–100
E70 % v/v	20–48	20–48	22–50	22–50	22–50	22–50
E100 % v/v	46–71	46–71	46–71	46–71	46–71	46–71
E150 % v/v min.	75	75	75	75	75	75
VLI	no	no	*	*	*	*

** VLI only for some critical markets during transition between summer and winter periods*

PREDICTIONS OF CUSTOMER SATISFACTION ON HOT WEATHER DRIVEABILITY PERFORMANCE BASED ON EXTENSIVE DATABASE AND EXPERIENCE

Predictions of customer satisfaction for hot weather driveability are based on a database containing information on many hundreds of vehicles tested over many years. These tests are conducted on a selection of vehicle technologies representative of the European market at different ambient temperatures, and the vehicles are assessed for their sensitivity to a wide range of fuels of different volatility. These performance data, when linked on a market weighted basis with the vehicle population data and an accurate ambient temperature profile of a region, allows hot weather driveability technical satisfaction levels to be generated for any combination of ambient temperature and volatility. The average monthly maximum temperatures (recorded over many years in the hottest city of the market) are used to define either the hottest month in the season under review or any individual month. These technical satisfaction levels are then used to calculate lines of total customer satisfaction for individual European markets based on customer reaction test data.

The predictive potential of the CONCAWE approach is demonstrated for France in Figure 1. It shows that the calculated satisfaction curve for the 1993 vehicle population matches well with the CEN

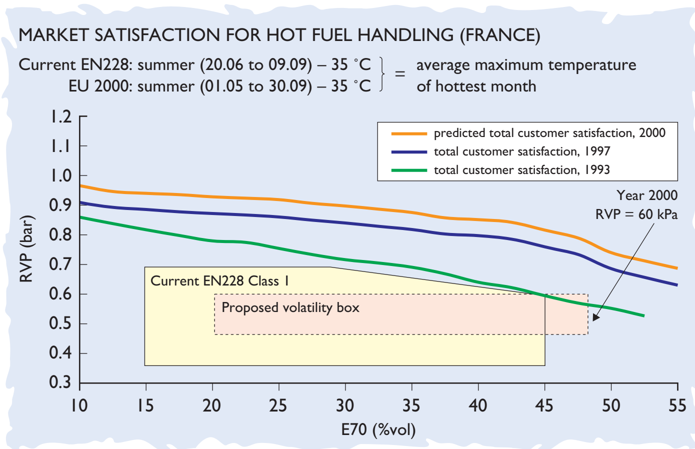


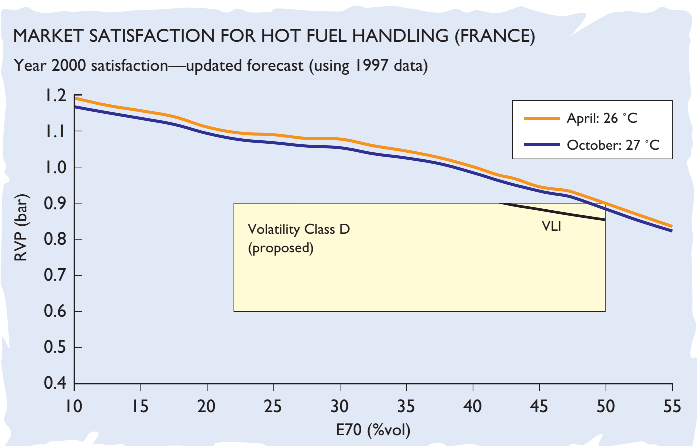
Figure 1
Summer market satisfaction for hot fuel handling (France). Due to a change in the car parc over the years, total customer satisfaction curves have moved away from the volatility box.

volatility class chosen for the summer period in 1993 when EN 228 was first introduced. The Figure also shows that the satisfaction curve moves away from the volatility box for the 1997 car parc and even further for the predicted 2000 car parc when older, more sensitive vehicles have been scrapped. It can be seen clearly that there is no further need for a summer VLI, as the satisfaction line is well above the proposed new rectangular volatility box which is based on the legally defined summer RVP of maximum 60 kPa for 2000. This conclusion is valid for all European countries investigated.

CONCAWE PROPOSAL TO SERVE AS A GUIDELINE; LIMITED NEED FOR A VLI DURING TRANSITION PERIODS

Investigations have shown that, for volatility classes for seasons other than summer, the VLI specification would also generally be no longer necessary. This conclusion can be drawn from customer satisfaction curves developed for average monthly maximum temperatures in individual months, covering the critical transition months between winter and summer for individual markets (14 EU markets). These diagrams serve as guidelines to define adequate non-summer volatility classes for individual markets and to decide whether extra control of volatility is needed during the critical transition periods between summer and winter. Only four markets were identified as critical—Finland, France, Greece and Portugal. Figure 2 shows the monthly satisfaction curves for France during transition, and Volatility Class D for the winter season. To avoid driveability problems, a satisfaction curve should never intersect a volatility box; hence some further control is needed during the transition months of April and October, which could include a VLI specification.

Figure 2
Other seasons (not summer) market satisfaction for hot fuel handling (France)



FURTHER WORK REQUIRED FOR 2005—JOINT INDUSTRY PROGRAMME?

All hot weather driveability assessments are based on existing, European-wide approved CEC (Coordinating European Council) test procedures and well established relationships between test-procedure derived data, road driving behaviour and customer satisfaction curves. CONCAWE's guidelines are currently based on ca. 15 000 individual tests carried out over many years using 655 vehicles covering a wide range of vehicle technologies. CONCAWE considers that the guidelines have been a valuable contribution in the debate for the revision of the year 2000 volatility specifications.

A new hot weather driveability test method has been published recently by the driveability group within GFC, the French national CEC body. GFC consider this method to be a more appropriate and critical assessment of the driveability performance of new vehicle technology. Basic performance data obtained with the new method have not yet been published. Neither—as far as CONCAWE is aware—have comparisons been carried out with the current CEC test method, nor have relationships been established to road driving and customer satisfaction. The generation of an additional database for newly registered vehicles with the new test method could be a challenge for the next revision of EN 228, currently scheduled for 2005. This new database should be developed jointly by the automotive and oil industries.

The Seveso 2 Directive

The Directive should by now have been implemented in Member States. It forms the subject of the recent CONCAWE report No. 7/98

The subject of this report is the Council Directive on the Control of Major Accident Hazards involving dangerous substances, popularly known as the COMAH Directive or, alternatively, Seveso 2. This Directive applies to establishments which hold more than specified quantities of substances which are classified as hazardous because of their toxicity, flammability or potential to cause harm to the environment. Many petroleum products are classified as hazardous and thus many oil industry sites will be 'Seveso sites'. However, pipelines, transport and intermediate temporary storage are specifically excluded.

For sites which already fall within the existing Seveso 1 Directive, the major changes are:

- Seveso 2 relates to establishments (i.e. whole sites), not installations;
- the concept has been introduced of adding inventories of substances with similar hazards;
- the category 'Dangerous to the Environment' has been introduced;
- at the lower-tier threshold an operator must notify the competent authority and prepare a Major Accident Prevention Policy;
- at the top tier, the operator must prepare a safety report, have on-site emergency plans and provide information for the preparation of an off-site emergency plan, and provide information to the public on actions to be taken in the event of a major accident;
- there are greater requirements for operators to provide information to, and consult with, the workforce and the public, and the safety report must be made available to the public; and
- Member States must set up a system for land-use planning around major hazard sites.

The Directive applies to establishments where dangerous substances are present in quantities equal to, or in excess of, threshold quantities (lower-/top-tier) which are given in Annex I of the Directive. The flowchart (see following page) will help operators decide if the regulations apply to their activities.

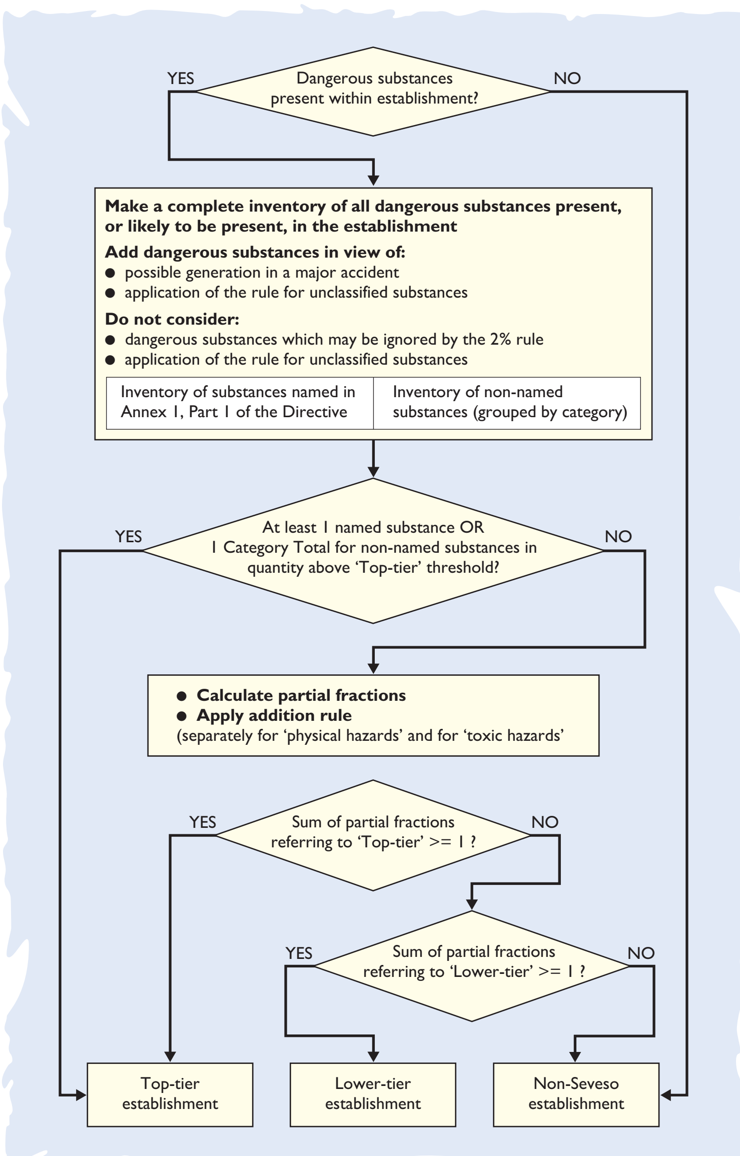
CONCAWE has always supported the aims of the Seveso Directive and played an active part in discussions with the Commission during the development of Seveso 2. However, it has always considered that the main purpose of such a Directive is to focus attention on those sites which pose the greatest hazard, and not to attempt to cover all sites which pose any hazard. Such sites are covered by other local legislation. It therefore has some concern over the situation which has arisen over the storage of middle distillates such as diesel, heating oil and kerosine. The situation with these is still unclear.

Since the Directive was adopted, the environmental classification for these materials proposed by CONCAWE has been changed. CONCAWE Report No. 98/54 now recommends to its member companies that the most appropriate environmental classification for kerosine and gas oil/diesel streams should be 'dangerous for the environment (R51 and R53)' This has the effect that these materials would now covered by Category 9 (ii) of Annex I, Part 2 of the Seveso 2 Directive and implies that threshold quantities for middle distillates should be 500 tonnes and 2000 tonnes for lower and upper tier sites respectively. These should be compared to the threshold quantities for gasoline of 10 000 tonnes and 50 000 tonnes even though gasoline has a similar aquatic toxicity classification *and* a much higher flammability hazard rating. It is hoped that this discrepancy can be resolved before the date when establishments have to submit safety reports. The dates for implementation are as follows:

- notification by establishments to Competent Authorities: 3 February 2000;
- submission of Safety Report for upper-tier establishments:
  - by establishments previously covered by Seveso 1: 3 February 2001;
  - by establishments NOT previously covered by Seveso 1: 3 February 2002.

One of the main new requirements is for lower-tier establishments to produce a Major Accident Prevention Policy (MAPP) which sets out overall aims and principles with respect to the prevention and control of major accidents. Evidence has to be given that the operator has properly implemented the policy. This can be proved by demonstrating that a Safety Management System (SMS) is in place. A MAPP may be created from an existing HSE policy and a SMS may be integrated within an overall management system. In that respect it is important to understand that the Health, Safety and Environment (HSE) management system, which the MAPP relates to, is an essential part of the overall management system within the establishment. It may be appropriate to have only one MAPP available on a corporate level rather than several site-specific MAPPs.

Safety reports are only required for top-tier establishments. Compared to the old Directive, the Seveso 2 Directive has more detailed and prescriptive requirements, and also requires that it be made available to the public. The various elements which will now need to be included are discussed in the report. Similarly, top-tier sites have to prepare an on-site emergency plan and they must now consult their workers in its preparation. They must also make information available to the Competent Authorities responsible for preparing the off-site plan. Both plans should be based on major accident scenarios which are possible at the establishment. These two plans must now be tested. Preparation of off-site plans is the responsibility of the Competent Authorities and the only action required of the operator is to make available information on the nature of possible major accidents along with their consequences and likelihood.



The revised Directive also requires certain information to be actively communicated to individual members of the public (e.g. actions to be taken in case of a major accident) whilst other information need only be made generally available for public access (e.g. contents of a safety report). It also requires sites to have an audit and review programme.

Developments related to the Existing Substances Regulation

There is much debate among Member States, the EU Commission, industry and NGOs at present regarding the future of chemicals control on existing substances in the European Community.

Council Regulation (EEC) 793/93 on the evaluation and control of the risks of existing substances, generally known as the 'Existing Substances Regulation' was adopted on 23 March 1993 and entered into force 60 days after its publication in the Official Journal of the EC on 4 June 1993. The aim of the Existing Substances Regulation is the protection of human health and the environment from exposures to dangerous substances. The basic principle of the Existing Substances Regulation is that controls on hazardous chemicals should be based on an assessment of the actual risks to human health and the environment, rather than on the intrinsic hazardous properties of the substance. This approach is based on sound science and was supported, and continues to be supported, by CONCAWE and other industries.

The Existing Substances Regulation consists of procedures for:

- the collection of data on existing substances produced or imported into the Community (i.e. HEDSET (Harmonized Electronic Data Set) dossiers);
- the preparation of lists of priority substances for which the need for risk assessment is greatest;
- the assessment of risks; and
- the identification of any measures needed to control those risks.

The risk assessment itself is conducted by a member state 'rapporteur', acting on behalf of the European Union. Since 1994, a total of 110 substances have been identified on three separate priority lists for the risk assessment process. It should be noted that although no petroleum substances, *per se*, have been identified on any of the priority lists, risk assessments have been initiated for certain hydrocarbons (e.g., benzene, toluene) which are present in various petroleum substances. Risk assessment conclusions for four substances, and strategies for risk reduction measures for only three of the substances, were to have been published by the end of 1998.

This slow rate of progress has caused concern among some Member States and non-governmental organizations as an indication of the failing of current chemicals control mechanisms in the EU. This has been attributed to a number of factors, including:

- underestimation of the effort involved;
- a lack of resources from Member States, the Commission and industry;
- a failure to identify the real priority substances which need risk assessments; and
- an over-burdensome data requirement.

The Commission has undertaken an initiative to review the current Community legislation governing industrial chemicals, in the form of a brainstorming workshop held in February 1999 under the theme 'Industrial Chemicals: Burden of the Past, Challenge for the Future'. Representatives from all stakeholder groups (i.e. regulators, scientists, industry and NGOs) were invited to debate the issues of industrial chemicals in the Community in order to strengthen the level of protection for human health and the environment.

In her opening remarks, EU environment commissioner Ritt Bjerregaard stated that, despite the EU's 'impressive arsenal of instruments' governing chemicals, it was clear that 'the current Community legislation just isn't doing the job' and does not allow for a rapid response on emerging issues (e.g. persistent and/or bioaccumulative chemicals and endocrine disruptors). General themes expressed during the workshop included a need for increased commitment from Member States, the Commission and industry, the need for more effective coordination of activities, the need to give greater consideration to the application of the precautionary principle within a defined framework and, in the longer term, the need to consider a new legislative framework. The workshop will lead to a Commission communication, later in the year, to the Council and European Parliament, which will set out a strategy for the control of chemicals in the EU.

CONCAWE recognizes that the Existing Substances Regulation is a key legal instrument for ensuring the responsible management of existing substances in the EU. CONCAWE also recognizes that the current state of progress in the implementation of risk assessments under this Regulation falls short of desired objectives.

In an effort to improve upon the implementation of this important Regulation, CONCAWE member companies have volunteered to undertake initial risk assessments of representative streams for its major marketed petroleum groups having wide dispersive use (e.g. LPG, gasoline, diesel fuel, industrial gas oils, etc.).

A Risk Assessment Coordination group, chaired by a member of the Board and comprised of the Chairmen of the various CONCAWE management groups, as well as the Ecology, Industrial Hygiene and Toxicology Groups and the respective technical coordinators, has been constituted to provide guidance and management oversight for this important activity. The coordination group will also seek to liaise its activities with the American Petroleum Institute which is in the midst of planning its strategies to fill toxicity, eco-toxicity and physico-chemical data-gaps under the Vice-President's High Production Chemical Challenge Program to improve the amount of information which is available publicly on petroleum substances.

Occupational noise and the proposed EC directive for physical agents

Is there a scientific basis for lowering the standard for occupational exposure to noise?

INTRODUCTION

European Directive 86/188/EEC requires legislation in EU member states to protect workers from risks to their hearing from exposure to noise at work. In 1993 the European Commission published a proposal for a directive on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents, known as the Physical Agents Directive. This incorporated threshold and limit values for occupational noise exposure which were much more stringent than the values given in the 1986 Directive. The values proposed in 1993 appeared overly protective with regard to the prevention of hearing damage, as well as being technically unachievable. CONCAWE, along with representatives from other industries, expressed its concerns about the proposed limits.

The proposed Directive has not been finalized since its appearance in 1993. However, during 1998 it became clear that the Commission and the EU presidencies of various member states remained intent on progressing the draft Directive. In order to participate in the forthcoming debate, CONCAWE's Health Management Group has initiated a programme of exposure data collection and scientific evaluation.

EXPOSURE TO NOISE AND NOISE-INDUCED HEARING LOSS

Noise is commonly defined as unwanted or undesirable sound. It has long been known that prolonged and repeated exposure to high intensity noise in the workplace may cause hearing impairment, commonly referred to as noise-induced hearing loss.

Hearing impairment is not only caused by noise, but also by the ageing process, some medication and some illnesses. Exposure to high noise levels may also occur outside of the workplace, for instance as a result of DIY work or hobbies. Music at high volume, for example delivered by earphones and in discotheques, constitutes a significant noise exposure, especially for many young people. All these various factors may combine to give an additive hearing loss.

Hearing impairment becomes evident only when noise intensity exceeds around 30 decibels in the speech hearing frequency band between 500 and 4000 Hertz. Smaller changes therefore are likely to remain unnoticed by the individual but can be identified using audiometric testing. The effect of chronic exposure to high intensity noise results in a typical, irreversible hearing loss centered around the hearing frequency of 4000 Hertz. Some individuals are more susceptible to high intensity noise than others. About 10 per cent of the population is considered to be noise sensitive.

The nature and extent of hearing impairment is dependent upon the intensity and duration of exposure. A number of studies have addressed the distribution of hearing loss in long-term, noise-exposed worker populations. The studies have estimated the percentage of workers with hearing impairment as a function of an average noise exposure level. Considerations of a maximum accepted percentage of hearing impairment, and of the associated costs and benefits, have led to the current occupational exposure limits.

EUROPEAN DIRECTIVE 86/188/EEC

Under this Directive the daily personal exposure of a worker to noise has to be assessed. The assessment of daily personal exposure takes account of varying noise levels during a working day, but does not incorporate the attenuating effect of any personal ear protection that is being worn. Measures to prevent or control noise exposure should be introduced depending on the findings of the exposure assessment. The assessment needs to be repeated at regular intervals, and when changes occur, for example in the event of significant changes to noise levels because of new equipment in the workplace or of changes to operating practices.

The Directive introduced two action levels for assessing the results of the noise exposure assessment:[1]

- For daily personal exposures to noise levels over 85 dB(A), the awareness of the workforce should be raised by providing information on the risks and the correct use of personal ear protectors.
- For daily personal exposures to noise levels over 90 dB(A), a programme has to be developed to reduce the exposure as far as reasonably practicable, and personal ear protection must be used until exposure is reduced by other means.

Additionally, the Directive requires that, where daily personal noise exposures exceed 85 dB(A), hearing checks should be carried out in accordance with national law and practice.

Since 1986 the Directive has been implemented gradually by EU member states in their national legislation, in some cases with more stringent requirements. To date, the European Commission has not published a review of the implementation of the Directive.

THE PROPOSED PHYSICAL AGENTS DIRECTIVE

The 1993 proposal (followed by an amended proposal in 1994) included occupational exposure to noise in its scope. The intention was that, following its adoption, Directive 86/188/EEC would be repealed. A threshold level of 75 dB(A) was given as the exposure value below which continuous and/or repetitive exposure over the working day has no adverse effect on health and safety of workers, and 90 dB(A) was indicated as the exposure limit value above which an unprotected person is exposed to unacceptable risks, and for which any exceedance would be prohibited.

THE SCIENTIFIC BASIS FOR A 75 DB(A) THRESHOLD LEVEL FOR DAILY PERSONAL EXPOSURE TO NOISE

In response to the proposed Directive published in 1993, CONCAWE commissioned the Institute for Sound and Vibration (ISVR) of the University of Southampton (UK) to carry out a review of the scientific basis for the proposed limit of 75 dB(A) for daily personal noise exposure. Because noise intensity is expressed on a logarithmic scale, this level equates to ten times less sound energy than 85 dB(A) daily exposures.

[1] *The dB(A) scale is the measurement unit adopted for noise, because it correlates well with hearing damage.*

ISVR reviewed a publication from the International Organization for Standardization (ISO) which dealt with the risks arising from daily personal exposures to noise. They concluded that the data used by ISO suggested a higher exposure level than 75 dB(A) as the 'no observed adverse effects level' for noise-induced hearing loss (NIHL). In addition, ISVR indicated from a review of literature data that there is no evidence of noise-induced hearing loss for daily exposures of 75 dB(A) or 80 dB(A), and that the average hearing loss due to daily personal exposure to 85 dB(A) is relatively small.

COSTS AND TECHNICAL FEASIBILITY OF A 75 DB(A) THRESHOLD VALUE IN THE OIL INDUSTRY

No cost-benefit analysis for the 75 dB(A) threshold was provided in 1993 to accompany the proposed Physical Agents Directive. It was clear, however, that comprehensive compliance for workers operating process plants or, for example, powered hand-held tools, would be extremely costly and offer no apparent benefit. In addition, it appeared unrealistic to try to achieve 75 dB(A) in process areas, given the noise emission characteristics of the individual pieces of equipment and the multitude of equipment required to operate oil refining processes.

A WORK PROGRAMME TO ESTABLISH DAILY PERSONAL NOISE EXPOSURES AND THE INCIDENCE OF NOISE-INDUCED HEARING LOSS

Many oil company facilities have been operating hearing conservation programmes since the 1970s. These programmes generally consist of a series of elements, including: an assessment of daily personal noise exposure; demarcation of high-noise work areas and hearing protection zones; engineering specification for new equipment; regular hearing checks; and training and awareness programmes.

Because of the potential major confounding effect that the use of hearing protection might have, no attempt is made to search for a newer relationship between daily personal noise exposure and hearing impairment on the basis of oil industry data. However, CONCAWE member companies are undertaking two separate studies to provide up-to-date information on noise exposures, and on the incidence of hearing impairment.

The first study will update and extend CONCAWE Report 90/53 in which daily personal exposures to noise were reported for Western-European refinery workers. The new study will not only look again at refinery workers, but will also extend to workers in the distribution of petroleum products. The study is being carried out by a group of industrial hygienists from member companies and will look for trends in the exposure levels and the number of workers involved.

The second study will examine the consecutive hearing tests (audiograms) of a group of approximately 1000 European refinery workers and compare the results with a reference population of people not exposed to noise at work, in order to establish the effectiveness of hearing conservation programmes.

Best Available Techniques to reduce emissions from refineries

CONCAWE will play a full part in the development of the BAT reference document for refineries.

Over the past few years, European governments have progressively sought the application of Best Available Techniques (BAT) for the control of environmental emissions from a range of industrial sectors, including the oil industry. This culminated in the Integrated Pollution Prevention & Control (IPPC) Directive[1] which was adopted in 1996. The Directive calls for a high level of protection for the environment as a whole and this protection should be achieved through application of Best Available Techniques (BAT) taking into consideration economic viability and local environmental factors.

EIPPCB BREF Work Programme

Start year	*Industries*[1]
1997	Primary/secondary steel; cement and lime; paper/pulp; ***cooling systems***
1998	Ferrous metal processing; non-ferrous metal production and processing; glass; chloralkali; textiles; tanneries; ***monitoring of emissions***
1999	**Refineries;** smitheries and foundries; **large volume organic chemicals; large volume gaseous and liquid inorganic chemicals;** intensive livestock farming; ***emissions from storage (of dangerous substances and bulk materials); wastewater and waste gas treatment/management systems in the chemical industry; cross-media and economic aspects***
2000 (draft)	Large volume solid inorganics; hazardous waste disposal/recovery; slaughterhouses/animal carcasses; food and milk
2001 (draft)	Large combustion plants; coal liquefaction; surface treatment of metals; asbestos; ceramics; polymers; surface treatment using solvents
2002 (draft)	Speciality inorganics; organic fine chemicals; municipal waste incineration; non-hazardous waste disposal; landfills

[1] *Bold type denotes BREFs that may affect the oil industry*
[2] *Italic type denotes BREFs which are 'horizontal', i.e. they are general to most industries*

The Directive does not itself specify Emission Limit Values (ELV) to be achieved or which techniques should be used. Instead, it provides a framework for local regulators to control industries in their own areas. To assist them, the Directive calls for the Commission to organize an exchange of information on BAT between Member States. The main vehicle for this information exchange are the so-called BAT reference documents (BREFs); these will be written for a number of selected industries that are seen to be major contributors to the types of pollution mentioned in the IPPC annexes (see table on the left). The BREFs are to be prepared for the Commission by the European IPPC Bureau established in Seville.

It is clear that the BREFS will assume great significance, since it is intended that legislators and control authorities will use them as a guide for establishing future ELVs for selected emitting sources. The Directive also allows for the setting of EU-wide ELVs where the need is identified but no such proposals have yet been made. Certainly, the BATs identified will provide a benchmark for determining the obligations of industrial operators in respect of pollution prevention and control.

Although CONCAWE's viewpoint on the concept of BAT may differ from those who favour a strict interpretation, it does intend to be fully involved in the preparation of the documents relevant to the oil industry, most importantly, in the Refinery Reference Document scheduled to start in 1999

[1]*Reference Council Directive 96/61/EC of 24 September 1996*

(see table on the right). This is because CONCAWE, as the technical organization of the oil industry, wishes to make a positive and informed contribution to the whole exercise, based on actual data on facilities installed in refineries, their capital and operating costs, and delivered performance capability. For that purpose, CONCAWE established two Special Task Forces to study BAT pollution control as applied for all media (water, waste, soil and groundwater, and air quality). The report will be submitted as background information and considers a wide range of emissions control techniques for refinery operations, the cost of installing and operating them, and the performance they have been demonstrated to deliver. In other words, actual practical data and costs of installed equipment are presented, rather than the cost/performance claimed by the designers/vendors of the equipment.

The 1999 BREF work

Industry	*Leading industry organization*
Oil refineries	CONCAWE
Emissions from storage (of dangerous substances and bulk materials)	CONCAWE
Large volume organic chemicals	CEFIC
Large volume liquid and gaseous inorganic chemicals	CEFIC
Wastewater and waste gas treatment/ management systems in the chemical industry	CEFIC

The information was gathered by means of questionnaires sent to all CONCAWE member companies' European refineries. The data are presented as a series of technical descriptions and tables of cost and performance. The report describes the techniques used to minimize emissions/discharges to air and surface water, soil and groundwater, and the production of waste. In addition, the implications of pollution controls on energy use are addressed.

Several important principles concerning BAT are reviewed in the report to ensure that the available techniques described are properly assessed in future considerations of their applicability as BAT. These are as follows:

- There is no such thing as a 'universal' BAT for oil refineries. They differ in size, complexity, the types of processes they operate, and the crudes they process. Climatic/environmental conditions (e.g. wind/geology) and the location of the refinery (e.g. inland or coastal, etc.) can influence the impact of emissions on the environment. BAT therefore includes a site-specific content to account for these differences.
- It is *the impact* that emitted pollutants have on the environment into which they are discharged that should dictate the level of control required as BAT, and *not* the simple availability of existing techniques/technology to control them to ever lower limits. This risk-based approach to BAT will help ensure that society's limited resources are directed toward the most cost-effective controls that result in the largest possible environmental benefit.
- BAT costs are frequently quoted based only on the hardware. This approach significantly underestimates the real cost of BAT applications, which may be up to four times greater when taking into account design, engineering, infrastructure preparation and installation costs.
- The cost of 'BAT' is significantly impacted by what level of control already exists at a refinery. While application of a technology offering 99 per cent emissions control may be cost-effectively applied to an otherwise uncontrolled site, the same technology installed at a site which has previously invested in controls that are 97 per cent effective could provide a very poor emission reduction return for the investment.
- Cross media impacts can often result from the application of controls. These should be considered in the risk assessment mentioned previously when assessing the wisdom of applying a BAT at a given location.
- BAT should be used to set appropriate emission levels for a given situation/location as a result of establishing the level that can be economically met. However, the facility should be allowed to achieve the specified level using the techniques of their choice.

CONCAWE news

CHAIRMANSHIP

Peter Gill has stepped down as CONCAWE chairman. The secretariat would like to express its appreciation of Peter's competent leadership during the past three years and wishes him well in his future career. We welcome Bart van Holk as CONCAWE's new chairman.

SECRETARIAT

Suzie Baverstock has left the secretariat and is returning to the UK to a position with BP-AMOCO. We would like to express our thanks for her contribution to CONCAWE in the field of air quality issues over the past three years.

The CONCAWE Internet site is being extended and future reports will also be made available via the Internet.

SECRETARIAT STAFF

Secretariat staff		Areas of responsibility
Secretary-General	Jochen Brandt	
Technical Coordinators	Bo Dmytrasz	Petroleum products
	Peter Heinze	Automotive emissions
	Eric Martin	Safety management, oil pipelines, water and soil protection, and waste management
	Henk Schipper	Air quality
	Jan Urbanus	Health
	Kees van Leeuwen	Publications and refining planning
Administration	Martien Sijbrandij	
Secretaries	Laurence Evrard	
	Sandrine Faucq	
	Elfriede Geuns	
	Annemie Hermans	Library
	Barbara Salter	

CONCAWE PUBLICATIONS, 1998 TO DATE

General circulation (yellow cover) reports:

1/98	Methods of prevention, detection and control of spillages in European oil pipelines
2/98	Western European cross-country oil pipelines 25-year performance statistics
3/98	Sulphur dioxide emissions from oil refineries and combustion of oil products in western Europe and Hungary (1995)
4/98	European downstream oil industry safety performance—1997
5/98	A survey of European gasoline qualities—summer 1996
6/98	Performance of cross-country oil pipelines in western Europe—1997 survey
7/98	The SEVESO 2 Directive and the oil industry
8/98	Trends in oil discharged with aqueous effluents from oil refineries in Europe—1997 survey
9/98*	Motor vehicle emission regulations and fuel specifications—part 1 summary and annual 1997/98 update

Special interest (white cover) reports

98/51	A study of the number, size and mass of exhaust particles emitted from European diesel and gasoline vehicles under steady-state and European driving cycle conditions
98/52	Exposure profile: crude oil
98/53	Pilot study to investigate airborne benzene levels in service station kiosks
98/54	Classification and labelling of petroleum substances according to the EU Dangerous Substances Directive (Revision 1)
98/55	Polycyclic aromatic hydrocarbons in automotive exhaust emissions and fuels
99/51*	Proposal for revision of volatility classes in EN 228 specification in light of EU fuels directive
99/52*	Exposure profile: kerosines/jet fuels

Product dossiers

97/108	Lubricating oil base stocks
98/109	Heavy fuel oils

Catalogues of CONCAWE reports will be made available via the Internet site at www.concawe.be

* *available shortly*

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