

Acid News

NO. 2, JUNE 2001



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NECs AND LCPS

Moving towards a compromise

JUST NOW THE EU Council of Ministers and the European Parliament are in the final stage of negotiation to arrive at a compromise on the future levels of emissions of ozone-forming, acidifying, and eutrophying air pollutants. The aim is to reach agreement on the content of two highly important directives, both new – the one for national ceilings on emissions (NECs), the other on emissions from large combustion plants (LCPS). After several years of

preparation and analysis within the Commission, they have been subjected to the regular EU decision process during at least a couple of years – the proposal for a new LCP directive having been put forward in July 1998, and that for NECs in June 1999.

These proposals were not only developed and presented separately. They were also dealt with separately at their first readings in the Parliament. The Council concluded how-

ever that they had so much in common that they ought to be treated as one – the idea also being that this would make it easier to arrive at a compromise.

The versions that are to be considered in the present negotiations are on the one hand the common position agreed between the national representatives on the Council in June 1999, and on the other that with the changes proposed by the Parliament

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Acid News

is a newsletter from the Swedish NGO Secretariat on Acid Rain, whose primary aim is to provide information on the subjects of acid rain and the acidification of the environment.

Anyone interested in these problems is invited to contact the secretariat. All requests for information or material will be dealt with to the best of our ability. Acid News is distributed free of charge.

In order to fulfill the purpose of Acid News, we need information from everywhere – so if you have read or heard about something that might be of general interest, please write or send a copy to:

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THE SECRETARIAT

The Secretariat has a board comprising one representative from each of the following organizations: Friends of the Earth Sweden, the Swedish Anglers' National Association, the Swedish Society for Nature Conservation, the Swedish Youth Association for Environmental Studies and Conservation, and the World Wide Fund for Nature Sweden.

The essential aim of the secretariat is to promote awareness of the problems associated with air pollution, and thus, in part as a result of public pressure, to bring about the needed reductions in the emissions of air pollutants. The aim is to have those emissions eventually brought down to levels – the so-called critical loads – that the environment can tolerate without suffering damage.

In furtherance of these aims, the secretariat operates by

- Keeping under observation political trends and scientific developments.
- Acting as an information centre, primarily for European environmentalist organizations, but also for the media, authorities, and researchers.
- Producing information material.
- Supporting environmentalist bodies in other countries in their work towards common ends.
- Acting as coordinator of the international activities, including lobbying, of European environmentalist organizations, as for instance in connection with the meetings of the Convention on Long Range Transboundary Air Pollution and policy initiatives in the European Union.
- Acting as an observer at the proceedings involving international agreements for reducing the emissions of greenhouse gases.

EDITORIAL

Should have learnt

IN PRESENTING its Clean Air for Europe program in May, the Commission was taking a bold step towards the development of a single program for the improvement of air quality in the EU. It means that the CAFE program will be the first in a series of "thematic strategies" that are to be worked out under another new arrival, the Sixth Environment Action Programme.

As described by the Commission in its communication, CAFE gives indication of high intentions. Coordination with other, related Commission activities, close collaboration with researchers and those engaged in the work under the Convention on Long-Range Transboundary Air Pollution, and also stakeholder involvement, will be assured through the setting-up of a number of working groups as well as by other means.

In undertaking the CAFE program, the Commission is saddling itself with great responsibility. A good deal of experience has accumulated from the Commission's previous work on air quality, and especially from the two Auto-Oil programs, the first of which was run in common with the oil industry and the car makers. Although that did indeed lay the foundation for some important directives it was nevertheless severely criticized for having excluded environmentalists as well as member countries from the deliberations.

That was however corrected in the second Auto-Oil program, in which both environmentalists and member countries were allowed to take part alongside of industry. Due however

to various circumstances, such as the fact that the program was rendered largely out-of-date even at an early stage, and that the proceedings and methods of analysis were involved and to a considerable extent impenetrable, this program also failed to come up to expectations.

It is to be hoped that the Commission will have learnt a lesson from this and avoid previous mistakes. The way the matter of stakeholder involvement is handled will of course be of special interest to environmentalists. No outcome of CAFE will have political credibility if it should appear to have been unduly influenced by vested commercial interests – making it all the more necessary to ensure that the industrial side will be balanced by environmentalist participation. There can be no credibility or wide acceptance without transparency and all-round involvement.

One thing that is not clear from the communication is how CAFE is to be financed. The working unit within the Commission's environment directorate must have the staffing needed to do its job, and then there are all the costs for studies, analyses, meetings, travel, the spreading of information, and so forth.

It would be well if the Commission already at this stage were to give some idea of how the CAFE budget will look, and show that the resources that have been set aside will be sufficient to enable the high-flying plans outlined in the communication to be fulfilled.

CHRISTER ÅGREN

Many thanks!

We want to thank all those readers who have replied to the questionnaire accompanying the last issue for their help in giving us ideas of how to make Acid News still more useful. Be sure that all views will be carefully weighed.

Should we not yet have managed to have made the changes of address that have been requested, or a switch to elec-

tronic subscription, it may be because we have not been able to read the answers. In that case, please e-mail the necessary information to per@acidrain.org.

There is still time to reply to the questionnaire if you should not have done so. If you have mislaid the form, you can get a new one from www.acidrain.org/readerq.htm.



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as a result of its second reading this last March. By and large Parliament wants to have more strict requirements than the Council has so far been willing to accept.

NECs

Here the Parliament wants to have lower emission ceilings (i.e. stricter) for three of the four pollutants – in other words for SO₂, NO_x, and VOCs, but not for NH₃ (ammonia) – with the aim of achieving the so-called interim targets for ground-level ozone and acidification when the ceilings have become a fact, as proposed, in 2010.

While the Parliament's position is more in line with the Commission's original proposal, that of the Council would have ceilings closer to those the EU member countries had undertaken to reach by signing the Gothenburg protocol to the Convention on Long-Range Transboundary Air Pollution.

The Parliament also wants to have a binding agreement right away as to the end date at which the EU's long-term environmental goals have to be reached, proposing the year 2020. As regards air pollutants, the long-term aims are those of the EU's fifth environmental action plan, embracing health, ground-level ozone, acidification, and eutrophication.

In its common position the Council shows itself agreeable both to the interim and long-term environmen-

tal goals, as well as to the attainment of the former by 2010. But the members are not prepared to accept the ceilings for emissions which, according to the Commission, would be needed to meet the interim aims. The Council therefore recommends further analysis, which will in any case have to be undertaken by the Commission in preparation for review of the directive. Moreover both the Council and the Commission consider it too early to set an end date for attainment of the long-term aims, since no analysis has yet been made either of the necessary measures or of the costs.

Various compromise solutions are of course available. It should for instance be quite possible for the member countries to agree on stricter requirements in the form of lower ceilings. But it is evident from all that has been said so far that only a few of them are prepared even to take up the matter for discussion. It is therefore most unlikely that a sufficient number of them will be willing to go so far towards meeting the Parliament's wishes as to make a compromise possible.

A possibility that has been considered briefly both by the Council and the Parliament would be to make the ceilings proposed by the former compulsory – possibly with improvements that some of the member countries could agree to – but also to include

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Rather than investing in conventional techniques for reducing emissions of SO₂, India and China would do better to change to producing energy from renewable sources, say international experts.

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Having economies that are especially sensitive to climate change, the poorest countries will be those that suffer most. Ecosystems are also under threat – the effects seen to be already under way.

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Factsheet pp.11-14:

Air pollution and health

A digest of the chief effects, causes, and permissible limits to the concentrations of the most pervasive pollutants.

in the directive some lower ceilings which would however be no more than guiding.

Since both Council and Commission are dead against any set year for attainment of the long-term aims, it seems the matter will have to await the revision the directive that is scheduled for 2004.

The conclusion must be that a clear majority of the Council will reject the Parliament's proposals for changes in the NEC directive. It therefore seems that if there is to be any compromise, it will have to be more on the Council's terms than on the Parliament's. Since however it is a package proposal for the two directives that is now being discussed, the way should be open for greater concessions on the part of the member countries in regard to the LCP directive.

LCPs

For these the Parliament has proposed altogether eighteen changes, of which the most important would mean stricter emission standards both for old and new plants, as well as closing the present loopholes in the directive.

Parliament has gone further in its second reading than it did after the first towards meeting the Council's wish for instance to relax the emis-

sion requirements for various types of plant. The Council on the other hand has shown itself much less willing to meet the Parliament's wishes. It did however give way somewhat when taking its common position, by agreeing to the inclusion of requirements for lessening the emis-

It is mainly the UK and south European countries that are opposing stricter requirements

sions from so-called existing plants (built before 1987).

But the Parliament wanted stricter requirements than the Council has been willing to accept for SO₂ and NO_x. The Council had, too, in its common position included the possibility of freeing some of the "existing" plants from the terms of the directive if they were to be operated for no more than 20,000 hours after January 2008. Parliament was agreed to this exception, provided it ceased to be valid after 2012.

As a further concession, Parliament is also prepared to agree to the Council's proposal to allow "bubbles" for all of a country's emissions from

existing plants as an alternative to limits for each individual plant.

Parliament is however insisting on a tightening of the emission standards for new plants (in this case built after 1987, but before the new directive has come into effect, which will probably be in 2003). But no concessions have been forthcoming from the Council, despite the fact that the emission standards for NO_x in particular are modest, to put it mildly, compared with what they might be as a result of employing modern techniques for firing boilers and cleaning exhaust gases.

It is mainly the UK and south-European countries such as Spain and Greece that are opposing stricter requirements for emissions from existing as well as new plants, although some other countries, notably France, Portugal, Italy, Finland, and Ireland, are also against such proposals – at least as far as certain types of plant are concerned, or certain kinds of fuel. The Commission is in favour of tighter requirements for NO_x, but not for SO₂, as regards both new and existing plants.

Opposition to tightening the requirements for plants that will come into operation after 2003 does not seem to be general within the Council. Since the Commission has said it would in any case back it, both for NO_x and SO₂, the outlook for its ac-

The second readings in Parliament

INSTEAD OF VOTING on party lines at the second readings of the NEC and LCP directives in the European Parliament, many of the MEPs chose to follow their countries' more or less official positions. Although the tendency was quite clear, it was by no means as marked as it had been at the first readings.

In general it may be said that it was mostly British and Greek (as well as some Spanish and Finnish) MEPs in the conservative PPE party that voted against any tightening of the emission requirements – although there were also some Greek members of the social-democratic PSE group that voted on that side too. Anyone interested in seeing how his country's representatives voted can find it on the Parliament's website on the in-

ternet.¹ Also there is the record of the debate that preceded the voting.

There was some tumult when the proposals came up for debate on the evening of March 13. Although the session was scheduled to start at 21 hours – when normally only a few MEPs would still be present – hundreds of them streamed into the chamber. It immediately became apparent that a group consisting mainly of conservative British MEPs intended to try and get debate and voting on the LCP directive adjourned until the next plenary session, claiming support from "Rule 146." Since the second reading must have taken place within a certain time after the handing over of a common position to the Parliament, such a move could, if it had succeeded, at worst have

prevented a second reading.

But the plot was foiled by the session president quickly giving the word to the parliamentary rapporteur, Mrs Ria Oomen-Ruijten, thus enabling the debate to get going before any MEP had called for observance of Rule 146.

The second reading could proceed according to schedule. After a few minutes there was a return to normal routine. The chamber became almost deserted, leaving present only about twenty MEPs who were really engaged in the matter and possibly inclined to take part in the debate.

¹ Go first to www.europarl.eu.int and select language. Under "Activities" choose "Plenary sessions." Then move to "Minutes, by date" and finally March 14, 2001.

Later reading for ground-level ozone

The Parliament's consideration of the standards for ground-level ozone in the proposed directive on air quality, which were put forward at the same time as that for the NEC directive (AN 1/01), has been delayed, but will come up for a second reading in June.

Warnings from the Commission

The European Commission has decided to send so-called Reasoned Opinions (second written warnings) to Greece, Italy, and Spain for failing to adopt the national legislation required for implementing the directive on the sulphur content of liquid fuels,¹ and to inform the Commission thereof.

The directive, adopted 1999, aims to reduce the emissions of sulphur dioxide by setting maximum levels for the sulphur content of heavy fuel oil and gas oil, such as heating oil and light fuels used on ships. The deadline for adopting and communicating the texts of national legislation expired on July 1, 2000.

If a member state fails to comply with a Reasoned Opinion, the Commission may decide to bring the case before the European Court of Justice.

¹ Council Directive 1999/32/EC of 26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels and amending Directive 93/12/EEC.

First EU candidate in environment deal

In March, Slovenia became the first country to clear the environmental obstacles in negotiations for accession to the EU. By dropping a request for the temporary exemption of a local refinery from the Auto-Oil rules on fuel quality, it removed the last hindrance. Slovenia has been granted limited transition periods for three directives only: those for packaging waste, urban wastewater treatment, and integrated pollution prevention and control (IPPC). For the last it has until 2011 to comply, where the present EU member countries have until 2007. The agreement with Slovenia is regarded as confirmation that the Commission will be taking a firm line in respect of the environment in dealing with the other candidate countries.

ENDS Daily, March 22, 2001.



tually happening seems quite good.

The environmental effect of strengthened requirements for existing and new plants will not only depend on the limit values that may be set for emissions, but also on the loopholes that will be allowed to remain in the final directive. Besides the 20,000-hour allowance, loopholes have been left, in the Council's common position, for peak-load plants and plants burning indigenous solid fuels and indigenous lignite. The Parliament wants to see them abolished, or at least sharply curtailed.

As in the case of requirements for existing plants, it is mostly Spain and Greece that are against the Parlia-

ment's proposals. The UK has expressed opposition to any change as regards peak-load plants.

Thus, in contrast to the Council's almost solid opposition to the changes Parliament has proposed for the NEC directive, much fewer member countries are resisting changes of importance in that for LCPs. Moreover the Parliament is finding support on several points from the Commission.

All told, the way should thus be open for inclusion of at least a good many of the Parliament's proposals, in full or in part, in a final compromise document.

CHRISTER ÅGREN

Towards a more efficient use

Proposal aims at endowing Europe with the world's most "energy intelligent" economy



AT THE SUMMIT MEETING in Lisbon last year, the EU prime ministers agreed that Europe was to become "the most competitive and dynamic knowledge-based economy in the world." The steps that are now being taken, in the so-called Lisbon process, are mostly aimed at promoting education and creating opportunities for employment by the use of indicators.

But the environmental aspect is lacking. In a common manifesto presented on March 14, a group consisting of members of various parties in the European Parliament held that the aim should be expanded so as to include making the European economy the most "energy-intelligent" in the world – thus paving the way to sustainable development. They pro-

posed final energy intensity as a suitable indicator. The goal could be a 2.5-per-cent reduction of energy use every year.

It was noted that the more efficient use of energy does not come

*A third of the
final consumption
could be eliminated*

particularly high on the political agenda at the moment, despite the gains it would bring, such as:

❑ Reducing dependence on imported energy and vulnerability to price fluctuations.

❑ Providing a cost-effective means of attaining targets for reduction of the emissions of greenhouse gases.

❑ Reducing the effects on health from the use of fossil fuels.

❑ Favouring employment and quick economic return-rates.

❑ Bolstering industry by reducing costs and opening markets for new products. Households and business both stand to gain economically from investments in energy efficiency.

❑ Possibly benefiting the big expansive economies, say, of Asia, India, and Brazil, as a result of success in Europe.

The potential for a more efficient use of energy is, in the view of the group, very great. They calculate that about a third of the present final energy consumption in the EU could be

eliminated through more efficient use – the greatest possibilities being in the transportation sector, where use could be halved. Much could also be done in the residential and service sectors, with the possibility of a 35-per-cent cut. Opportunities are least in industry, only offering 15 per cent.

As examples of the possibilities for efficiency improvement they mention the best refrigerator-freezer units now on the market, which have an electricity consumption that is less than 36 per cent of the average comparative model in Europe, and the assertion of Volkswagen's chief executive that his company is about to turn out a car with a fuel consumption of no more than 1 litre per 100 kilometres.

A number of barriers will however have to be swept aside if there is to be any progress. Among them are lack of knowledge of the best techniques, market imperfections, and deterrent taxation. Another problem is that steps to promote energy efficiency are much less visible than, say, those to encourage the use of renewables. Somehow the former must be made more visible.

The group would like the European Commission to produce a package of energy-efficiency measures and try to get most of them adopted at a special energy council next year. Among the measures they think should be included are a directive for increasing the proportion of co-generation in power production, and another for improving energy efficiency in buildings – which now use up to 40 per cent of the energy in the EU.

They also point to the possibility of using environmental standards in public procurement as a means of stimulating technical developments and keeping down prices for improvements in such things as windows and lighting equipment, saying it is "imperative that the current revision of Community legislation for public procurement should enable environmental considerations to be fully taken into account" in that respect.

Among other items on the group's list are a ton and kilometre tax on heavy vehicles on the Swiss model (see AN 1/01), more research not only to develop better techniques but also to see what will be needed for their

application, and education in energy intelligence. Consumption standards and labelling are also mentioned.

The group also urges the institution of a European Energy Programme Agency under the Commission to coordinate and forward the

work, as well as setting aside money in the EU budget for local and regional agencies.

PER ELVINGSON

Further details in: **Call for an Energy Intelligent Europe.** Available at www.eceee.org/latest_news/2001/news20010330.lasso

Commission's plan found wanting

IN APRIL last year the EU Commission proposed an action plan to improve energy efficiency in the EU (COM(2000)247). Among its proposals was one for a reduction of energy intensity in the EU by 1 per cent a year.

But in the view of the EU Parliament, expressed in a resolution passed in March, it ought to be 2.5 per cent. The parliament took its line from a report by Anders Wijkman, a Swedish Christian Democrat member and one of those who initiated the above manifesto.

An objection that Wijkman had made to the action plan was that it lacked priorities and any clear aim – a particular weakness of the proposed plan being that it formed no

part of a coherent strategy for energy in the EU. Ideally, according to Wijkman, all relevant proposals – such as the renewables directive, the action plan for energy efficiency, and the climate change program – should be packaged together, with inter-linkages and possible synergies clearly revealed.

Among the new measures that the Parliament is proposing are a directive to ensure that 25 per cent of the EU electricity will be co-generated by 2015, and reductions made in the sales taxes on energy-efficient products.

The text of Wijkman's report can be found under the address <http://www2.europarl.eu.int/omk/OM-Europarl?PROG=REPORT&L=EN&PUBREF=-//>

Making a move for housing

THE GERMAN government claims that its law for improving the energy efficiency of housing, which was passed in March, should lead to a reduction of the energy use in that sector of 30 per cent by 2005, thereby cutting the annual carbon dioxide emissions by 10 million tons. Entering into effect later this year, this law sets standards for old as well as new housing, and supersedes existing legislation on the insulation of buildings as well as on heating systems.

A certificate will be issued for the permitted energy consumption of every new building, and there will be obligations to replace inefficient appliances and to take other measures to improve efficiency in existing housing. The government expects

two million boilers will be replaced by more efficient models, roof insulation increased, and new windows put in.

Loans for improvements will be available at low interest rates from a special fund, capitalized initially at DM10 billion. Government spokesmen maintain that the extra spending required by the law will be economically justifiable, since the investment would be amortized within the lifetime of the buildings as a result of lower outlay on energy.

There has been some controversy over the method of calculating energy use. Since it is based on primary energy use, it excludes in effect electric heating.

Source: ENDS Daily, March 7, 2001.

Attention turning to older plants

Great gains could result in Europe from eliminating a loophole in Council's proposal

ACCORDING TO A RECENT STUDY¹ by the IIASA, by 2010 the emissions of sulphur dioxide from existing² large combustion plants in the EU could be further reduced by 1.5 million tons a year merely by application of the measures proposed for these plants in the compromise solution put forward by the European Council in June last year. A further 2.1 million tons could be cut from the emissions of the ten candidate countries for admission to the EU by the same means.

The institute has based its analysis on the requirements of the Council's common position (see box) and the scenario for energy consumption expected in 2010 that the Commission used in forming its directive on national ceilings for emissions.

That scenario, which had been accepted by the member countries, envisaged an increase of 19 per cent in the use of energy in the EU between 1990 and 2010. It also included assumptions as to the large combustion plants' use of energy from different sources (coal, lignite, oil, gas, or whatever), as well as to the various sizes of plant that would be in operation in 2010.



The extension of the requirements for LCPs to plants built before 1987 that now appears imminent should have a great effect on European emissions of sulphur dioxide.

While there is a certain amount of uncertainty in all these assumptions, it is greatest in respect of the energy scenario – not least because it would show emissions of the greenhouse-gas carbon dioxide increasing by about 8 per cent, in contrast to the

EU's commitment to a reduction under the Kyoto protocol to the UN climate convention.

The outcome of IIASA's analysis appears from the table. Should no plants take advantage of the 20,000-hour rule (again see box), the emis-

The LCP directive: Proposals for amendment

A proposal for a directive to replace that of 1988 for controlling the emissions of sulphur and nitrogen oxides from large combustion plants (those with a capacity of more than 50 MW) was put forward by the EU Commission in July 1998.

It sets no requirements for plants built before 1987 (called "existing" in Commission documents). The inclusion of such plants was however urged by the European Parliament at its first reading of the proposal in the spring of 1999. The parliament also wanted the requirements of "new" plants, built after 1987 and covered by the direc-

tive of 1988 (88/609/EEC), to be tightened up, and to see those stricter requirements applied to "existing" plants as well, after a transitory period of five years. In other words, as from 2005.

After subsequent discussion, the member states' representatives on the European Council felt bound to go at least some way towards meeting the parliament's demands. The result was the common position reached in June last year.

That would have a start made in 2008 in reducing emissions from "existing" plants to the extent required in directive 88/609/EEC for "new" plants,

built after 1987. The member countries would have a choice of two ways of meeting the requirements. They could either make them apply to all pre-1987 plants, or employ a so-called emissions bubble to ensure that the combined emissions from these plants would be reduced to the same extent as they would have been if the requirements had been applied to each plant individually.

Some old plants would be exempted under the Council's compromise proposal if they were to be operated for less than 20,000 hours after January 2008.

If on the other hand it is assumed that a quarter of the plants would

*Will substantially
contribute to achievement
of emission ceilings*

Since the requirements for nitrogen oxides are, to put it mildly, mod-

The IIASA study clearly brings out the need for measures to reduce the emissions from pre-1987 LCPs. For lack of such undertakings these plants alone would, in 2010, be answering for 44 per cent of the emissions of sulphur dioxide in the EU, and 12 per cent of the nitrogen oxides. The proportions would be still greater for the candidate countries, being likely to amount there to 58 and 18 per cent respectively of these countries' emissions of sulphur dioxide and nitrogen oxides.

² "Existing plants" is EU parlance for those built before 1987.

	Current legi- slation	Council's Common Position	
		100% implementation	75% implementation
EU member states			
Austria	3	3	3
Belgium	22	6	10
Denmark	63	17	29
Finland	14	14	14
France	29	6	11
Germany	201	201	201
Greece	338	64	133
Ireland	26	3	8
Italy	278	115	155
Luxembourg	0	0	0
Netherlands	8	8	8
Portugal	79	16	32
Spain	767	111	275
Sweden	2	2	2
UK	458	147	353
SUM EU	2289	714	1236
Accession countries			
Bulgaria	617	71	207
Czech Republic	166	72	121
Estonia	88	17	34
Hungary	214	27	73
Latvia	21	5	9
Lithuania	29	9	14
Poland	936	122	325
Romania	413	57	146
Slovakia	22	9	15
Slovenia	57	6	18
SUM Acc. countries	2562	393	963

The Clean Air for Europe Programme

IT IS NOW PROPOSED to gather all the work of the EU Commission for improving air quality under one hat. In the Clean Air for Europe program¹ presented on May 7, sights have been trained especially on particles and ground-level ozone, since those are pollutants that are considered to have distinct effects on health, and much will have to be done if they are to be brought down to acceptable levels.

Several directives of importance for air quality are due for revision around 2004, and for proper results it will, in the view of the Commission, be necessary to gather them into a single program. The idea is that CAFE shall "evolve into an on-going, cyclical program," for which 2004 will only be the first milestone. It is also the first of the thematic strategies announced in the Commission's proposal for a 6th Environmental Action Programme.

The remaining problems concerning acidification, eutrophication, and damage to buildings are to be dealt with, too, under the CAFE program, and a watch is to be kept on developments in regard to pollutants that are as yet unregulated, as well as on what is happening in "hot spot" areas where air pollution is exceptionally extensive.

The outcome of the program is intended to be a thematic strategy that will be ready for adoption in 2004. This is to include an evaluation of current legislation, an analysis of the measures for the further reduction of emissions that will be needed for meeting air-quality objectives, as well as proposals concerning new or revised directives for air quality and national emission ceilings.

The Commission emphasizes its desire to facilitate the inclusion of air-pollution aspects in all activities, and encourage public participation in the work by developing indicators and improving the access to data.

¹ The Clean Air for Europe (CAFE) Programme: Towards a Thematic Strategy for Air Quality.



MOTORFUELS

Commission wants them to be sulphur free

IF THE PROPOSAL for a directive made by the Commission in May should come through, as from 2011 all petrol sold in the EU will have to be practically free of sulphur. The Commission in any case wants fuels with a sulphur content of no more than 10 ppm to be widely available in all countries by 2005. The date when sulphur-free diesel is to become mandatory is to be set during a later review.

The Commission gives two reasons for wanting to see the sulphur content of motor fuels further reduced:

- It will facilitate the introduction of new, more fuel-efficient engine types. Such engines will need advanced catalyzers if they are to meet the requirements for cleaner exhausts, and it will be necessary to have fuel with a very low sulphur content if they are to function properly.

- Vehicles will have to be made generally cleaner. Sulphur not only reduces the efficiency of the catalyzers now used on vehicles, it also contributes to the formation of particles in the exhaust gases both of petrol and diesel-driven types.

While conceding that the production of low sulphur fuel involves more processing at the refineries, with increased emissions of CO₂ in consequence, the Commission maintains that the latter will be well outweighed by the reduced emissions from petrol-driven vehicles that will result from the new engine technology.

Since the evidence is less certain as regards sulphur-free diesel fuel it is proposed to wait before setting a date for mandatory introduction. In this context "sulphur-free" is defined as that with a sulphur content of max. 10 ppm. Since last year the highest contents permitted in the EU are 150 and 350 ppm respectively for petrol and diesel fuels, and from 2005 it is to be no more than 50 ppm in both cases.

The Commission's proposals are generally regarded as a gift to the auto makers – forcing the oil companies to invest in extra refining equipment while making it easier for the auto industry to meet the coming exhaust standards and fulfill its promise to the Commission to produce cars with a lower fuel consumption.

The Commission announced however a desire, when presenting its proposal for sulphur-free fuels, to start talks with the auto makers with a view to getting their vehicles' emissions of carbon dioxide reduced still further. The aim under the present agreement is to have attained an average by 2008 of 140 g CO₂/km for new cars sold in the EU. The target set by the EU is 120 g/km by 2010. That would amount to a consumption of 5 litres of petrol or 4.5 litres diesel per 100 kilometres.

Source: Commission press release IP/01/681, May 11, 2001.



Environmental
Factsheet No. 9
June 2001

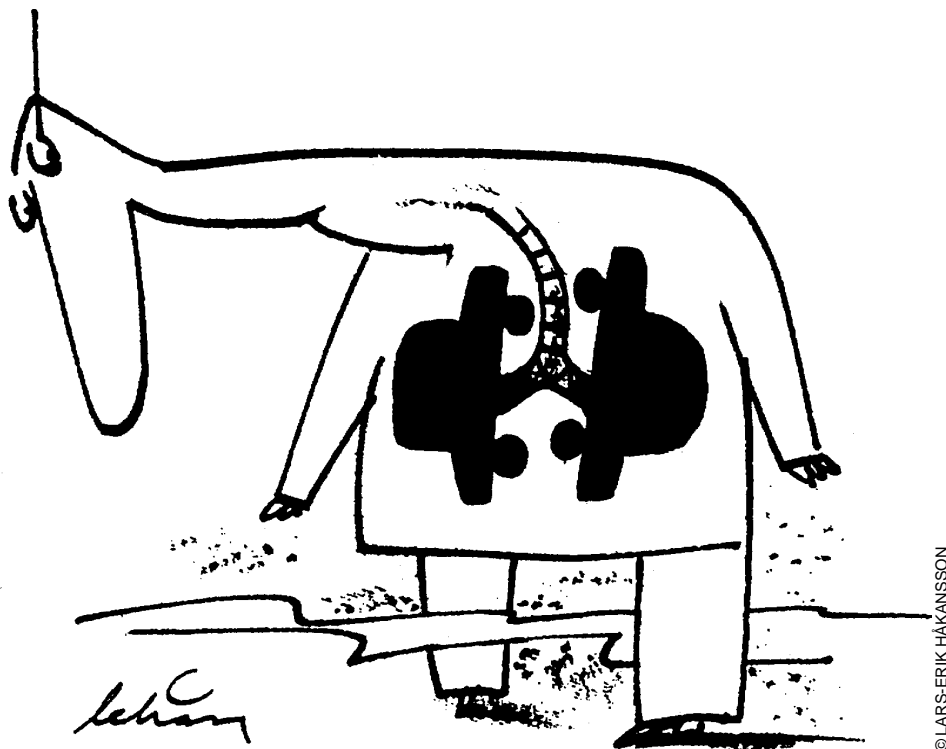
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AIR POLLUTION AND HEALTH



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Although the concentrations of air pollutants are in general on the way down in Europe, the problems remain considerable – especially as regards ground-level ozone and small particles. In some parts, too, the situation continues to become worse. In the following is a digest of the chief effects, causes, and permissible limits to the concentrations of the most pervasive pollutants.

Air pollution is not easily measured, comprising as it almost invariably does a mixture of many different substances, some of which are more toxic than others. By interacting in some cases, they become even more harmful.

The effects of breathing toxic substances may range from a slight feeling of discomfort to premature death. Those most at risk are children, the elderly, asthmatics and persons with heart and circulatory problems. Sensitivity varies very widely, however, from one individual to another.

Target values and limit values

A number of target values and limit values have been set up with the aim of confining the pollutants to permissible levels.

Target values, such as those from the World Health Organization, are only recommendations, and so not binding. These are set at levels aiming to protect human health.

Limit values on the other hand are binding, and because they are compulsory, their economic consequences have been taken into account when deciding on them.

It has not been possible to determine any minimum dose below which there will be no ill effects from carcinogenic substances. Resort has therefore been made to a **medicinal low risk level** that will keep the risk of getting cancer under a certain level, for example 1 in 100,000, for individuals who are exposed to the specified concentration throughout their lifetime.

The risk to health come mainly from the following pollutants in the outdoor air:

Nitrogen dioxide

When inhaled, nitrogen dioxide can penetrate relatively deep into the airways, where it can cause irritation and damage to tissue. It can also aggravate both asthma and allergic reactions. It impairs, too, the defence

mechanisms of the lungs against bacteria, viruses, and other air pollutants such as ozone and particulate carcinogens. Repeated exposure to nitrogen dioxide, either alone or in combination with other factors, is suspected of starting off asthma in children.

Nitrogen oxides moreover have significant indirect effects on health through their contribution to the formation of ground-level ozone and the conversion in the air to very small particles. See below.

The main contributor to the concentrations of nitrogen oxides in urban surroundings is usually road traffic, although in some cities combustion plants make a significant contribution. The target and limit values applying at present are shown in Table 1.

Sulphur dioxide

Sulphur dioxide also causes irritation of the airways. Long-term exposure in combination with airborne particles increases the likelihood of respiratory infections in children. Further effects on health can be traced to the part played by sulphur dioxide in the formation of particles in the air (see below).

Sulphur dioxide can occur in high concentrations during periods of inversion. It was probably the most harmful component of the smogs that plagued London in the early 1950s, costing thousands of lives.

In most parts of Europe the levels of sulphur dioxide have fallen considerably in recent decades. Main emission sources is the burning of coal and oil. The contribution from traffic is small. Current target and limit values are given in Table 2.

Particles

Through the use of sophisticated statistical methods and more powerful computers, researchers have been able to identify links between exposure to particles and a variety of effects on health even at levels that had previously been considered safe.

A large number of studies made both in the US and in Europe have shown that when the concentration of small particles in air rises, even from low levels, there is a rise in mortalities from respiratory, cardiac and circulatory diseases, and more people seek hospital care for bronchitis and asthma. It is not known exactly how these particles cause damage, but they are thought likely to excite and aggravate inflammations of the airways.

Even exposure to low levels for long periods is considered harmful. The long-term effects have not yet been so well researched, but living in regions where

there are high concentrations of particles is believed to reduce life expectancy.

Calculations have shown that in Austria, Switzerland, and France (Künzli et al, 2000) small particles (PM₁₀) at current levels in air give rise to 40,000 premature deaths a year in these countries, and the average life expectancy of people living in an urban environment to be reduced by 18 months. Furthermore, they start off half a million asthma attacks each year and lead to a total of 16 million lost person-days of activity.

It is the very smallest particles that are believed to be the most harmful, because

when they are inhaled they can penetrate deep into the lungs. Their shape and chemical composition as well as their size are thought to influence their harmfulness, as do the substances that adhere to their surface.

Particles are now generally measured as PM₁₀, where PM stands for particulate matter and the number 10 indicates the maximum diameter in micrometers (actually particles of such a size that 50 per cent pass through a given sampling filter). For several years an even finer fraction, PM_{2.5}, has also been measured in the US. This gives a better measure of the

Table 1. NITROGEN DIOXIDE (µg/m³)

	1-hour mean value	Annual mean value
WHO target value (WHO 2000)	200	40 (health) 30 (vegetation; NO+NO ₂)
EU limit value, applies from 2010 ^(A)	200 ^(B)	40 (health) 30 (vegetation; NO+NO ₂) ^(C)

(A) European Union 1999. (B) Must not be exceeded more than 18 times per calendar year. (C) Applies from 19 July 2001.

Table 2. SULPHUR DIOXIDE (µg/m³)

	10-min. mean value	1-hour mean value	Max. 24-h. mean value	Annual mean value
WHO target value (WHO 2000)	500	-	125 (health)	50 (health) 10-30 (ecosystem)
EU limit value, from 2005 ^(A)	-	350 ^(B)	125 ^(C)	20 ^(D)

(A) European Union 1999. (B) Must not be exceeded more than 24 times per calendar year. (C) Must not be exceeded more than 3 times per calendar year. (D) To protect ecosystem. Applies outside urban areas, with effect from 19 July 2001.

Table 3. PARTICLES (PM₁₀, µg/m³)

	Max 24-hour mean value	Annual mean value
WHO target value (WHO 2000)	dose response	dose response
EU limit value, from 2005 ^(A)	50 ^(B)	40
Prel. EU limit value 2010 ^(A)	50 ^(C)	20
Guide value proposed by IMM ^(D)	30	15
Current levels in Europe		10 (remote areas) 100 (heavily polluted areas)

(A) European Union 1999. (B) Not to be exceeded more than 35 times per year. (C) Not to be exceeded more than 7 times per year. (D) IMM = National Institute of Environmental Medicine, Sweden. See Pershagen 2000.

very smallest particles, and presumably a better indication of the effect on health. In recent years a start has been made on measuring PM_{2.5} in the EU too, although the present standards only apply to PM₁₀. A change in the EU standards will be discussed when the current directive is revised in 2003.

Particles are classed as either primary or secondary:

Primary particles are those that are formed during combustion, but may also consist of dust, small soot flakes, pollen, etc. Major sources are combustion processes (often small-scale burning) and internal combustion engines (primarily diesel engines). At present the extent of these emissions and their distribution among sources are not fully known.

Secondary particles consist mainly of sulphate and nitrate salts that are formed in the air from sulphur dioxide and nitrogen oxides. Any source that emits these substances therefore contributes to their formation.

Secondary particles are small and can remain suspended in the air for long periods. There is an extensive transboundary migration – in most places only a small proportion is traceable to local emissions, and a large percentage, particularly of the finest fractions, consists of secondarily formed particles. In urban areas in Europe 30-70 per cent of the measured levels of PM_{2.5} derives from particles brought in from afar, while the figure for rural areas is closer to 100 per cent.

The WHO guidelines do not set any target values for airborne particles, since it is considered unlikely that a level will be found that does not have harmful effects. In Sweden the National Institute of Environmental Medicine (IMM) has proposed limit values well below the levels so far considered acceptable. See Table 3.

According to calculations by the EU Commission for 1995, almost 90 per cent of Europe's urban population was living in areas where particle levels exceeded the maximum 24-hour mean and annual mean values of the forthcoming EU standard. This proportion is expected to fall to around two-thirds by 2010 as a result of decisions already taken in respect of emission controls for combustion plants and vehicles, as well as of sulphur levels in fuels (European Commission, 2000).

Volatile organic compounds

These compose a very large group of pollutants. Some are fairly harmless, while others are extremely toxic. They can occur either as gases or bound to particles, and several of the substances in this group contribute to the formation of ground-

Table 4. BENZENE (µg/m³)

	Annual mean value
EU limit value, applies from 2010 (A)	5.0
Low risk level (B)	1.3
Current levels, urban environment, Europe	1-10 (background level) 20-50 (roadside)

(A) European Union 2000. (B) Assessment by National Institute of Environmental Medicine, Sweden. Lifetime exposure to this concentration gives rise to 1 case of cancer per 100,000 inhabitants.

Table 5. OZONE (ppb; 1 ppb = 2 µg/m³)

	1-hour mean value	8-hour mean value	3-month mean value
WHO target value (WHO 2000)		60 (health)	
Current EU target values (A)	90/180 (B)	55	
Proposed EU target value (C)		60 (D)	AOT40 ^(E) = 3,000 ppb-hours ^(F)
Proposed target value (G)	40 ppb		

(A) European Community 1992. (B) 90 ppb is the level at which the public must be informed, 180 ppb that at which a warning must be issued. (C) European Commission 1999. (D) Interim target 2010: not to be exceeded more than 20 times per year. (E) AOT40 = Accumulated exposure over the threshold of 40 ppb. (F) Interim target 2010: AOT40=8.500 ppb-hours. (G) Bylin et al 1996.

level ozone – which is probably the most significant health effect of this group as a whole.

The group includes known carcinogens such as benzo(a)pyrene, ethene and benzene, as well as various aromatic hydrocarbons. Among the nitrated polyaromatic hydrocarbons (nitro-PAH) are some of the most carcinogenic substances known to man, several of which are present in diesel exhaust fumes.

Petrol-driven cars that are either without or have only ineffective catalytic converters are a main source of emissions of volatile organic compounds in urban air. Also small-scale combustion, such as the household burning of wood or coal, can make a significant contribution.

At present the limit values in the EU are only for benzene, but standards are also being worked out for polyaromatic hydrocarbons (PAH).

In most European cities the levels of benzene in the air exceed the medical low risk limits by a large margin. For current limit values and levels, see Table 4.

Ozone

Ozone is a powerful oxidant and can give rise to eye irritations and irritations of the

airways that lead to a reduction in lung capacity, even at relatively low concentrations. Because ozone is a gas with low solubility in water it can penetrate deep into the lungs. During periods of elevated levels rises occur in the number of people who are admitted to hospital emergency departments with respiratory problems. When concentrations rise, even from relatively low levels, the need for increased medication of asthmatic children and increased mortality are among the observed effects.

High levels occur primarily in spring and summer, since ozone formation is a process that is driven by sunlight. Concentrations in Europe exceed by a large margin every year the levels at which health effects begin to appear. Following so-called episodes, high levels can also occur in areas with relatively clean air. However, the amount of ozone to which an individual is exposed will depend largely on how much time he or she spends outdoors – the indoor level always being much lower.

Following national and international agreements that will result in measures to reduce the emissions of nitrogen oxides and volatile organic compounds, ozone

levels are expected to fall over the next few decades. Levels over Europe are however also affected by emissions from all over the northern hemisphere, which means that increasing emissions in Asia, for example, could counteract this trend. For target values and current levels, see Table 5.

Asthma and allergies

In many industrialized countries the incidence of asthma and allergies has risen sharply in recent decades. So far no explanation has been found. The incidence of hypersensitive reactions is thought to be due to hereditary dispositions as well as environmental factors. One as yet unexplained phenomenon is the much greater increase in western than in eastern Europe.

Researchers do not believe that air pollution is a critical factor that could account for this rise or for the differences between countries. Nevertheless air pollution does play an important role in this context. Nitrogen dioxide, sulphur dioxide, ozone, and particles have all been shown to aggravate and in some cases start off symptoms of asthma in susceptible individuals. Ozone and nitrogen dioxide have also been proved to increase sensitivity to pollen among sufferers from hay fever. This is because these pollutants damage the mucous membranes of the airways, so that allergenic substances are more likely to trigger a reaction.

Preventive measures are profitable

Numerous studies have shown it to be economically profitable to greatly reduce the emissions of air pollutants, with the greater part of the gain lying in the reduction of negative effects on people's health.

One example is the cost-benefit analyses that have been carried out to illustrate the effect of implementing the Gothenburg Protocol under the Convention on Long Range Transboundary Air Pollution (Holland 1999; Amann 1999). Whereas the annual cost of doing so is estimated to be 2.8 billion euros for 2010, the annual profit would be 12.8 billion euros, or four times greater than the cost.

If countries chose to reduce emissions even further (in line with the so-called G5/2r scenario) the cost would rise to 8.5 billion euros a year for 2010, but the profit even more, to an enormous 42.3 billion euros.

In both cases the most important item on the profit side is the reduced damage to people's health, primarily as result of lowered levels of harmful particles.

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Information on the Internet

- WHO Europe:** www.who.int/peh/air/Airqualitygd.htm
- European Commission:** www.europa.eu.int/comm/environment/air/index.htm
- European Environment Agency:** <http://eea.eu.int>
- Health Effects Institute:** www.healtheffects.org
- EMEP:** www.emep.int (data on emissions, long-range transboundary air pollution and the deposition of pollutants)
- International Institute for Applied System Analysis:** www.iiasa.ac.at/~rains (information on particles, etc.)

The EU framework directive

In September 1996 the EU Council of Ministers adopted the directive on ambient air quality assessment and management (96/62/EC). This is a framework directive which, among other things, lays down how monitoring systems should be set up so as to make information on measurements readily accessible to the public.

So far it has been supplemented by two daughter directives. The first was adopted in 1999 and covers sulphur dioxide, nitrogen dioxide, particles (PM₁₀) and lead (1999/30/EC). The second, covering benzene and carbon monoxide, was adopted in 2000 (2000/69/EC). A proposal for target values

for ozone was presented by the Commission in 1999 (European Commission 1999) and a decision is expected in 2001. Work is in progress on proposals for polycyclic aromatic hydrocarbons (PAH) and a number of heavy metals.

The framework directive says nothing about how the limit values should be achieved; that is up to each member country to decide. It does however require that corrective measures should be taken if the standards are not being met. The specified limit values are minimum standards, which means that member countries can introduce stricter standards if they wish.

Sources are often far from local

Emissions of sulphur and nitrogen oxides largely responsible for high concentrations

THE SMALLEST PARTICLES – those that would seem to be the most dangerous to health – can be transported over long distances in the air.

These particles may be either primary or secondary. Although the primary sort come mainly from the emissions from combustion, they can also consist of stirred-up dust, pollen, etc. The emissions from such sources as diesel-engined vehicles and small-scale firing are quite a large cause of the frequently high concentrations of small particles in urban air.

The secondary type is a result of chemical processes in the air. They consist of sulphates and nitrates formed from oxides of sulphur and nitrogen – the very substances that cause acidification. Their ultimate sources are mainly large combustion plants, ships (emitting both sulphur and nitrogen oxides), road vehicles, and mobile machinery (chiefly NOx).

Although the two types can occur

in varying proportions, the secondary ones are – except in places where the direct emissions are very large – the most important. Calculations appear to show that 30-70 per cent

*Consist mainly of
particles borne in
from elsewhere*

of the smallest particles (PM_{2.5}) in European cities have come in from afar and are for the most part of the secondary type.

It turned out from a recent study of the situation in Sweden that the concentrations of PM_{2.5} were just about the same at all the measuring stations, no matter whether those were out in the open country or in congested city streets. The conclusion was that even in the cities the

concentrations consist mainly of particles borne in from elsewhere. In the case of the slightly larger particles, those between 2.5 and 10 micrometres in diameter (PM_{2.5}-PM₁₀) the concentrations proved higher in city streets, but mainly because of the large amounts of stirred-up dust.

The situation will also be affected by meteorological factors. When winds are blowing in from the north or west, where there is relatively little pollution, the concentrations of PM₁₀ in the Swedish countryside show an average 24-hour value of less than 10 µg/m³. But the arrival of a lot of polluted air from central Europe will cause concentrations to rise markedly all over the country, even in cities. The background concentrations can in fact become double or more than the average.

It also emerged from this study that the combination of incoming transports and local emissions will make it difficult to meet the limit for concentrations set by the EU for 2005 in Sweden's two largest cities.

"Incoming transports will seldom be the cause of concentrations exceeding that limit. But they raise the starting line – which is why international agreement will be necessary," notes Tula Ekengren of the Swedish Environment Protection Agency.

PER ELVINGSON

Just as bad as smoking

IF THE CONCENTRATIONS of fine particles in the air were to be cut by 5 per cent – or 1 microgram per cubic metre – the average lifespan of the population in England and Wales would increase by altogether 0.2-0.5 million years, or 1.5-3.5 days per individual. In other words, exposure to particles may have about the same effect on health as passive smoking.

The Committee on the Medical Effects of Air Pollutants which reports this has based its calculations on the connection between long-term exposure to fine particles (PM_{2.5}) and the effects on health noted in American studies. Although there is some uncertainty as to that connection, as well as to the possibility of transferring the results to conditions in the

UK, the committee nevertheless considers it important to try and determine the probable effects of exposure.

The key uncertainties it mentions are whether the results can be explained by undetected confounding, whether high exposures in the past lead to an overestimation of the effect, and what lagtimes and durations of exposure are required to produce an effect, besides the lack of understanding of the underlying mechanism.

Note. The COMEAP is an advisory committee of independent experts that provides advice to British government departments and agencies on "all matters concerning the potential toxicity and effects upon health of air pollutants." Its report is available on the web at www.doh.gov.uk/comeap.

Further information on particles can be found in the factsheet forming the centre pages of this issue. The text of the above-mentioned study is available on internet: www.envron.se/dokument/press/2001/mars/p010307.htm, although only in Swedish.

Latest news

A seminar on fine particles and health, arranged by the European Commission and the Health Effects Institute, was held in Brussels on March 6-7. The presentations made during the meeting, together with the summarizing comments, are available on the HEI website: www.healtheffects.org/Brussels2001/brussels-agenda.htm.

It won't only cost

There is much talk about the costs of joining the EU. But there are also large benefits, which tend to be forgotten. According to the environmental consultants Ecotec, full compliance with EU air-quality laws on the part of the thirteen countries seeking accession would result in 15,000-34,000 fewer premature deaths from exposure to particles and 43,000-180,000 fewer cases of chronic bronchitis, the latter now being caused mainly by the burning of lignite.

ENDS Daily, May 2, 2001.

Surprisingly little

It need cost relatively little for the EU to reduce its emissions of greenhouse gases as required under the Kyoto protocol: no more than 0.6 per cent of the countries total GDP or 3.7 billion euros a year. Nearly two-thirds of the reductions could be made either at no cost or at a profit.

These are the calculations made by two consultant firms, Ecofys and AEA Technology, and the national technical university of Athens, Greece, for the EU Commission. They assume that the reductions will be made where they are cheapest. If all countries had to reduce to a like extent, the cost would double.

Another aim of the study from which these findings come was to try and determine the sectors where it should be cheapest to reduce emissions. It turned out that there was most to be gained from reductions during the extraction of fossil fuels, and least from transportation. No consideration was taken of the effects of non-technical measures for abatement, such as increased taxes on energy.

Source: **ENDS Daily**, May 9, 2001. The study can be read on http://europa.eu.int/comm/environment/enveco/climate_change/sectoral_objectives.htm.

No doubt there

Cost-effective techniques to reduce industrial emissions of nitrogen oxides are available and can in some cases deliver reductions that will be far greater than required under the EU's directive for integrated pollution prevention and control (IPPC). This conclusion was almost unanimously accepted at a conference in Paris, NoxConf 2001, organized by ADEME, France and InfoMil, The Netherlands.

Industry and power plants are together responsible for one-third of the emissions of NOx in the EU.

ENDS Daily, March 26, 2001.



ASIA

Gains from switching to use of renewables

It would cost China and India less than investing in cleaning techniques for reduction of their emissions of sulphur dioxide.

THE POSSIBILITIES of using energy from renewable sources in China and India, and also of investing in renewable energy as an alternative to conventional cleaning techniques for reducing emissions of sulphur dioxide, have been examined on large scale in a three-year cooperative research project¹ financed by the European Union.

The research team set up a data base that included the current use of electricity together with prognostications for it in forty-seven regions of the area up to the year 2020.

What is likely to happen if present trends continue is set forth in a business-as-usual scenario, indicating increases of 45 and 9 per cent respectively in the use of renewable energy in China and India between 1990 and 2020. With account taken of current control policies, the emissions of sulphur dioxide are estimated to increase by 23 per cent in China and 145 per cent in India (but here from 1995). The emissions of carbon dioxide are considered likely to have doubled in China during that period, and quadrupled in India.

The potential for renewable energy is dealt with in a policy scenario, which only takes into account the limitations of supply and technology, leaving aside institutional barriers and the costs. Under a policy carried out according to this scenario, the use of renewable energy would increase between 1990 and 2020 by 85 per cent in China and 57 per cent in India.

Sulphur dioxide emissions would noticeably increase under this scenario too, although not as much as under business-as-usual. They would in fact be 5 and 20 per cent less for China and India than they would be under the latter.

The results of the two scenarios were then inserted into the RAINS ASIA integrated computer model for assessment of air pollution in Asia,² which makes it possible to study the costs of going over to the use of renewable energy as an alternative to cleaning technology for controlling the emissions of sulphur dioxide from fossil-fuel generation. This can be done because the data base that has been set up to calculate the potential

for renewable energy also contains data of the costs of investment in various energy sources in relation to their ability to reduce emissions of sulphur dioxide.

The model shows that the cost of attaining a given environmental target drops markedly if an increased use of renewables is included among the possible measures – in the case of China by 17 to 35 per cent, and by a least two-thirds in India.

It has also been possible to identify a relatively large potential for renewable energy that was not taken into account in the business-as-usual scenario but would nevertheless be worth considering even if its effect on the emissions of air pollutants were ignored. In India it would be a matter of investment in windpower, and in China in hydroelectric, solar thermal and geothermal energy.

Some other renewables are also of economic interest – not on their own merits but as alternatives to investment in cleaning techniques to restrain the emissions of sulphur. They all have the advantage of cutting back on the use of coal, thus reducing the emissions of carbon dioxide as well as other pollutants besides sulphur.

That more advantage is not being taken of the profitability of going over to the use of renewable energy suggests that there are barriers in the way, and in its final report the project group points to a number of possibilities for policy interaction to overcome them.

Among them would be support for the development of the necessary technology, measures to increase awareness among the public, and incentive mechanisms to foster the use of renewable energy. Not least should existing distortions in the pricing of conventional energy be removed, and users enabled to see the real cost of various forms of energy – in other words, that their external costs be internalized.

PER ELVINGSON

¹ **Potential for use of renewable sources of energy in Asia and their cost effectiveness in air pollution abatement.** Four institutes participated in the project: Wageningen University (coordinator), the Energy Research Institute (Beijing, China), the Tata Energy Research Institute TERI (New Delhi, India) and the International Institute for Applied Systems Analysis IIASA (Laxenburg, Austria). Their final report, as well as the data on which it was based, can be downloaded in pdf format from www.dow.wau.nl/msa/renewables.

² RAINS (Regional Air Pollution INformation and Simulation) is a computer model developed by the International Institute for Applied Systems Analysis, IIASA, in Austria. It makes it possible to analyze strategies for the reduction of emissions on a continental scale. It comprises modules for emission generation, options and costs for emission control, for the dispersion of pollutants in the atmosphere, and environmental sensitivities. It has been of great importance for the development of clean-air agreements in Europe. In its adaptation to Asia it considers SO₂ as a major pollutant contributing to the acidification of natural ecosystems. The model is available on internet: www.iiasa.ac.at/~rains/asia2/asia2-home.html.

Less of one, more of the other

The auto makers regard direct-injection petrol engines as an important means of meeting their undertaking to the EU Commission to reduce the emissions of carbon dioxide from new cars – such engines being more energy-efficient than the ordinary type.

The trouble is they let out more by way of the small particles that can seriously affect health. Diesels are admittedly worst in this respect, according to tests carried out by Rototest, a Swedish laboratory dealing with exhausts, but direct-injection petrol engines are hardly far

behind – their particle emissions being several times greater than those from conventional petrol engines.

Because it was thought there were only small emissions of particles from petrol-engined cars, no account has been taken of them in EU legislation.

Source: Emissions of Ultrafine Particles from Different Types of Light Duty Vehicles. By P. Kågeson, C. Holman and J. Färnlund. Publication 2001:10. Published by the Swedish National Road Administration.

EU NEWS IN BRIEF

New standards for motorcycles

In March the EU ministers of environment agreed in the main to support the Commission's proposal for new emission standards for motorcycles, which are intended to become effective by 2003-04 (AN 1/01, p.11). The ministers wanted somewhat harder requirements for the emissions of hydrocarbons for machines with a cylinder volume of more than 150 cc (to 1.0 instead of 1.2 g/km). But they disregarded the Parliament's desire, expressed at the first reading of the directive in February, for stricter albeit only voluntary requirements in 2006.

Germany is said to have been disappointed at the ministers' decision, since it would have preferred a stricter approach. For one thing it would have liked to see standards for particles included in the directive. A second reading in the Parliament is due shortly.



Once again a car-free day

This year Saturday September 22 will be the all-Europe day for car-free cities, organized by the European Commission under the slogan "In town, without my car." Last year it was respected by some 760 cities all over Europe.

Further information: www.22september.org

Common tax on energy

After some time in the doldrums, the idea of all-European energy taxes has emerged under the Swedish EU presidency. It is said to have received a favourable reception at an informal meeting of the Union ministers of finance in March. The Swedish negotiators hope it will be possible to have arrived at an outline agreement by the end of June. The more difficult process of deciding on the actual rates will have to be passed on to Belgium when its turn comes to take over the presidency.

The common taxation on energy is generally regarded as a key element of policy for combating global warming.

ENDS Daily. April 23, 2001.

It will be worst for the poor

Having economies that are sensitive to change, the poorest countries will suffer most

FAR MORE PEOPLE will be hurt than are likely to be favoured even by a slight increase in average global temperature. And the higher the rise, the more serious will be the effects, both for humans and nature. So says the report put out in February by IPCC, the Intergovernmental Panel on Climate Change, a UN organ.

Just previously the IPCC scientists had said that the average global temperature could be expected to rise by 1.4 to 5.8 degrees C between 1990 and 2100 (see AN 1/01).

It emerges clearly from the later report that the poorest countries will be the most hard hit when the temperature rises. This is partly because their economies are largely dependent on activities, such as agriculture, that are sensitive to climate change. Moreover they have only small means of adapting themselves to changes such as rising sea levels or missing rainfall. They are also lacking in resources for the kind of preventive health care that might reduce the risk of outbreaks of climate-related diseases such as malaria.

The report includes a whole catalogue of possible threats to humans and ecosystems in various parts of the world, as well as making an attempt at determining the probability that any specific degree of global warming will cause certain effects. The scientists warn however that most of their work has been concentrated on the changes that are likely to take place at the lower end of the expected increase in temperature.

ECOSYSTEMS. Even the warming that is judged to have taken place during the last century (+0,6°C) constitutes a threat to the most sensitive systems. These include coral reefs, atolls, mangrove swamps, boreal and tropical forests, polar and alpine ecosystems, prairie wetlands, and remnant native grasslands. The greater any coming temperature rise will be, the more ecosystems and species will be at risk.

EXTREME WEATHER EVENTS. Here too the temperature rise already re-



Nature will also suffer. Along with mangrove swamps, coral reefs, boreal and tropical forests, alpine ecosystems are among the most sensitive to climate change.

corded is deemed responsible for an increase in the frequency of heat waves, droughts, floodings, etc. Hundreds of millions of people can be affected by floodings a result of a combination of rising sea level with more violent storms. And the more the temperature rises, the greater will be the effect in these respects too.

THE SPREAD OF EFFECTS. Whereas a marked warming up is likely to have an adverse effect in most parts of the world, a small increase will be bad for some parts but will actually favour others. Generally speaking, however, more people will be harmed than benefited, even by a small increase in temperature.

Effects expected in Europe

The capacity to adapt is generally high as regards human systems in Europe. They are however more vulnerable in the southern and arctic regions.

In summer the water supply and soil humidity are likely to be affected in those parts of Europe that are already subject to recurrent drought. An increase in the precipitation is however expected both in the north and the south in winter.

Half of the alpine glaciers as well as great expanses of permafrost may vanish in the course of the present century.

There will be a great increase in flooding, both from rivers and the sea, over

large parts of Europe. Problems with erosion and loss of wetlands along the seashore will increase as a consequence of the predicted rise in sea level.

Agriculture will benefit in northern Europe but suffer in the south. Biotic zones will move to higher ground as well as northwards. Some species will be threatened by loss of habitat.

High temperatures and heatwaves may affect traditional summer tourist destinations, and less reliable snow conditions may spoil winter tourism.

Source: *Climate Change 2001: Impacts, Adaptation and Vulnerability*. IPCC Working Group II.

LARGE-SCALE CHANGES IN THE CLIMATE SYSTEM. The risk of large-scale and possibly irreversible changes – say, in the transport of warmth northwards by the Gulf Stream – is judged to be “very low” if there is little warming up. It will however increase in step with any rise in temperature.

KYOTO PROTOCOL

EU must do still more

ACCORDING TO the European Environment Agency's latest inventory, from 1990 to 1999 the emissions of greenhouse gases in the fifteen EU countries had dropped by 4 per cent.

The inventory takes account of the six gases included in the climate convention's Kyoto protocol. It shows the EU to be halfway towards realizing its Kyoto target – namely to have reduced the overall emissions of these gases to 8 per cent under their 1990 level as an average for the five years between 2008 and 2012.

The reduction already achieved in the EU is in striking contrast to the 11-per-cent increase in the US during the same period – the country which is answerable for 40 per cent of the emissions of these gases in the industrialized parts of the world. The corresponding figure for the EU is 24 per cent.

From 1998 to 1999 the EU's emissions fell by 2 per cent, despite a simultaneous increase in overall GDP of 2.5 per cent. This was primarily due to the introduction of technical measures to reduce the industrial emissions of nitrous oxide and hydrofluorocarbons in the UK and France, as well as the shift from coal to gas that had continued to take place particularly in Germany and the UK during the nineties, and a relatively mild winter which lessened the need for energy for indoor heating.

Nevertheless the EEA sees no room for complacency – warning that great further efforts will be needed if the Kyoto target is to be met. As indicated, the favourable results to date have been largely due to the considerable fall in the British and German emissions of greenhouse gases. These countries are the biggest emitters in the EU, together emitting about 40 per cent of the EU total. But their emissions now seem to be on

But no threshold can yet be determined above which transport would cease completely.

PER ELVINGSON

¹ **Climate Change 2001: Impacts, Adaptation and Vulnerability.** IPCC Working Group II. A Summary for Policymakers can be downloaded free of charge from www.ipcc.ch.

the rise. According to preliminary estimates, the UK's total emissions of CO₂ had increased by 2 per cent in the course of 2000, and Germany's energy-related ones by 0.2 per cent.

Moreover, if present trends continue, more than half of the EU countries will be on their way to substantially exceeding their share of the emissions total allowed the EU under the Kyoto protocol (see table). This applies to Austria, Belgium, Denmark, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain.

Source: European Environment Agency. News release April 20, 2001. Available at <http://eea.eu.int>. The inventory, **Annual European Community Greenhouse Gas Inventory 1990-1999** (EEA Technical Report No 60) can also be found on the website. A more thorough analysis of the EU emission trends will be forthcoming from the EEA in July.

Change in the emissions of greenhouse gases in the EU countries between 1990 and 1999 and targets for 2008-12 under the Kyoto protocol and the EU burden sharing agreement. Figures in per cent.

	Change 1990-1999	Target 1990- 2008/12
Austria	+2.6	-13
Belgium	+2.8	-7.5
Denmark	+4.0	-21
Finland	-1.1	0
France	-0.2	0
Germany	-18.7	-21
Greece	+16.9	+25
Ireland	+22.1	+13
Italy	+4.4	-6.5
Luxembourg	-43.3	-28
Netherlands	+6.1	-6
Portugal	+22.4	+27
Spain	+23.2	+15
Sweden	+1.5	+4
UK	-14.0	-12.5
EU total	-4.0	-8

NEWS IN BRIEF

Campaign against oil companies

Greenpeace has announced it will “seek to hurt” the export markets of five large American oil firms by mobilizing “ever-growing disenchantment” with US president George Bush's decision to turn his back on the Kyoto climate protocol. The group has stopped short of explicitly calling for a boycott of the companies' products. The firms targeted are Exxon-Mobil, Chevron, Texaco, Conoco and Phillips.

ENDS Daily, April 27, 2001

Climate change can be slowed

Ways of curbing the increase of the greenhouse effect have been dealt with by IPCC in their third assessment report presented earlier this year. It will be fully possible, in the view of the scientists involved in the project, to bring down the emissions of greenhouse gases to levels below the present ones, and at no great cost. In fact half of the measures would be profitable, but are being stopped by all kinds of hindrances, ranging from consumers' lack of interest to distorting subsidies and taxation.

More to be had from: **Climate Change 2001: Mitigation.** IPCC Working Group III. It is summarized on www.ipcc.ch.

To help clean-up on Kola peninsula

More than ten years ago the Norwegian government started to set aside funds for environmental improvement on the Kola peninsula. The money was earmarked for work on a complex of mines and smelters at Nikel, which are said to be contaminating neighbouring territories of Finland and Norway with heavy metals, as well as emitting huge quantities of sulphur dioxide.

Payments were however withheld until it could be seen that planning on the Russian side was taking firmer shape – as it now appears to have done. Before the end of this year a first payout of NOK 44 million (5.5m euros) is to be made, out of the total of NOK 270 million that the Norwegians have set aside. Among others investing in the project are Sweden (3.3m euros) and the Nordic Investment Bank, the latter being expected to match Norway's contribution.

ENDS Daily, May 14, 2001

Determined attack on ammonia

Dutch are out to tighten still further their strict rules for controlling emissions

THERE IS ONE PIG to almost every human in the Netherlands (pigs number 14 and humans 15 million). With a further 108 million poultry, 4.2 million head of cattle, and 1.4 million sheep, this small country has the highest livestock density in Europe.

The vast amounts of manure that these animals produce far exceeds in nutrient content all that is needed for the country's crops. The consequent overfertilization leads to an extensive leakage of nitrogen and phosphorus to air and water, and so to a variety of environmental problems.

The Dutch authorities have been trying ever since the 1980s to improve the situation, but with limited success. Efforts are now being intensified, however, with the aim of attaining a balance between supply and demand in respect of nitrogen and phosphorus, and markedly reducing the release of ammonia to the atmosphere. It is hoped in this way not only to fulfill the country's own aims as regards environmental quality, but also to meet the requirements of the EU nitrate directive and the commitment under the Gothenburg protocol to reduce emissions of ammonia.

The means that will mainly be used for counteracting the excess of manure is the so-called mineral accounting system (MINAS). Every farmer will be required to produce a balance sheet each year, showing the inputs and outputs of nutrients on his property. A certain over-run will be allowable, but for anything beyond that there will be a heavy fine – a strong incitement to farmers to cut down leakage.

As from the year 2002 all livestock farmers must have contracts for the disposal of manure. Those with a surplus must have contracts to get it taken away, either by other farmers who need extra manure, or by manure processors. The only alternative for those who fail to make such arrangements will be to produce less



manure – in other words, cut down on livestock. The Dutch authorities are also taking special steps to reduce the numbers of farm animals, mainly by buying back production permits for pigs and manure.

The Dutch probably have the world's strictest rules for control of ammonia, which evaporates from manure both in the animal housings as well as while it is in storage or being spread over the fields. Ways of

handling in order to minimize emissions are set forth in a decree on the use of animal manure. Whereas in grassland it must be injected into the ground, on arable land it may be spread on the surface, provided it is immediately ploughed under. Spreading may in any case only take place during a relatively short period in spring or early summer. During the rest of the year it has to be stored, and if that is done in the open it has to be covered over.

A "green label" scheme for animal housing, with tax incentives and subsidies to encourage the development of low-emission buildings, has been in existence for some time in the Netherlands. As from this year there will however be stricter limits on the amounts of ammonia that may be emitted per animal, and from 2008 low-emission housing will be compulsory for all pig and poultry holdings. This latter measure is considered likely to be the most effective in the efforts to further reduce emissions of ammonia.

Between 1980 and 1998 the Dutch emissions of ammonia had declined by 25 per cent, from 204,000 to 154,000 tons a year. The ceiling to which the Netherlands has committed itself under the Gothenburg protocol is 128,000 tons per year by 2010, but according to the EU Commission in its proposal for a directive on emission ceilings, it ought to be still lower, 104,000 tons by 2010.

The Dutch authorities think the latest tightening of the country's mineral policy, requiring extensive investment in farming, may well force several thousand farmers to give up.

PER ELVINGSON

Manure and the environment

Manure contains several kinds of nutrient, the two most important in the present context being phosphorus and nitrogen – the latter appearing as nitrate as well as ammonia.

☐ Phosphorus leaches mostly into rivers and lakes, where it causes eutrophication.

☐ Nitrate runs out into the groundwater, possibly making it undrinkable. This is especially a problem in large-grained, porous soils.

☐ Ammonia evaporates into the air, causing eutrophication as well as acidification of soil and water when deposited.

☐ Some of the nitrogen also leaves the soil in the form of nitrous oxide, a potent greenhouse gas.

Source: **Manure and the environment. The Dutch approach to reduce the mineral surplus and ammonia volatilisation.** Available in English, Dutch, French, German, and Spanish. Can be ordered free of charge from Ministry of Agriculture, Nature Management and Fisheries, Infotiek, P.O. Box 20401, 2500 EK The Hague, Netherlands. E-mail: infotiek@dv.agro.nl.

On the march in many places

Marked increase in capacity forecast for this year, steady advance in the following



PHOTO: BWEA

Offshore windpower is expected to expand considerably in the UK during the next few years. The turbines here are those in a pilot project started last year off England's northeast coast.

WORLD WINDPOWER capacity, having increased by 15 per cent in 2000, is forecast by the Danish consultants BTM Consult to grow this year by as much as 39 per cent.

A capacity increase of 1440 MW is now expected in the US, as compared with a mere 180 MW last year. The total addition for the world in 2000 was 4500 MW, led by Germany (1665 MW) and Spain (1024 MW). BTM Consult predicts an annual average increase of 17.6 per cent in installed capacity between 2001 and 2005.

But that would assume only a mod-

erate increase in Europe "until offshore really takes off."

One country with advanced plans for offshore windpower is the UK, where the potential is considered very great. According to the British Wind Energy Association it could meet the country's needs for electricity about three times over.

Early in April it was settled that the Crown Estate, manager of the Queen's lands and territorial waters, would issue seabed leases to eighteen companies to install more than 500 turbines with a combined capacity

of 1000-1500 MW in thirteen locations.

Provided all goes well with the planning permissions, the mills are expected to be in place at the latest by 2004 and then supply 1 per cent of the country's electricity.

Several of the big oil and power companies are taking part in this project – among them being the giant nuclear energy generator British Energy, which is thus taking its first step into renewables.

Apart from a contribution of £49 million from government funds for offshore wind energy, the operation will be largely market financed (although it is already aided through the Renewables Obligation and Climate Change Levy).

At 1.9 to 3.0 pence per kWh, as against 1.8-2.2 pence for gas, onshore windpower is already competitive, according to the BWEA. Electricity from the first offshore windfarms is estimated to cost 5-6 pence per kWh.

One-tenth of the government's plan to have 10 per cent of the country's electricity generated from renewables by 2010 will be achieved by the above projects. The effort has been cheered by Greenpeace and Friends of the Earth, who would however like to see more of it.

PER ELVINGSON

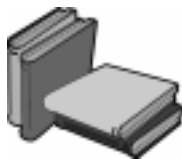
Sources: Reuters, April 3 and 9, 2001, and www.offshorewindfarms.co.uk.

Offshore windfarms in Europe

Location	Online	MW
Vindeby, Denmark	1991	5
Lely, IJsselmeer, NL	1994	2
Tunø Knob, Denmark	1995	5
Dronten, IJsselmeer, NL	1996	11
Bockstigen, Sweden	1997	3
Blyth Offshore, UK	2000	4
Middelgrunden, Denmark	2001	40
Utgrunden, Sweden	2001	10
Totals		80

Source: British Wind Energy Association

Recent publications



A guide to EU environmental policy (2001)

Edited by Andrew Jordan. Presents the actors, institutions, and processes involved in environmental policy within the EU as well as analyzing the interplay between environmental and other policy.

350 pp. £18.95 (paperback). Published by Earthscan Publications Ltd, 120 Pentonville Road, London N1 9JN, England. E-mail: earthinfo@earthscan.co.uk. Internet: www.earthscan.co.uk.

World Directory of Environmental Organizations (2001)

Sixth edition, edited by Ted Trzyna and Julie Didion. A comprehensive guide to organizations in all parts of the world concerned with the environment and natural resources.

272 pp. £50.00. Published by Earthscan, address as above.

Flexibility in Climate Policy (2001)

A run-through of the so-called flexible mechanisms in the Kyoto protocol – such as joint implementation, the clean development mechanism, and emissions trading – and the way they may be used.

240 pp. £17.95 (paperback). Published by Earthscan, address as above.

Managing the Planet (2000)

By Norman Moss. A report on the development of environmental policy at a global level, and its likely effect on national policies as well as our daily lives.

240 pp. £16.99. Published by Earthscan, address as above.

Reforming the Transport Pricing in the European Union (2001)

Edited by B. De Borger and S. Proost. Describes and analyzes the current pricing of passenger and freight carrying in Europe while proposing possible changes, such as a combination of higher fuel excise, alternative parking policies, electronic road pricing, and emissions regulation.

256 pp. £55.00. Published by Edward Elgar Publishing. Can be ordered from Marston Book Services Ltd, P.O. Box 269, Abingdon, OXON, OX14 4YN, UK. Internet: www.marston.co.uk.



The Econen is a small computer that is used, in teaching EcoDriving, to register driving time and distance, speed at any time and average driving speed, total and average fuel consumption.

ECODRIVING

Change-over will pay in many ways

By learning to drive economically the average motorist cannot only bring down his or her fuel consumption but also make less noise, cause fewer accidents, and save wear on the car as well.

Unless something is done about it, the emissions of carbon dioxide from road traffic in the EU are likely to have increased by 30 per cent between 1990 and 2010. A lot of changes will be needed in the way of taxation and spatial planning if the trend is to be reversed. But people's driving behaviour will also be important. By changing it the average car driver can cut fuel consumption by 10-15 per cent – as well as reducing noise, accidents, and wear on the car.

Lessons in economical driving can be had in several countries. A course that has been available for some time in Finland and Sweden is called EcoDriving. There it has been shown that ordinary motorists can learn to drive so as to bring down fuel consumption by 10-15 per cent, and drivers of heavy vehicles to make similar improvements.

How long that improvement will

last has so far not been looked into. It will doubtless largely depend on how interested the drivers are in keeping it up – which may in turn depend on whether there is any sort of arrangement making it evident that he will continue to gain by driving economically. The savings in truckers' fuel costs may for instance be passed on as a bonus to drivers.

Whereas in Finland the courses are organized by Motiva, the section for energy efficiency at the Department of Industry, in Sweden the scheme is in the hands of the driving schools' association, with financial support both from the National Road Administration and the National Energy Administration. A number of private companies, local authorities, etc. have already had employees who must do a lot of driving go through courses in ecodriving, and some driving schools have even

made it a regular part of their curriculum.

Thus far only a few private persons have taken courses. Whether it pays to do so will depend on how far one drives every year, and how much fuel one can save by taking a course. The road administration has calculated that an average car owner, who drives 15,000 km a year and has managed as a result to cut fuel consumption by 10 per cent, will have got back the cost of the course in something between one and two years. For professional drivers it would take much less time. It has been estimated that sending a bus driver in Stockholm on a course would pay for itself in less than half a year.

The advantage of ecodriving is not confined to the saving of fuel. An

important part of the method is learning to drive with greater alertness to traffic conditions. This both saves wear on the vehicle and helps to avert accidents. It will also mean lower emissions of hydrocarbons, small particles and nitrogen oxides, since these are greatest at moments of acceleration and deceleration, which will be less frequent with ecodriving.

It may well be asked if it has any disadvantages. The answer is, hardly. In fact there are gains all around – not only for the driving schools and those taking the courses, but also for the economy as a whole and the environment. The only likely losers will be the oil companies.

PER ELVINGSON

How it is taught

Persons taking lessons in ecodriving are first made to drive around a test circuit in their usual manner, with an instructor at their side. The amount of fuel consumed is registered by a computer. Then follows a lesson in the theory of ecodriving, with a glance at the results of the test drive. The course ends with another drive around the test circuit, and a fresh check on fuel consumption.

The learner is taught:

Always to look well ahead, keeping a watch for crossings and traffic lights as well as the movements of other vehicles. Slow down when approaching a red traffic light either by declutching and letting the car glide forward (if it has a carburettor engine) or braking with the engine if it is of the injection type, so as to give the light time to change, and avoid stopping.

Change up early. Accelerate relatively quickly, with the pedal about half down, and change gear before the engine has come up to about 3000 revs per minute. If the car has no revolution metre, do this: Drive only for a length or two of the car in bottom gear, then after changing to second gear accelerate to 40 kph, to 60 on third, and faster on 4 or 5.

Drive on as high a gear as possible. On a level road most cars can be driven at an even 50 kph on top gear.

Keep a steady foot on the accelerator. By gassing evenly you save fuel – best done by staying at a good distance from the car in front. Learn to keep the engine at a steady revolution (2000 rpm is suitable), and use the top gears as much as possible.

Stick to speed limits. Fuel consumption rises by 20 per cent when you increase speed from 90 to 110 kph. Tires get worn more at higher speeds, the noise becomes more disturbing, and the risk of accidents mounts.

Plan your trips, so as to avoid getting stuck in traffic at rush hours. And choose a parking place so you can do a lot of business without having to move the car.

Reduce resistance. Remove roof racks and boxes when they are not needed. Check tires, too: the car runs more easily if they are kept at the right pressure.

Shut off air conditioning when it is not needed. Otherwise the compressor will go on working, possibly increasing fuel consumption by as much as 1 litre per 100 km.

Further publications

Environmental taxes: recent developments in tools for integration (2000)

92 pp. Environmental Issues series No 18. Published by European Environment Agency and the Office for Official Publications of the European Communities. ISBN 92-9167-261-0.

Good Practice Greenhouse Abatement Policies: Transport Sector (2000)

A joint OECD and IEA publication, prepared for the Annex I Expert Group under the Climate Convention, examining issues affecting policies for abating climate change concerning the transportation sector.

Available from OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France. The report, as well as some background material, can be found at www.oecd.org/env/cc/domestic_transport.htm.

Towards More Sustainable Freight Transport (2001)

Conference report from European Federation for Transport and Environment. Report 00/7. Can be ordered from T&E, Boulevard de Waterloo 34, 1000 Brussels, Belgium. Available in pdf format at www.t-e.nu.



Useful websites

EEB, the European Environmental Bureau, has re-worked its website so as to give better information on air pollution.

The address is www.eeb.org. Under the heading Activities select "air pollution."

The environment directorate of the EU Commission has also made its information on air pollution fuller and more easily accessible, now giving background information as well as reports on current work and links to recent documents and legislation. Address:

www.europa.eu.int/comm/environment/air/index.htm

And don't forget to explore the Secretariat on the web: www.acidrain.org

Getting economically more attractive

No reason why the nations of the world should not enjoy a better environment as well as a high level of energy services.

IT IS ESTIMATED that \$9-15 trillion will be invested worldwide in new power projects over the next two decades. If a greater part of this investment should go to clean energy technologies, the result – insists the UNEP in a new report¹ – will be a global economy that is more secure, more robust, and much cleaner than that of the last century.

The demand for energy has increased steadily in recent years, having grown on an average by about 2 per cent annually in the nineties. But, says the report, the energy systems so far developed to meet this demand are clearly unsustainable, since they lead, directly or indirectly, to levels of pollution that are damaging to health, cause acidification of ecosystems, contamination of soil and water, loss of biodiversity, and global warming.

As regards health, it says that much of the air pollution that kills an estimated 500,000 people a year comes from the burning of fossil fuels in power stations, industrial furnaces, and motor vehicles. Air pollution is also estimated to cause four to five million fresh cases of chronic bronchitis as well as millions of cases of other serious illnesses.

Taking more energy from renewable sources as well as using it more efficiently are the means urged for

attacking these problems – renewables, in particular, now being plentifully available and becoming more so. From a small base in the 1970s, biomass, geothermal, solar, small-scale hydropower, and wind technologies have grown proportionally faster than any other technologies for supplying electricity.

Renewable energy is moreover steadily becoming economically more attractive. The evolution of the wind-energy industry has far exceeded even the most optimistic predictions that were made for it in 1990. The cost of wind-generated electricity has consequently dropped sevenfold, making windpower competitive with most fossil-fuel technologies.

“It is increasingly true that there are no technical, financial or economic reasons why the nations of the world cannot enjoy the benefits of a high level of energy services and a better environment. It is simply a question of making the right choices,” comments Klaus Töpfer, the UNEP’s executive director.

¹ **Natural Selection: Evolving Choices for Renewable Energy Technology and Policy.** Report from UNEP, the United Nations Environment Programme. Available at: www.uneptie.org/energy/Publications/natural-selection.htm.

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Coming events

Sustainable Development in the Baltic Sea Region. Starbienino, Poland. June 25-July 6, 2001. Course organized by the Edberg Foundation and Karlstad University in Sweden, welcomes students from countries in the Baltic Sea drainage area. *Information:* edbergstiftelsen@kau.se. Internet www.edbergstiftelsen.org

UNFCCC COP6bis. Bonn, Germany, July 16-27, 2001.

IUAPPA – 12th World Clean Air & Environment Congress. Seoul, Korea, August 26-31, 2001. *Information:* iuappa@kistmail.kist.re.kr, www.covanpcu.co.kr

Environmental Health Risks 2001: International Conference on the Impacts of Environmental Factors on Health. Cardiff, UK, September 10-12, 2001. *Information:* www.wessex.ac.uk/conferences/2001/envh01/

Air Pollution 2001. Ancona, Italy, September 12-14, 2001. *Information:* www.wessex.ac.uk/conferences/2001/air01/

Second International Symposium on Air Quality Management at Urban, Regional and Global Scales. Istanbul, Turkey, September 25-28 2001. *Information:* Prof. S.Incecik, Istanbul Technical University, Department of Meteorology, Maslak-Istanbul 80626, Turkey. E-mail: aqm2001@itu.edu.tr Internet: <http://atlas.cc.itu.edu.tr/~aqm2001>

Delivering Kyoto: Could Europe Do It? London, England, October 1-2, 2001. Organized by the Royal Institute of International Affairs. *Information:* www.riia.org

Nitrogen. 2nd Conference. Potomac, Maryland, USA, October 14-18, 2001. *Information:* Rhonda Kranz, The Ecological Society of America, 1707 H Street, NW, Suite 400, Washington, DC 20006, USA. E-mail: nitrogen@esa.org. Internet: <http://esa.sdsc.edu/n2001>.

COP7 – Seventh Conference of the Parties to the UN Framework Convention on Climate Change. Marrakesh, Morocco, October 29-November 9, 2001.

Second International Conference on Plants and Environmental Pollution. Lucknow, India, November 15-19, 2001. Organized by International Society of Environmental Botanists and National Botanical Research Institute, Lucknow, India. *Information:* K.J. Ahmad, e-mail: nbri@lw1.dot.net.in. Internet: www.icpep.org