

Acid News



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PETROL PRICES

Fourfold increase called for

THOSE WHO STILL BELIEVE that urban environmental problems can be solved by building more roads can take little comfort from a new OECD study. To quote: "Building more and more roads in cities and conurbations has enabled more people to travel by car, but has not reduced peak-period congestion to any notable extent. As soon as new road space becomes available in large cities, it is quickly filled. Even city regions with the most extensive road networks have high congestion levels."

The solution to sustainable city development lies instead, according to the study, in sharp successive rises in the taxes on motor fuel, causing a quadrupling of prices over a twenty-year period. In combination with other measures this would, it says,

lead to distinct environmental improvement.

Three years of research, in which traffic problems and policies were studied in more than 130 cities in twenty countries, have led to these conclusions. They are fully supported by the OECD working group on city problems and the conference of transport ministers (ECMT), which together commissioned the study.

It was found that in the countries studied, car traffic had risen by 3.3 per cent a year over the last twenty years, and road freight carrying still faster, by 5.5 per cent per year. In many countries the current projections point to a doubling of car and freight traffic during the next 30-40 years. If that should happen, the problems of air pollution, noise, and

congestion, which are already very troublesome in urban areas, would obviously be greatly accentuated.

Great changes will therefore, according to the authors of the study, be needed as regards city planning, the pricing of travel, vehicle design, and the management of traffic – all involving changes in people's habits and way of life.

Since this change-over to a sustainable way of life will take time – the study says 20-30 years – it ought to be started as soon as possible. As a means of attaining the desired results, a three-level policy is proposed. It is also emphasized that the economic, environmental, and social benefits of the change-over will greatly outweigh the cost.

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Acid News

is a newsletter from the Swedish NGO Secretariat on Acid Rain, whose 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 Swedish NGO Secretariat on Acid Rain was formed in 1982 with a board now 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 required reduction of the emissions of air pollutants. The eventual aim is to have those emissions 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 as follows, 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 and distributing information material.
- Supporting environmentalist bodies in other countries by various means, both financial and other, 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 bodies responsible for international conventions, such as the United Nations Convention on Long Range Transboundary Air Pollution.
- Acting as an observer at the proceedings involving international agreements for reducing the emissions of greenhouse gases.

EDITORIAL

Sulphur in fuel oil

A CONSIDERABLE PART of the emissions of sulphur in the European Union comes from petroleum in some form, mostly through combustion, and the proportion is tending to increase as emissions from other sources, in particular large coal-fired combustion plants, decrease. According to the European Commission, in 1993 36 per cent of the total EU emissions of sulphur from combustion, which then amounted to almost 15 million tons in terms of sulphur dioxide, were from petroleum. The remaining 64 per cent came from the burning of coal.

There are however no requirements for limits on sulphur in heavy fuel oils and bunker oils for ships. So far there are only directives limiting the sulphur content of light fuel and diesel oils.

For several years various drafts of a directive for heavy fuel oils have been circulating within the Brussels bureaucracy, and a formal proposal is said to be forthcoming by the end of this year. It is believed that the Commission will be proposing a ceiling of 1 per cent for sulphur in heavy fuel oils (except for oils burnt in plants equipped for desulphurization). It seems it will be a harmonizing directive, based on Article 100A of the Treaty of Rome, which means that the same rules must apply in all the member countries.

Since the average sulphur content of the fuel oils now sold in the European Union is 2.2 per cent, a limit of 1 per cent must be seen as a step forward, although a lower figure would have been more desirable. The maximum permissible content will nevertheless later have to be successively lowered.

Recourse to Article 100A is in any case undesirable, since it is impossible, under a harmonizing directive, for single countries to apply still stricter standards. Sweden, for instance, already has a limit of 0.8

per cent. The directive should therefore be made into one setting minimum requirements, enabling single countries to go further if they so wish. This would only be reasonable, since the primary aim of a directive of this kind is not to maintain free trade among the member countries but to protect the environment.

It is also important to have it explicitly stated that economic instruments are permissible. In Sweden the imposition of a tax on sulphur some years ago brought about a fall of 25-40 per cent in the sulphur content of heavy fuel oils, from an average of 0.65 per cent sulphur to 0.4-0.5 per cent.

Then there is the matter of marine oils. For vessels at sea there are no emission limits whatsoever, and recent research has shown that the emissions both of sulphur and nitrogen oxides from shipping in the northeastern Atlantic are about three times greater than had previously been assumed (see article, p. 5).

It is essential that the European Union should not duck the issue here. If the matter is left to IMO, the International Maritime Organization (a UN organ) it is unlikely that results would be forthcoming within any foreseeable time. Most of the member countries in that organization consider 5 per cent to be a suitable limit for sulphur in bunker oils – which in practice would leave the field wide open for an increase in emissions. Today the average sulphur content of bunker oils is just under 3 per cent.

The European Union should therefore, in its coming directive, put a ceiling on the sulphur content of bunker oil for shipping plying within the territorial limits of the member countries, and in the same time increase the pressure on IMO to move faster.

PER ELVINGSON

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A set of best-practice measures should constitute the first level of policy. These should include city planning to check the development of urban spread, strict rules for car parking, confining road construction to environmentally improving by-passes, the favouring of public transport, stricter environmental requirements for motor vehicles, tax incentives for small vehicles with low fuel consumption, road charging.

Actual examples of such measures are described in the background part of the report – which says however that they can in themselves hardly bring about any permanent improvement in city environments, only a slowing down of the expected growth of traffic.

The second proposed policy level comprises innovative measures, some of which are still at the trial stage. The emphasis is again on careful city planning, such as densifying around existing systems of public transport, including workplaces in residential areas, guiding new development to the vicinity of new tracked systems of transport, and making provisions for wholly car-free areas. No new roads should be built other than those needed to meet the needs of new residential and industrial developments.

The innovative measures should also include traffic calming – various measures to thin out the traffic. Following American models, employers should be compelled to set up

plans for lessening their employees' use of cars for getting to and from work. Footpaths and cycle tracks should be extended. Road charges should be used to direct traffic, avoid congestion, and make room for buses and trams. Municipal authorities should be incited to meet air-quality requirements by threats of having state funding withheld.

These measures would however still not suffice for the attainment of environmental aims. Assuming the untrammelled increase in road traffic to be 50 per cent between 1991-2015, application of the measures in levels one and two would only bring that figure down to 30 per cent.

It has therefore been deemed necessary to add a third level, the most important element of which would be to raise the price of motor fuel by 7 per cent each year, above the level of inflation, for twenty years. That would mean a quadrupling of the price in real terms.

Such a rise in the price of fuel is expected to bring about technical improvements in vehicles that will reduce fuel consumption per kilometre by 30 per cent, as well as causing people to choose smaller cars and drive with an eye to economizing on fuel, which would result in a further 15-per-cent reduction. Fuel would then cost per kilometre only two-and-a-half times as much as it does today. But it is thought that would still mean 15-per-cent fewer trips, which would themselves be on an

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Air quality standards 4

Following adoption of a framework directive, the EU Commission is to present others for thirteen separate pollutants between 1996 and 1999.

Suing a polluter 6

After long-drawn-out legal proceedings brought by local authorities and environmentalist organizations, the case against one of Spain's largest atmospheric polluters appears to be more or less settled.

Fossil fuel problem 7

Although the necessity of burning lignite has put Spanish electricity generators high on the list of sulphur emitters in Europe, improvements are now announced.

Transport policy 10

The major flaw of EU transport policy is said to lie in relentless catering to a growing demand for transport – and vast road schemes in particular are drawing criticism.

Energy crops 12

Research on energy crops has mostly been confined to the economic and technical aspects, but Dutch scientists have now attempted to classify them for ecological effects.

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An OECD evaluation of Polish environmental policy has revealed great efforts towards improvement. The long-term aim of sustainable development in the environmental plan has however still not been reflected in economic policy.

Effects of energy tax 14

German researchers have concluded that an energy tax, on fossil fuels and electricity, would both create new jobs and cause energy consumption to fall despite concurrent economic growth.

Benefits of abatement 16

The benefits accruing from cleaner air, as a result of reducing emissions of sulphur dioxide would, according to a report by British consultants to the Department of Environment, far outweigh the costs.

Acid rain

A brief report on the outcome of the Fifth International Conference on Acidic Deposition appears on page 9 of this issue.

New directives coming up

AT THE MEETING of the EU Environment Council in Brussels on June 22-23 the ministers agreed on "a common position on the framework directive on ambient air quality assessment and management." The draft now goes to the European Parliament for deliberation at a second reading.

The directive is intended to lay the foundation for a strategy for dealing with air quality within the European Union. The aim is to "define and establish objectives for ambient air quality" in order to protect people's health as well as the environment by maintaining the quality of the air where it is good and improving it where it is not. It will also be a part of the strategy to develop a common set of methods for measuring air quality and to ensure the dissemination of information, to the public as well as within official circles.

After adoption the directive will be extended by the addition of a number of so-called daughter directives, which are to set air-quality standards in regard to thirteen separate pollutants. These have been divided into two groups, of which the first comprises six pollutants for which there are already directives. The air-quality objectives for these will now be revised and updated, with binding maximum limit values set for each pollutant.

The limit values will have to be met within a given period of time, and once attained may not be exceeded. For some pollutants so-called "alert thresholds" are to be prescribed. These will indicate levels above which there is an acute risk to human health, and at which immediate steps should be taken to inform the public.

The Commission is to put forward proposals for new directives, at the latest by December 1996, for five of thirteen pollutants already covered by directives – sulphur dioxide, nitrogen dioxide, fine particulate matter (including PM₁₀), suspended particulate matter, and lead. For the sixth in this group, ozone, a proposal is to be presented in 1998.

Proposals for the pollutants in the second group, comprising benzene,

polyaromatic hydrocarbons, carbon monoxide, cadmium, arsenic, nickel, and mercury, are to be made at the latest by December 1999. The Commission has however indicated that



it will try to produce directives for carbon monoxide and benzene by the end of 1997.

Some of the items in the directive that had to be dealt with were of a more controversial nature. This applied for instance to low-level ozone. The problem with this pollutant is that it is formed secondarily from nitrogen oxides and volatile organic compounds (VOCs), and this often takes place tens or even hundreds of kilometres from the emission source. The concentrations in one country

may therefore be due to some extent to emissions from another, making it sometimes difficult for a country to live up to its obligations through its own efforts.

Since however the present directive allows the air-quality objectives for ozone to be expressed as non-binding guide values, instead of binding limit values, it has been possible to shelve the problem for the time being.

There was also a problem with the so-called standstill paragraph, obliging member countries whose concentrations of air pollutants do not exceed the limit values to maintain the status quo. In other words, the air quality in such places should not be allowed to deteriorate, even if deterioration should mean still not exceeding the limit values. The intention is of course to preserve any areas of clean air there may be in Europe.

Member countries on the southern side of the continent, such as Spain, objected to this on the grounds that it would imperil their economic progress. As a compromise the text was therefore altered so as to read approximately: In these areas Member States shall maintain levels of pollutants below the limit values and shall endeavour to preserve the best overall ambient air quality compatible with sustainable development.

Last July a steering group was formed, together with separate working groups for sulphur dioxide, nitrogen dioxide, particulates, and lead. The working groups, made up of representatives of the Commission, five or six member countries, international organizations such as WHO, industry, and environmental NGOs, are to produce so-called position papers for each pollutant. They will deal with the scientific and technical aspects, the political ones being attended to by the steering group. The groups' preparatory work is expected to take until April or May next year, when their proposals are to be presented to the Commission's environmental directorate.

Call for reduction of ozone precursors

Because of the frequent occurrence in summer of high concentrations of low-level ozone, the European Parliament adopted a resolution on July 13 calling for a lowering of the values, both for warning thresholds and informing the public, as set forth in the present ozone directive.

The parliament referred to fresh scientific evidence of the harmful effects of ozone on human health and the natural environment. It pointed out that there are already effective technical possibilities of reducing the emissions of ozone precursors, and urged the Commission to propose measures for reducing the emissions of nitrogen oxides by 90 per cent, and those of volatile organic compounds (VOCs) by 75 per cent, within ten years.

Source: **Environment Watch: Western Europe**, July 21, 1995.

CHRISTER ÅGREN

Cost of pollution

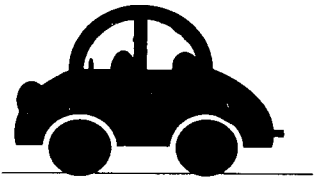
A report presenting a variety of findings on the effects of pollution on human health in Britain has recently been published by Friends of the Earth UK. Drawing information from a wide range of government and non-government sources it includes the following facts:

□ Very small particles (PM₁₀) from vehicle exhausts and industry kill some 10,000 people each year and generate health costs of at least £14 billion.

□ More than 1200 deaths each year are attributable to sulphur dioxide pollution, giving rise to health costs of £2.6 billion a year.

□ One in three persons in Britain (19 million) live in areas where the levels of tropospheric ozone exceed, during more than twenty hours of the year, the concentrations at which the UK Department of the Environment defines air quality as "poor." A like number live in areas where the average concentrations of nitrogen dioxide are above EU guide values.

Source: **Environment Watch: Western Europe**, August 4, 1995. The study can be obtained from FoE UK, 26-28 Underwood St, London, England N1 7JQ.



...and particles alone

The American Lung Association has released a report illustrating the monetary gain from improvements in health that would result from lowering ambient particulate levels in the United States. Based on particulate readings from all over the US, and concentration response functions from available epidemiological evidence, the report estimates the reductions in health effects that might occur if concentrations of PM₁₀ were reduced to the level of the California air-quality standards.

The total gain is estimated to be close on \$11 billion a year. The greatest benefits would come from the avoidance of almost 2000 cases a year of premature mortality (costing at least \$7 billion), and about 13,000 new cases of chronic bronchitis each year (cost \$3 billion). Days of restricted activity for adults would be reduced by 6.6 million a year (worth \$400 million), and days with acute respiratory symptoms by more than 20 million (saving about \$250 million).

The estimates are based on available economic information regarding willingness to pay for changes in the risk of effects on human health.

Car Lines, M.P. Walsh, July 1995.



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AT SEA

Emissions from shipping unexpectedly high

EMISSIONS of sulphur dioxide and nitrogen oxides from shipping in the northeast Atlantic are up to three times greater than had previously been thought, according to a study of marine emissions made by Lloyd's Register.

Lloyd's put the total annual emissions from shipping in the northeast Atlantic at 1.37 million tons for sulphur dioxide and 1.94 million tons for nitrogen oxides. According to earlier estimates of marine emissions in the region they were only 0.49 and 0.54 million tons for SO₂ and NO_x respectively – figures that have been used by the EMEP for its modelling of acid deposition.

Lloyd's based its figures on new engine emission factors derived from exhaust monitoring on ships in service, combined with data on ship movements from Lloyd's Maritime Information Service. The figures are from 1990 and do not include emissions from naval vessels, small craft or fishing boats.

The emissions of SO₂ and NO_x from the study area as a whole were of similar order to the land emissions in France, Spain and the United Kingdom.

In addition to the figures for the northeast Atlantic, a recent Swedish

study puts the annual SO₂ and NO_x emissions from Baltic shipping at 84,000 and 163,000 tons respectively, while research for the French government has estimated SO₂ and NO_x releases in the western Mediterranean at 229,000 and 174,000 tons.

Revelation of these unexpectedly high figures has led to increasing demands for measures to reduce the emissions. So far the oil industry has however managed, by intensive lobbying, to fight off all claims for a reduction of the sulphur content of bunker oil (see AN 1/95, p.7).

The sulphur content of the bunker oil sold today averages 3 per cent. According to the oil industry's own research institute CONCAWE, a limit of 1.5 per cent would mean the refineries would have to install desulphurization equipment at a cost of \$7-8 billion. Today shipping is about the only sector where the oil companies can find a market for their high-sulphur oil.

PER ELVINGSON

Marine exhaust emissions research programme 1995. Available from Engineering Service Group, Lloyd's Register House, 29 Wellesley Road, Croydon, England CR0 2AJ.

Suing a polluter

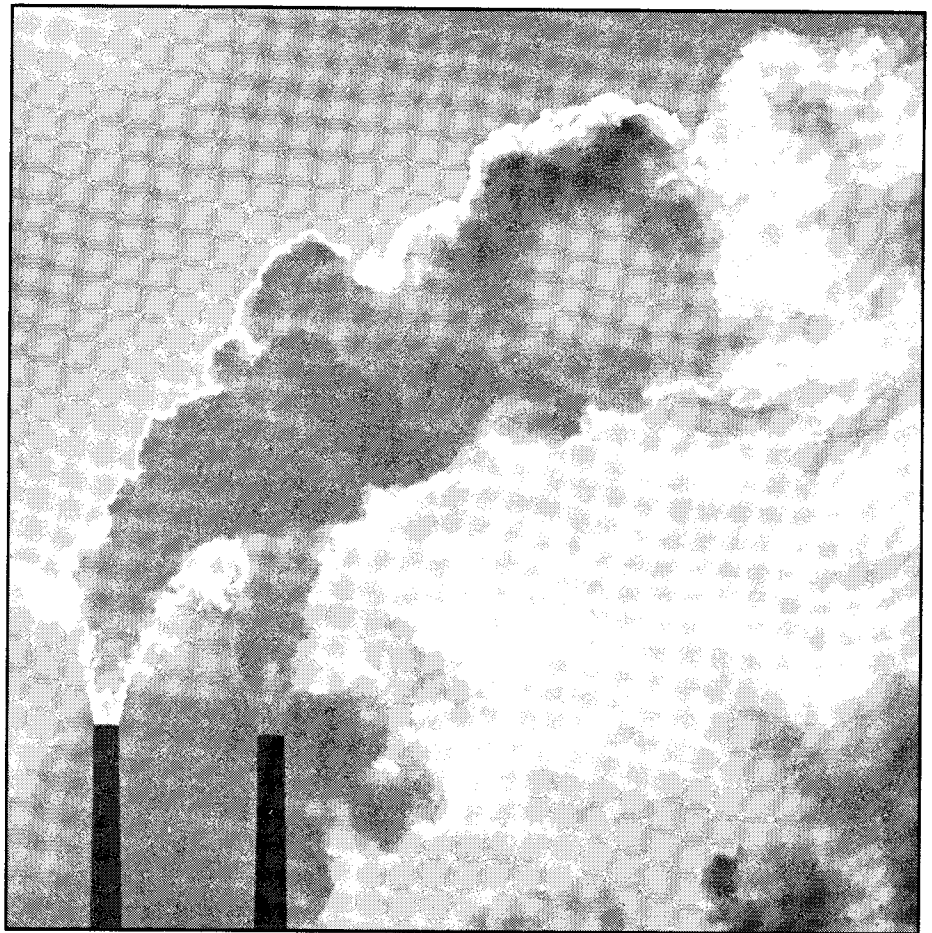
THROUGHOUT ITS FIFTEEN years of existence the thermal power plant in Andorra, a small town in the province of Teruel, in eastern Spain, has been a cause of social conflict and legal proceedings. It now seems however that this period of controversy is coming to an end.

The plant, consisting of three 350 megawatt generating units, became operational in two stages between 1979 and 1980. It is fired with locally mined lignite, with a high sulphur content (5.6 per cent) and consequently great emissions of sulphur dioxide – equivalent to an estimated 180,000 tons of sulphur per annum, placing this plant, owned by the state generating company ENDESA, sixth among the hundred largest point sources in Europe. The only attempt made to evade the effects of its pollution was to build a 343-metre high smokestack.

That however quite failed to solve the problem. Extensive forest damage soon became apparent downwind of the plant, an estimated 200,000 hectares being affected, and various official studies pointed to the Andorra power plant as the major cause. Subsequently about 140 reports have been published, with differing conclusions – which is hardly surprising, seeing that the producers of the reports ranged from environmentalist groups to ENDESA itself.

Legal proceedings started in 1987, when the local council of Morella (Castellón) presented a civil suit, demanding 400 million pesetas for the damage caused to its woodland. Two years later the public prosecutor in Castellón filed criminal charges against ENDESA, alleging offences against the environment. The civil suit was then dropped, but soon afterwards the twenty-five local authorities that were affected joined the prosecution, as did Greenpeace and three environmentalist organizations from Teruel and the neighbouring provinces.

Despite the swiftness with which the public prosecutor had acted, the preparations for the trial became long drawn out, with ENDESA's lawyers doing all they could to delay the pro-



cess. This led the local authorities that were involved in the case to seek an out-of-court settlement with ENDESA to obtain compensation for the damage done to their forests.

*May serve as starting
point for further action
against acid rain*

More recently, however, the regional environmentalist groups reached an agreement with ENDESA and the local and regional authorities involving the setting-up of a foundation for restoration of the forests and development of the region on sustainable lines.

But still more, the environmentalists have obtained a specific agreement from ENDESA to install flue-gas desulphurization units on all three generators of the Andorra plant in

1997, six months earlier than had been planned. The present emissions of sulphur dioxide will thereby be reduced by 90 per cent.

In view of these agreements the environmentalists as well as the local authorities withdrew from the proceedings. In withdrawing too, Greenpeace issued a communiqué describing ENDESA's undertaking to reduce emissions from its Andorra plant as an ecologist victory and calling on the company to take similar measures at its other thermal power plants.

It was only later that CODA, a national network of environmentalist organizations that had associated itself with the proceedings two months earlier, heard about these agreements. It then also withdrew, considering itself unable to pursue the matter alone. To all appearances the trial will now come to an end, if only because the preparatory court at Alcañiz had declared in 1995 that the emissions from the plant did not contravene to the law, and although

an appeal against that resolution has been made to the provincial court of Teruel, it seems likely that it will be ratified.

Such an outcome could in any case have been foreseen. Transferring the trial from a court in the area where the forest damage had occurred to one in the vicinity of the power plant greatly increased the social and economic pressure to shelve the case.

There can be no simple answer to the question of whether the environmentalists can claim a victory or admit failure in this matter. There is certainly no cause for jubilation, seeing that

□ The decision to install flue-gas desulphurization at Andorra had already been taken, driven on to some extent by the lawsuit, but more so by the pressure of the requirements placed on Spain by the EC directive on large combustion plants.

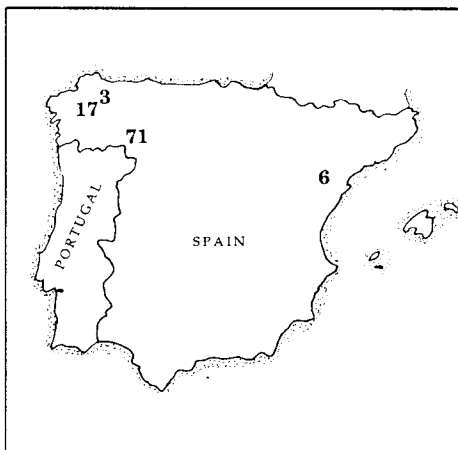
□ It has once again been shown how difficult it is to prosecute those who are responsible for offences against the environment – especially when the accused are persons close to the circles of political and economic power. Environmental legislation will have to be extended and reinforced if it is to be effective.

□ Demands must also be made on ENDESA to go much further towards reducing emissions of acid pollutants by not building any new thermal plants unless they are equipped with clean combustion systems, by replacing old ones, closing down its nuclear plants, and resolving the problem of pollution from its plant at As Pontes in Coruña, Spain's north-western corner, which is the third worst emitter of sulphur dioxide in Europe.

Although the case against ENDESA has seemingly been dropped, the matter has not been entirely settled, as it may well serve as a starting point for further action against acid rain in Spain.

CARLOS MARTINEZ CAMERERO

The writer is a lawyer, actively participating in the work of AEDENAT, Asociación Ecologista de Defensa de la Naturaleza. A report entitled **The trial of Teruel Thermal Power Plant for Offenses Against the Environment**, presenting the legal aspects of the case, has been published by AEDENAT with financial contribution from the Swedish NGO Secretariat on Acid Rain. It can be obtained from AEDENAT, Campomanes 13, 28013 Madrid, Spain.



Among the 100 largest emitters of sulphur in Europe are four Spanish power plants. Together these four are responsible for almost half of the country's total emissions, amounting to 1.1 million tons of sulphur a year.

Placing	Emissions (tons S/yr)
3. As Pontes	271 000
6. Andorra (Teruel)	183 000
17. Meirama	90 000
71. Compostilla	42 000

Source: Sulphur emissions from large point sources in Europe. 1995. Published by the Swedish NGO Secretariat on Acid Rain.

Problems with fossil fuels

SPAIN is one of the main emitters of sulphur in Europe. Most of the country's emissions (70 per cent) come from the generation of electricity with an almost total absence of cleaning.

In Spain almost half of the electricity is generated in plants fired with fossil fuel. Rather more than a third is nuclear generated, and the rest is hydroelectric power.

The most polluting fuel by far is lignite, of which there are two types: black and brown. Black lignite contains 6 per cent sulphur and has a low energy content. The brown kind contains somewhat less sulphur (usually about 3 per cent), but has a still lower energy content. There is thus hardly any difference between the two, if the sulphur emissions are calculated per unit of energy.

The largest deposits of black lignite are those adjoining the power plant at Andorra, on the east side (see adjoining article). Brown lignite on the other hand is mined chiefly in Coruña province, in Spain's north-western corner, where it is used to fire the plants at As Pontes and Meirama. As Pontes is at present the third largest emitter of sulphur in all Europe, while Meirama comes seventeenth. At present rates of extraction, however, the local lignite deposits are estimated to have become worked out sometime around 2000.

Although they account for no more than 30 per cent of the power generated in thermal plants, these three – Andorra, As Pontes, and Meirama – are responsible for 60 per cent of the Spanish emissions of sulphur dioxide.

Firing with lignite has also made it necessary to alter legislation. After the As Pontes and Andorra plants had been put into operation it appeared that their emissions of sulphur dioxide were exceeding the permissible limit, which was 8000 mg/m³ of flue gas. By a special ENDESA decree (which is currently being contested), emissions of up to 12,500 mg/m³ or higher "if necessary," are now being allowed.

The other types of fuel used in Spanish power plants are domestic pit coal and anthracite, imported coal, and fuel oil (the last being more or less a byproduct of petrol refining). For each one of them the emissions are markedly lower than they are for lignite. There has recently been an increase in the use of imported coal, mainly because it has become cheaper than the locally mined. Sometimes, too, switches are made to imported low-sulphur coal when the local concentrations of atmospheric pollutants are exceptionally high.

For a period of transition Spain managed to get exemption from some of the requirements of the EC directive on large combustion plants of 1988 – which themselves can hardly be described as onerous – allowing it higher emissions than other members of the Community. This was largely explained by the country's need to be able to go on using domestic fuels, even though they were highly polluting.

But the directive also stipulates that emissions of sulphur dioxide from the existing large combustion plants in Spain must have been reduced by 24 per cent by 1988 and by

Gains wide publicity

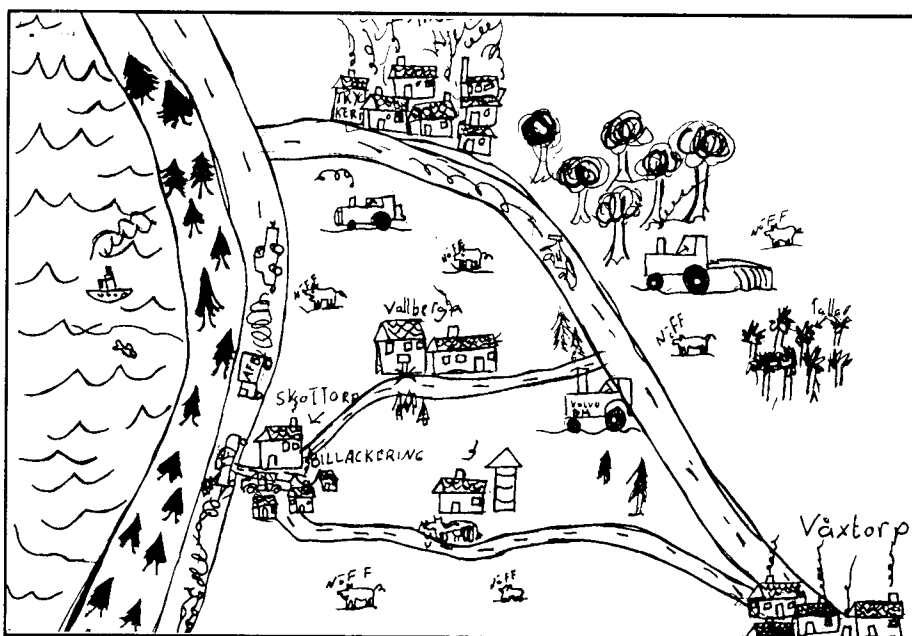
THIS AUTUMN *Air Pollution Project Europe* will be starting off on its fourth consecutive year. Having then involved half a million pupils from a great part of Europe, as well as 14,000 teachers, it may well be the biggest environmental project for schools yet undertaken in Europe.

Last year about 100,000 youngsters from twelve countries took part in the project, which has two sides: one being to measure the acidity of the precipitation, the other to study its effects on lichens.

Once again the rain and snow were shown to be widely acidified – especially in Russia, Finland, Sweden, and Norway, and somewhat less in the Czech Republic, Slovakia, Poland, the Baltic States, and Denmark. The only country where the precipitation was judged not to be acid was Hungary.

Lichens are one group of plants that are sensitive to air pollutants, especially sulphur dioxide, making them a suitable object for study. Comparison of their incidence in various environments revealed great differences between urban and industrial areas and the surrounding countryside.

The contrast was especially striking in the case of fruticose (bushy) lichens, of which two-and-a-half times as many species were found in rural surroundings as in cities. The only conclusion can be that locally



Drawing from Vallberga school in Sweden.

generated air pollution puts a stop to their diffusion.

Foliose lichens (with leaflike thallus) turned out to be less affected than the fruticose species – the difference in their case between town and country not being so great. Apparently the least sensitive were crustose (crustlike) lichens, the number of species being about the same everywhere.

An important aim of the project has been to gain publicity, and in this respect last year's school classes have been remarkably successful,

their activities having been widely reported in the media. Because the participants were thus able to give an account of their work, millions of Europeans must have been made aware of what it has revealed as regards the effects of acidification.

KNUT G. SMEDSVIG
Officer in charge

Further details of the project, as well as a full report on last year's activities, can be obtained from the Norwegian Society for the Conservation of Nature, P.O. Box 2113, Grunerløkka, 0505 Oslo, Norway.

Spanish energy..

Continued from page 7

37 per cent by 2003, as from 1980 levels. The new environmental program of the state-owned ENDESA power company does, too, include measures to that end.

The whole complex at Andorra, and part of that at Compostilla (León) are to be equipped for flue-gas desulphurization. Emissions at Andorra are expected to be reduced by 90 per cent, which means pouring out 165,000 tons less sulphur each year.

At As Pontes there will be a changeover from brown lignite to imported hard coal, with much lower emissions of sulphur as a result. But as the lignite deposits are coming to

an end, the change would in any case have had to be made sooner or later. From the point of view of the environment, though, it is not altogether to the good, since the coal will have to be hauled 50 kilometres by truck from the port to the power plant. This will require 750 20-ton trucks, or one every other minute in each direction, around the clock.

Two new plants are included in the ENDESA program: one a 175 MW generator with fluidized-bed combustion, the other a 350 MW installation for coal gasification, to be built with assistance from the EU THERMIE program.

The ENDESA program has been subject to heavy criticism from

AEDENAT, the Spanish environmentalist group – for the reason among others that it calls for continued investment in nuclear plants, and ridiculously little in renewable energy sources, which are allotted less than 4 per cent of the total outlay. More efficient use of energy is not even mentioned, and although new power stations are to be built, there is no indication of any closing down of the oldest and worst plants.

Article based in information in **Atmospheric pollutants from electric power generation in peninsular Spain**, compiled by AEDENAT with financial contribution from the Swedish NGO Secretariat on Acid Rain, which can be obtained from AEDENAT, Campomanes 13, 28013 Madrid, Spain.

Still reigning

LAST JUNE more than 800 scientists from forty-four countries gathered in Sweden, at Göteborg, for the fifth in a series of conferences on acid rain, this time pointedly named *Acid Reign '95?* The essential outcome of five packed days of reporting and debate, during which more than 600 papers had been presented, may be said to have been as follows:

□ The emissions of sulphur dioxide are lessening both in Europe and North America. Reduced fallouts have been recorded even in the so-called Black Triangle – the area of Central Europe where Germany, Poland, and the Czech Republic converge.

□ Nevertheless the air over Europe is still far more polluted than is acceptable from the point of view of the environment. Unless there is a radical reduction of emissions the damage to the environment will continue, and in some cases become accentuated.

□ Similar problems will soon arise in China, India, and other parts of southeast Asia, if the present trend towards a rapid increase in emissions is not broken. A start should therefore be made as soon as possible on negotiations to bring about a limitation of emissions in this part of the world.

□ The emissions of ammonia from farming are also a growing problem, causing as they do both acidification and eutrophication – with the general effect, among others, of impoverishing biodiversity. Considerable reductions are here needed.

□ One of the best ways of reducing the emissions of sulphur would be to bring about a more efficient use of energy. This would also help to reduce the emissions of nitrogen oxides and the greenhouse gas, carbon dioxide.

Although the emissions of sulphur have fallen generally both in Europe and North America, in many areas the depositions are still five to ten times greater than nature can withstand, and the damage to forests and surface waters will continue as long as the so-called critical loads are being exceeded. The present concentrations of sulphur dioxide in the air

will moreover continue to cause damage to materials of various kinds, such as in buildings and cultural monuments, as well as leading to thousands of deaths and tens of thousands of cases of sickness, particularly in those countries where emissions are greatest.

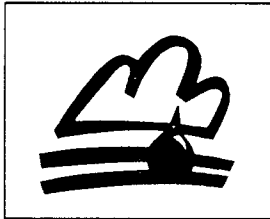
There are as yet no signs of any decline in the emissions of nitrogen oxides and ammonia, two other outstanding airborne pollutants that cause acidification. The same can be said of the concentrations of low-level ozone, which is formed from nitrogen oxides and volatile organic compounds.

Other effects of acidifying pollutants were also reported at the conference. They lead to a large-scale formation of aerosols – microscopically small particles – which hang like clouds over the industrialized countries of the northern hemisphere. Since they reflect back some of the sunlight that falls on them, the clouds of aerosols tend to keep down the temperature at the earth's surface – thus masking to some extent the general global warming that is known to result from the emissions of greenhouse gases, notably carbon dioxide.

These conferences on acidification are held every fifth year. This last one was preceded by a three-day visit to the Black Triangle, where the damaged forest was one of the objects of study. The volume of conference documentation will be considerable, comprising a report on the study visit entitled *Acidification in the Black Triangle Region*, and an *Abstract Book* containing abstracts of all the papers read at the conference, as well as a final statement from it. Most of the papers will moreover be published *in toto* in a special-edition set of books as a part of the peer reviewed *Journal of Water, Soil and Air Pollution*, Volume 85, Issues 1-4, intended to come out in December.

CHRISTER ÅGREN

The report from the study visit to the Black Triangle and the *Abstract Book* can both be ordered from IVL, Box 47086, 402 58 Göteborg, Sweden.



Destroying buildings

Rain dissolves the stone of buildings faster in central Manchester than at any other test site between Donegal in Ireland and Athens in Greece, according to a study conducted by Paul O'Brien at Trinity College, Dublin. Manchester suffered worst, even though its rainfall had been among the lowest during the period of the test, because its rain was the most acid. Also faring badly were Antwerp in Belgium and Liphook, Hampshire, another British test site. The rates of stone loss in large cities such as Athens, Amsterdam, and Copenhagen were only a fraction of those at the British sites.

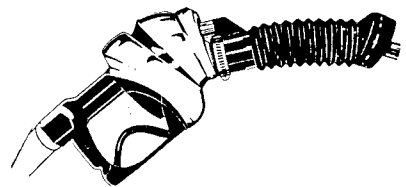
New Scientist, June 17, 1995.

Ozone and road traffic

As from last August, cars without catalytic converters as well as high-emission diesel vehicles can be banned from the roads of Germany whenever the levels of tropospheric ozone exceed 249 micrograms per cubic metre of air on two or more consecutive days. This has been made possible by a nationwide "summer smog" decree, issued by the state chamber of the German parliament, which will supersede the decrees of individual states. Violators can be fined up to DM 1000.

There are however a number of exemptions, affecting among others buses, taxis, various public-service vehicles, and motorcycles. Commuters and tourists do not have to comply with the ban, either, because it was thought that in their case it would cause unmanageable problems. Critics are already arguing that the numerous exemptions will make the decree difficult to implement.

Environment Watch: W. Europe, July 21, 1995.



Stopping petrol fumes

Since nothing has come of discussion within the EU Commission concerning the compulsory recovery of petrol fumes during car refuelling, Denmark has decided to follow the lead of Sweden, Germany and Luxembourg by imposing national requirements. Since April 1995 all new filling stations will have to be equipped for fume recovery. Existing ones can wait until the year 2000, but must comply thereafter. The move is a part of an overall Danish strategy to reduce emissions of volatile organic compounds.

Danish Environment, No. 3, 1995.

Infrastructure above all

IN ANY DISCUSSION of transport at the European level, a subject that almost inevitably crops up is that of the Trans-European Networks proposals. They are in fact a core element of policy within the European Union.

These so-called TENS comprise three separate plans – for transportation, energy, and telecommunications – all aimed at improving communications and the flow of people and goods within Europe. They also embody many of the European Commission's hopes for widespread job creation and regional development.

Environmentalists are especially concerned about the transport TEN. In the first place the claims for TENS that they will boost employment and aid regional economies are seriously flawed. Moreover the TENS could, in their present form, result in major losses for Europe's natural heritage and an accumulation of ecological problems for coming generations.

The environmentalists' fears have been confirmed by two NGO studies, which show up more clearly than any official report the environmental damage the TENS are likely to cause. According to *Missing Greenlinks*, published by Greenpeace, the TEN for transport will, if unchanged, cause the emissions of carbon dioxide from the transport sector to increase by 15-18 per cent more than the present forecast of 42 per cent, by 2010.

Birdlife International, in its report on *The impact of trans-European networks on nature conservation*, notes that despite reassuring statements and legislative clauses, the Commission has not set any clear objectives for integrating the care for the environment with transportation policy – which casts doubt on



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its ability to protect the environment in the face of economic pressures.

In Article 2(i) of the TEN guidelines draft (COM94 106 final), it is claimed that they will “contribute to the

*Road schemes will not
contribute to achievement of
environmental objectives*

achievement of the Community's environmental objectives.” Commissioners, officials, MEPs, and ministers should however be aware that the predominance of road schemes in the TENS means that they will *not* contribute to the achievement of such aims. Rather will they have the opposite effect of distancing the Community from them.

The procedure for TENS is to be that projects are chosen by national ministries of transport, are worked into masterplans by the European Commission, then approved as such by co-decision of the European Parliament and the Council of Minis-

ters, and finally implemented by national governments. It may be tempting for governments then to blame the Commission, and the Commission to blame the governments, for the outcome. Campaigners and others should therefore be careful not to let themselves become confused and assume the TENS to be essentially a European issue – since decisions will in fact lie mainly at the national level.

Earlier this year the European Parliament made amendments to the draft for the TEN guidelines. Although it approved the inclusion of several new motorways and other environmentally damaging projects, the EP greatly improved the guidelines by inserting a number of environmental safeguards into the main text. All the environmental clauses introduced by the Parliament were however rejected by the Transport Ministers at their June meeting. A clash between the two bodies may therefore be expected.

The matter is now, in the autumn of 1995, in the hands of the European Parliament, which will pass it on to the Council of Ministers at the

end of the year. Since agreement is unlikely at this stage, a conciliation committee consisting of representatives of the EP, the Council of Ministers, and the Commission, will have to make a proposal, which will then have to win approval both from the Council and the Parliament.

It is again unlikely that there will be any final decision before the spring of 1996, and even then work on most of the projects will still have to be started. So environmentalist groups will still have time for scrutiny and campaigning.

Here is the crucial question, though: Is all this proposed infrastructure really necessary? In its *White Paper on Transport* the Commission admitted that extending the infrastructure would not solve the problem of a growing demand for transport. That demand is in fact a consequence of an artificially low price for transport – a large share of the cost being external, often paid

for by the general taxpayer. The EU knows this, but fails to act accordingly. In the opinion of T&E, the major flaw of EU transport policy lies in its relentless catering to a growing demand for transport – and the TENS are the most striking symptom of that policy.

GJJS KUNEMAN
Director, T&E

This August T&E, the European Federation for Transport and Environment, published a paper titled **Ten questions on TENS – a look at the European Union's proposals for trans-European transport networks from an environmental perspective**. It answers ten of the questions most commonly asked about TENS. Available from the T&E Secretariat, Rue de la Victoire 26, 1060 Brussels, Belgium. One copy free.

A newsletter on European transport projects and actions to resist them, **Concrete Action**, is published by A SEED Europe. To subscribe, apply to Christian Moe, Nature and Youth, Torggt. 34, 0183 Oslo, Norway.

This is what is involved

THE current TEN plan for transport envisages around 140 road schemes, eleven rail links, fifty-seven combined transport projects, and twenty-six inland waterway stretches – although the list appears to be growing all the time. The proposed TEN road network comprises some 65,000 kilometres of motorways or roads of near-motorway standard.

In December 1994 the EU heads of government agreed on fourteen TEN schemes as "top priority." Work on them was to begin immediately or at least before the end of 1996, although much would depend on the amount of money that could be made available. Of the remaining TEN schemes, twenty-one

have been designated priority projects. The aim is to have the whole program completed before 2010.

Most of the money for single projects will have to be found by national governments, although 10 per cent of the cost can be provided by the European Union (or more in the case of the so-called cohesion countries: Spain, Portugal, Greece, and Ireland). The figure quoted for the cost of the entire TEN transport network is 400-500 billion ecus over the next fifteen years. Since the fourteen top-priority projects are alone expected to cost 91 billion ecus, however, the overall estimate is probably too low.

The fourteen top-priority projects:

Brenner axis: High-speed rail, combined transport (Italy, Austria, Germany)

Paris-Brussels-Cologne-Amsterdam-London: TGV high-speed rail (France, Germany, Benelux, Great Britain)

Madrid-Barcelona-Perpignan and Madrid-Victoria-Dax: Two high-speed rail links (Spain, France)

TGV Est: High-speed train, Paris-Strasbourg-Luxembourg-Karlsruhe-Munich-Berlin (France, Germany, Luxembourg)

Betuwe Line: Conventional rail transport of freight, combined transport, Rotterdam-Rhine/Ruhr (Netherlands, Germany)

Paris-Lyon-Torino: High-speed rail, combined transport (France, Italy)

Patras-Athens-Bulgaria and Via Ignatia: Two motorways forming a T (Greece, Bulgaria)

Lisbon-Valladolid: Motorway (Portugal, Spain)

Cork-Stranraer: Road, rail, and sea crossing (Ireland, Great Britain)

Milan Malpensa: Air, improving Milan's second airport (Italy)

Öresund Bridge: Road/rail crossing over Öresund sound (Denmark, Sweden)

British west-coast line: High-speed rail (Great Britain)

Ireland-Britain-Benelux link: Road through the Channel Tunnel, ferry across the Irish Sea (Ireland, Great Britain, Benelux)

Nordic Triangle: Rail, involving the links Helsinki-Stockholm-Copenhagen, Oslo-Gothenburg-Copenhagen, and Stockholm-Oslo (Denmark, Finland, Sweden, Norway)

Spending on roads criticized

The European Union's Cohesion Fund, which cofinances transport and environmental investments in the four poorest member states of the Union, is spending too much on roads, too little on railways, and almost nothing on nature conservation. This is the conclusion of a survey of the fund's expenditure in 1993 and 1994 made by World Wide Fund for Nature (WWF).

According to WWF, the Commission – which manages the Cohesion Fund – put 70 per cent of the fund's spending on transport into road projects and only 10 per cent into rail. A missed opportunity can also be seen in the lack of investment in suburban transport. The WWF is also critical of the lack of public information about the projects.

Environment Watch: Western Europe. September 29, 1995.

Don't want to wait...

The German transport minister Matthias Wissmann has threatened that Germany will take unilateral action to protect its territory from transit traffic if a European solution to the growth in freight transport is not found before too long. The measures that are being considered by the government include, according to the minister, putting a permanent ban on lorries at weekends, making it compulsory for transit traffic to use main routes, and increasing the motorway vignette from 1250 to 3500 ecus from 1997. The government is also thought to be considering a drastic rise in the price of diesel fuel, and building special transit terminals for combined transport near its borders.

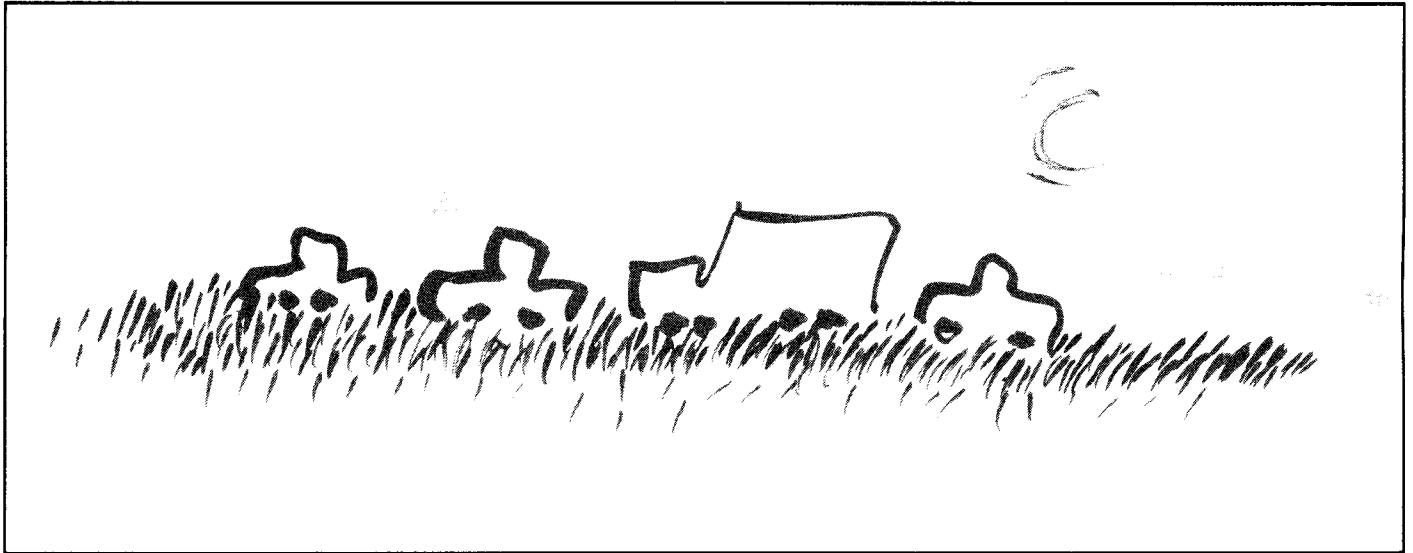
T&E Bulletin, June 1995.

Car makers pressed

Early in June the European ministers of transport and the continent's car makers made a voluntarily agreement to "substantially and continuously" reduce the fuel consumption of new cars sold in Europe, and to manage vehicle use so as to achieve "tangible and steady reductions in their total CO₂ emissions." The agreement does not however set any clear targets. Whereas the transport ministers would like new cars to have a fuel consumption that would be 25 per cent lower than that of present models, the European Automobile Manufacturers Association (ACEA) says it will be difficult to go much beyond the 10-per-cent reduction that they have undertaken to bring about between 1993 and 2005.

Environment Watch: Western Europe, June 16, 1995.

Assessing energy crops



© JON SUND

To reduce emissions of carbon dioxide it would be economically more sensible to grow energy crops for generating electricity and/or heat than for the production of biofuels.

BY USING nature's own solar collectors, the leafy plants, it may be possible to create a sustainable energy system – although at present only a minute fraction of Europe's energy is generated from biomass. Faltering profitability for conventional agriculture, combined with the call for a reduction of the emissions of carbon dioxide and other air pollutants, may however increase interest in the cultivation of energy crops.

Most of the research on such crops has so far been confined to the economic and technical aspects, with relatively little attention being given to the ecological effects. Scientists at the Centre for Agriculture and Environment at Utrecht, Netherlands, have however attempted to classify various crops according to their possibilities for ecologically responsible cultivation. Among the criteria employed were leakages of minerals (such as nitrates) and of pesticides, risk of soil erosion, and effects on the natural environment and landscape, as well as the net reduction of the emissions of carbon dioxide.

From their study the following results emerged:

□ The production of ethanol from winter wheat scored highest as regards sustainability. The expense would however eliminate it as a

cost-effective way of reducing CO₂ emissions.

□ For the generation of electricity and/or heat, hemp, miscanthus, reed, willow, and poplar were rated relatively high in terms of sustainability. Since they also appear to be economically viable, they might be a useful means for reducing emissions of carbon dioxide.

□ Worst from the point of view of sustainability were liquid fuels from rapeseed and sugar beet, together with electricity and/or heat generated from maize. Moreover all three turned out to be expensive for the reduction of CO₂ emissions.

From a separate study of the costs of reducing carbon-dioxide emissions it appeared that some energy crops do have distinct advantages when used for the generation of electricity and/or heat. For the Netherlands the cost of eliminating each ton of CO₂ through their use was put at 80-120 guilders. The cost of the emissions avoided by the use of energy crops for the production of motor fuel would be lowest with rapeseed (180 guilders per ton) and highest in the case of ethanol from sugar beet (830 guilders). Ethanol from wheat comes halfway between, at about 380 guilders per ton avoided.

It is important to consider whether the cultivation of energy crops will increase or lessen the effects of farming on the environment. The answer will naturally depend on how the land would have been used otherwise. Apart from the direct effects, such as the spread of pesticides and the leaching of nutrients, there are also many indirect ones that are difficult to assess. In the Netherlands, for instance, crops grown for energy

The potential

It would be theoretically possible to calculate the amount of solar energy that a given crop area can trap. In the Netherlands the average yearly electricity consumption of one person could be met by growing poplar on 0.25 hectare. But supplying the whole country's needs would mean growing poplar on an area twice as great as that of all the present farmland.

Taking the European Union as a whole, however, the possibilities are better. There are estimates showing that to avoid overproduction, 40-80 million hectares of arable land will have to be set aside during the next few decades. Assuming the higher figure, and 0.25 hectare per inhabitant, the whole of Europe's electricity needs could, theoretically, be met from biomass. Since the crop yield per hectare varies widely from one part of Europe to another, however, this is a very loose estimate.

Source: *Change*, No. 22, November 1994.

might replace those for fodder – which would then have to be imported, with effects both in the places where it would be grown and during transportation.

Extensive cultivation of energy crops would probably be quite possible without having any great negative effect on the environment. It is however questionable whether surplus arable land should be used for that purpose. It might perhaps be better to let nature restore itself to some extent, such as by creating wetlands, which would increase biological diversity as well as reducing the leakage of nutrients to the sea.

The present industrialized methods might alternatively be made to give way to less intensive farming with long-term sustainability. In view of the call for sustainability as well as the need to feed an ever-growing world population, there may not be any surplus land.

PER ELVINGSON

In **Change** No.22, November 1994, the possibilities of cultivating energy crops were considered from various angles. *Change* is a bi-monthly publication reporting on research and policy making in the Netherlands, with reference to global change. Can be obtained free of charge from RIVM/NRP, P.O. Box 1, 3720 BA Bilthoven, the Netherlands.

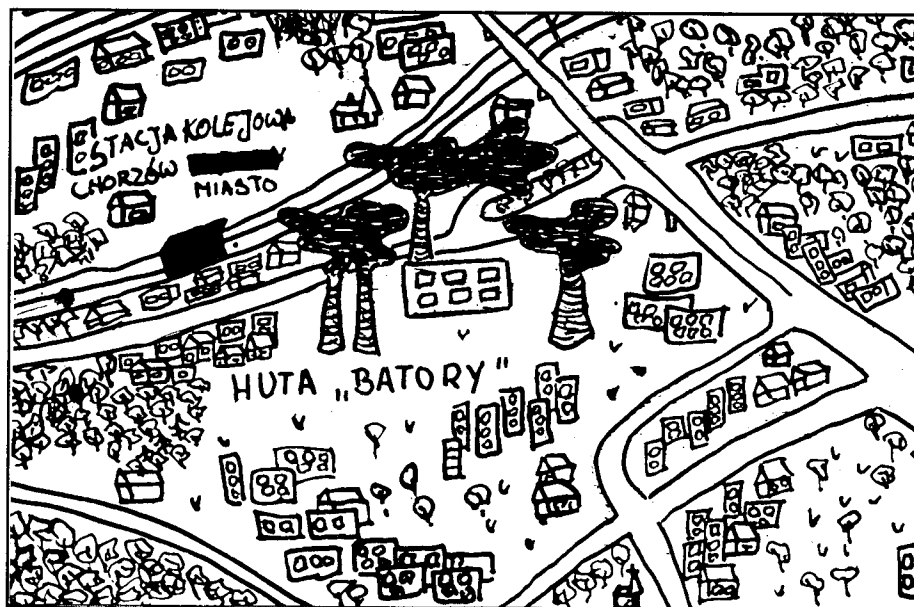
Wood biomass better than liquid fuels

Burning wood to generate power may make more sense – in terms of environment, agriculture, and energy policy – than producing liquid fuels from agricultural crops, according to the International Energy Agency, IEA.

In a report on biofuels, the IEA says energy forestry – growing trees for electricity generation – requires lower inputs of agrochemicals than arable crop production and can result in less soil erosion, nitrate pollution, watershed disruption, and other effects of intensive agriculture. Wood biomass also offers a much cheaper way to avoid emissions of carbon dioxide and involves much lower land-use costs.

“The combined aims of agricultural, environmental, and energy policy might be better served by wood-fired power generation than by the production of liquid fuels from food crops,” the report concludes.

Source: **Biofuels**. Energy and environment policy analysis series. IEA. Available from OECD Publications, 2 rue André Pascal, 75775 Paris Cedex 16, France.



POLAND

Spending on environment showing results

A RECENT EVALUATION of environmental policy in Poland by the OECD reveals some remarkable results. Despite a marked economic recession, the proportion of environmental investments in relation to GDP was more than two-and-a-half times greater in 1992 than it had been in 1985. Such spending now amounts to the equivalent of about \$1 billion a year. The total needed to bring Poland's emissions of pollutants down to west European levels will however, according to OECD estimates, be around \$35-50 billion.

The emissions of air pollutants from the eighty largest sources have lately shown a distinct drop. Particles have been reduced by 60 per cent, and emissions of sulphur dioxide, nitrogen oxides, and hydrocarbons by 40 per cent. The improvements are a result of changes in process technology, the installation of flue-gas cleaning equipment, and the closing down, wholly or partially, of twenty-two plants.

Marking a great step towards the fulfillment of Poland's international obligations has been the setting up of the Ecofund. This has been financed by the United States, Switzerland, Finland, and France writing off a part of the country's national debt in return for Poland investing a corresponding amount in Ecofund projects. These projects are aimed at the Baltic Sea, the greenhouse effect,

protection of the ozone layer, trans-boundary airborne pollution, and the preservation of biological diversity.

By the end of 1993 international environmental aid to Poland had amounted to \$230 million. The biggest donors were, in descending order, the European Union, United States, Denmark, Germany, and Sweden. Although most welcome, such aid has never, according to the OECD, accounted for more than 4-5 per cent of Poland's total environmental investments.

A new environmental program, with sustainable development as the long-term aim, was adopted by the Polish government in 1991. So far however that aim has not been reflected in economic policy. Here the OECD notes the need for greater consideration of the environmental aspects when planning developments in manufacturing industry as well as in the energy and transport sectors.

Since 1990 there have been formed more than a thousand new enterprises specializing in the production of equipment and the provision of services for environmental ends – thereby laying the foundation for “green” business in Poland.

MAGNUS ANDERSSON

OECD Environmental Performance Review: Poland (1995). Obtainable from OECD, Publications Service, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

Calling for climate action at local level

LAST MARCH, at the time of the UN climate conference in Berlin, 159 local authorities attending the Municipal Leaders' Summit on Climate Change endorsed the proposed AOSIS* protocol and called upon other local authorities to develop plans for reducing emissions of carbon dioxide locally by 20 per cent by 2005.

These local authorities represent 250 million people in sixty-five countries, both industrial and developing. They have already made commitments and themselves engaged in activities aimed at climate protection. Since much of the action against climate change must necessarily be implemented at the local level, they have requested the Conference of the Parties (to the UN Convention on Climate Change, which held the Berlin Summit) to accept them as full partners.

Specifically, they request ongoing input to the so-called subsidiary bodies, endorsement of a Local Authorities Climate Assembly to facilitate advice to COP, and local authority representation on all general advisory committees.

The municipal leaders also asked national governments to include them in the formulation of national climate plans, and to use regulatory and economic instruments to help reduce the use of fossil fuels, protect forest resources, and promote renewable energy.

Acknowledging the need for economic growth, they urged local authorities in non-industrialized countries and countries in transition to "break the link between economic growth and energy consumption" and to take the "wiser course" of giving priority to renewable energy sources and energy efficient technologies.

Adapted from the newsletter *Eco*, February 1995.

*Alliance of Small Island States, which wanted a climate protocol committing the industrialized countries to a reduction of their emissions of CO₂ by 20 per cent by 2005.

The Municipal Leaders' Summit was organized by the International Council for Local Environmental Initiatives (ICLEI), to which requests for further information should be addressed.

GERMANY

Ecological tax reform to create new jobs

GERMAN RESEARCHERS have concluded that an energy tax – on fossil fuels and electricity – would stimulate employment in labour-intensive industry as well as leading to a considerable improvement in energy efficiency.

They estimate it would bring about an increase in employment in Germany of 600,000 (net effect) over a ten-year period, and cause energy consumption to fall by 21 per cent between 1990 and 2010 – despite an expected economic growth of almost 40 per cent during that time. The country's emissions of carbon dioxide would lessen accordingly.

Since no negative effects were discoverable for the economy as a whole, the proposed tax could, it is urged, be applied in any one country alone if international action should appear likely to be delayed. In other words, EU legislation should not be allowed to stand in the way of such a reform.

Although the actions of one country would, by themselves, have little effect on the earth's atmosphere, they could show that ecologically directed structural change can take place without causing harm either to the economy or to welfare. This would stimulate the development of environmentally benign technologies which could be used everywhere to reduce energy use.

Even if only one country were successful in "going it alone," its example would, the German economists maintain, be likely to hasten international action for measures to protect the global climate.

The proposed tax would be subject to a progressive increase, rising annually by 7 per cent in real terms from a "basic price" of DM9 per gigajoule. Renewable sources would be exempted, thus making them more competitive. The price of petrol would increase by 24 per cent in the ten-year period. The increases for household and industrial electricity would be 46 and 96 per cent respec-

tively. Oil for domestic heating would cost 73 per cent more.

The rise in costs for households and businesses would, according to the proposal, be offset in a "revenue-neutral" way, so that neither businesses nor householders would face a higher overall tax burden.

□ Businesses would be compensated through reductions in employers' contributions to the social insurance system (pension, health, and unemployment insurance).

□ Householders would be given a per-capita reimbursement (a so-called eco-bonus).

The gradual increase in the rate would allow for adjustment to the effects of the energy tax on costs – leading in turn to improved competitiveness in many cases. The export-dependent capital goods, construction, and service industries would particularly benefit.

The reform would also bring a net tax reduction for all households with a disposable income of up to DM4000 per month.

The study, commissioned by Greenpeace Germany, was carried out by the German Economic Research Institute (DIW) on the basis of projections for the annual growth rates for the country's economy made for the German government.

Environmentalists have long demanded measures to fight climate change and reduce carbon dioxide emissions. The DIW study has brought eco-tax reform to the fore in political discussion in Germany and opened the door to an ecologically sound structural change in the country's economy. Even industrialists are taking the idea seriously: eco-tax reform now echoes in German corporate boardrooms.

KRISTINA STEENBOCK
Greenpeace Germany

Adapted from the newsletter *Eco*, February 1995.

Petrol prices...

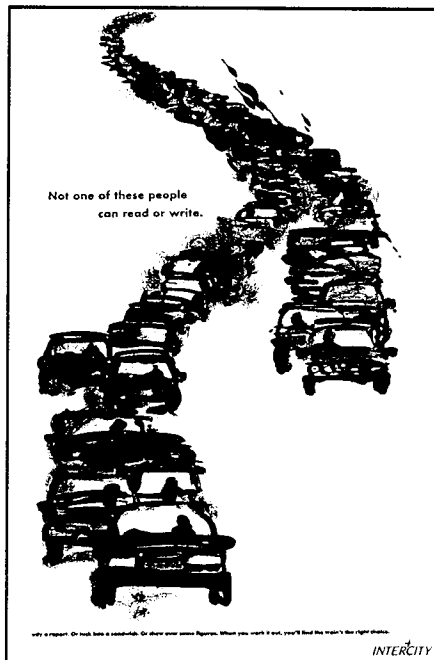
Continued from page 3

average 25 per cent shorter. The total of kilometres driven would be reduced by a third.

The measures of all three levels, taken together, are estimated to reduce the amount of fuel consumed by road traffic – and so the emissions of carbon dioxide – by 40 per cent by 2015, as from 1991 levels. Still more will therefore have to be done if the emissions of carbon dioxide are to be reduced by the 60-80 per cent the UN panel on climate change (IPCC) calculates is needed to stabilize concentrations in the atmosphere.

The greatest effect on travel will come from the proposed rise in the price of the fuel, but as the report emphasizes, all the listed measures will be necessary if a sustainable result is to be attained. Together they could markedly reduce the economic, environmental, and social costs of travel – which are estimated to amount to at least 5 per cent of the OECD countries' gross domestic product (see box).

It will be necessary, if the proposed measures are to be acceptable to the inhabitants of these countries, to inform them both of the present problems and the benefits of a change. They should be made to see that it will not only result in cleaner air, both locally and globally, but also in greater ease of movement in cities, better conditions for non-car owners,



"Not one of these people can read or write."
Promotion for travel by inter-city train in Britain.

and improved safety in traffic. The attendant extra tax income could be used by governments to offset any adverse consequences of the change.

PER ELVINGSON

Urban travel and sustainable development. Published by OECD and ECMT, 1995. Distributed by OECD Publication Service, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

OECD = Organization for Economic Cooperation and Development. Twenty-five member countries.

ECMT = The European Conference of Ministers of Transport. Thirty-one members.

As it is now

□ The streets in the central and inner areas of almost all large towns and cities are congested during much of the day, and at peak times there is congestion along the main arteries as well. In many places congestion is also increasing in the suburbs at certain times of the day. The cost of traffic congestion in the OECD countries is estimated to be equivalent to about 2 per cent of GDP, the gross domestic product.

□ There are unacceptable numbers of deaths and injuries on urban roads. Apart from the distress to the maimed and bereaved, they create an aura of fear. The estimated costs of road accidents in OECD countries amount to 1.5 to 2 per cent of GDP.

□ Many of the outer as well as the inner parts of cities are dominated by road traffic. Neighborhoods are split by

roads, and in most countries almost half of the urban residents are seriously affected by noise. The cost of air pollution in OECD countries might well be equivalent to about 0.3 per cent of GDP.

□ Almost all parts of cities are pervaded by polluted air. Besides contributing to smog, exhaust emissions are associated with a wide range of health problems. Local air pollution is estimated to cost the equivalent of about 4 per cent of the GDP in OECD countries.

□ The effects of road traffic are not all local. Smog and acid rain are regularly exported from cities to their surroundings and even to adjacent countries. Carbon dioxide, which is emitted whenever fossil fuels are burnt, contributes to global warming. The costs of non-local pollution may be between 1 and 10 per cent of GDP.

New publications from the Secretariat



The 100 worst sulphur emitters

By Mark Barrett and Rodri Protheroe. A greater part of the emissions of sulphur dioxide in Europe comes from a relatively small number of sources, and the hundred worst ones are responsible for almost half the total. Besides listing them, the report gives the addresses of the offending companies, so that together with a four-page factsheet summarizing its findings, and a 60x40 cm colour poster showing the location of the plants, it can serve as a background for local protests against effects of their emissions too.

To clear the air over Europe

By Magnus Nilsson. The World Health Organization (WHO) is currently engaged in revising its guidelines for air-quality standards. At the same time the European Union is working on an adjustment and extension of its mandatory limits for concentrations of air pollutants.

Besides surveying the present situation, the report puts forward proposals for revision of the system of guidelines and standards for air quality. Showing by innumerable examples the effects of air pollution particularly on health, it proposes a general tightening of air-quality standards in order to ameliorate the effects on health as well as the environment.

Large combustion plants.

Revision of the EC directive

By Fredrik Lundberg and Christer Ågren. Much of the acidifying air pollutants comes from large combustion plants, and just now an EC directive from 1988 for the control of their emissions is in course of revision. In this report the directive is critically examined, and proposals made, on the basis of the best available technology, for the admission of stricter standards both for new and existing plants.

Single copies of these reports can be obtained free of charge from the Secretariat. Please call for quotation if more copies are required.

SULPHUR DIOXIDE

Great gains from abatement

WHILE IT IS relatively easy to estimate the cost of reducing emissions of sulphur dioxide, it is more difficult to assess the gains. It seems however from a report made by Ecotec consultants for the UK Department of the Environment that the benefits accruing from cleaner air greatly outweigh the costs.

The supposition for the Ecotec findings was that the UK emissions would be reduced by 70 per cent by 2005 and by 80 per cent by 2010, compared to the 1980 levels – in line with the country's undertakings in accordance with the new protocol under the UN ECE Convention on Long Range Transboundary Air Pollution. The economic gain from the reduction of the emissions was assessed up to the year 2030 and discounted at a rate of 6 per cent to give a present-day value. The study took account of the benefits of avoiding damage to human health, vegetation, soils, crops, water resources, fish stocks, forests, and buildings. The costings were based on market values where available, otherwise methods such as willing-



Sensitive to acidification. How do we price him?

ness to pay or contingent valuation were used.

It appeared that the greatest benefits would be in respect to human

health – with savings, according to a central estimate (see table) of £18 billion. The exact figure would depend however on the scale of the effects, which is uncertain. The benefits of abatement would in any case be greatest in urban areas where there is the highest population and density of buildings.

Ecotec did not itself calculate the cost of SO₂ abatement. The Department of the Environment had however earlier stated that the capital cost of complying with the ECE protocol would be between £1 billion and £3 billion, and possibly less.

In the negotiations for the protocol, Britain had been pressed to reduce its emissions of sulphur by 80 per cent already by 2005. Doing so would, according to the Ecotec study, increase the benefits by £1.7 billion, with lower and upper bounds of £136 million and £1.9 billion. It should be noted that the figures refer to the effects on Britain alone.

PER ELVINGSON

Source: **ENDS Report No. 241**, February 1995. A summary is available from Ecotec at a cost of £20 (£60 for the full report). Ecotec, Priestley House, 28-34 Albert Street, Birmingham, England B4 7UD.

Present value of estimated benefits of sulphur dioxide abatement plan (£m).

	Lower bound	Central estimate	Upper bound
Vegetation	0	29	164
Aquatic ecosystems	0	711	3,996
Crops	11	19	19
Forests	0	0	1
Human health	505	14,595	14,595
Modern buildings	1,914	2,614	3,566
Total benefits	2,430	17,968	22,341

Coming events

Transforming the Baltic Environment: Strategies and Policies. Nyköping, Sweden, November 13-15, 1995.

Fifth international conference on environment and sustainable development in the Baltic region.

Inquiries: Stockholm Environment Institute, Box 2142, 103 14 Stockholm, Sweden.

Spatial and Temporal Assessment of Air

Pollution Impacts on Ecosystems. Vienna, November 22-24, 1995.

Inquiries: Dr. Gerhard Soja, Research Centre Seibersdorf, Dept. of Agricultural Research/LA, A-2444 Siebersdorf, Austria.

Executive Body for the UN ECE Convention on Long Range Transboundary Air Pollution. Geneva, Switzerland, November 28-December 1, 1995.

Intergovernmental Panel on Climate Change: 11th session. Rome, Italy, December 11-15, 1995.

Inquiries: IPCC Secretariat, c/o WMO, C.P. 2300, 1211 Geneva, Switzerland, fax +41-22-7331270.

EU Council of Environment Ministers. Brussels, Belgium, December 18-19, 1995.