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Prime Minister

ACID DEPOSITION

P41 I was invited at our meeting on 17 May to set out the options for our policy on acid rain.

Background

2. This problem has, of course, both scientific and political components. The scientific issues are complex and long term and although there have been welcome recent developments in our understanding, it is still far from complete. We cannot be certain which causes determine which effects - and therefore what success might follow from the various actions we might take. We are giving a high priority to research designed to reduce these uncertainties. Meanwhile we have to make provisional and prudential judgements, in such a way that we can change direction without too much difficulty or expense.

3. The political problem is, however, a fairly immediate one. A number of other Governments (notably the members of the so called "30% club") have embarked upon programmes of sulphur dioxide emission abatement. A draft Directive now before the EC Environment Council calls for a 60% reduction in sulphur dioxide, 40% in nitrogen oxides and 40% in particulates from power stations and other major installations by 1995 (all percentages below a 1980 baseline). This pressure is attributable to genuine concern about transboundary pollution, especially in Scandinavia and Germany, as well as to a desire for evenness in industrial costs. And in Western Europe generally professional as well as public opinion is widely agreed upon the need for abatement of acidifying emissions. We can expect to be pressed to accept such action at the forthcoming Conference in Munich, mentioned with approval in the Summit declaration.

4. Against this background, I have considered four options:

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(a) pursue a vigorous and well published research programme and welcome technological trends which bring emissions down, but take no other special action (our policy so far);

(b) join the "30% Club";

(c) support the Commission's draft Large Plant Directive;

(d) pursue a package of policies which achieves creditable gains in abating the air pollutants involved in acid deposition, but falls into none of the above categories.

5. I advocate option (d), but before outlining it I would like to summarize my objections to the other three.

6. Before starting this analysis, it is worth reminding ourselves of what has been happening. UK total sulphur dioxide emissions rose steadily during this century to peak at 6.2 million tonnes in 1972; they then fell to 4.67 million tonnes in 1980 and, if provisional figures are confirmed to about 3.75 million tonnes in 1983 (thereby giving us a 20% reduction in the past 3 years). Sixty-five per cent of these emissions come from power stations. Nitrogen oxide emissions have remained more or less steady at 1.65-1.75 million tonnes over the past 10 years: 46% of them come from power stations and the rest from a multiplicity of sources (statistical tables are at Annex A). But I must stress that there can be no guarantee that the gain in SO₂ abatement will be held. It has come from such changes as the substitution of gas for other fuels, the reduced use of heavy fuel oils, energy conservation, and the depression of industrial activity. Some estimates imply that we could see a rebound as the economy picks up.

7. I turn now to the four options. In the first part of this analysis I concentrate on sulphur dioxide because that is the most difficult problem, but I discuss nitrogen oxides,

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hydrocarbons and ozone when I come to option (d).

The research option

8. It is common ground that we must pursue research, and we proposed a collaborative programme at the Economic Summit. We are spending over £5m a year on the themes identified at the Chequers presentation, and in addition the CEGB has a £50m R & D programme on new technology for abating SO₂ and NO_x emissions from power stations. These costs are modest compared with the potential cost of emission control. We have to present this effort positively and get more credit for it than we have been doing. But research alone will not meet our political need, which is to have a credible response to the various international demands. While the research effort must be part of our package, I therefore reject it as the sole action.

The Large Plant Directive

9. At the other end of the scale, I am sure we are all agreed in rejecting the Large Plant Directive in its present form. Although the provisional figures suggest that we may have achieved a 20% reduction in national sulphur dioxide emissions between 1980 and 1983, and 15% in those from large plants as defined in the directive, to achieve a further reduction of 45% in the latter sector by 1995 could only be achieved by fitting flue gas desulphurisation to virtually all the CEGB's large power stations. This costs about £150m per 2 Gigawatt (2000 MW) installation and even assuming that we can hold the 15% gain since 1980, would incur expenditure of the order of £1.5 billion and very likely more. It is not a practicable proposition.

The 30% Club

10. I said in my earlier paper, I am much more attracted by the proposition that we joint the "30% Club". Unlike the draft Directive, this embraces total national emissions of sulphur dioxide and if we can hold to the 1983 position we are already two-thirds of the way there. Against this, there are however substantial uncertainties. The best estimates suggest that

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even without new special measures 1995 national emissions are likely to be less than those in 1980, but we cannot be confident of holding all or most of the recent advance. While reductions in the use of heavy fuel oil, further energy conservation, and a variety of ancillary measures may help there is a real risk that we could find ourselves having to secure at least a 15% reduction in national SO₂ emissions by installing abatement equipment which in this time scale could only be FGD. Since each 2GW FGD installation reduces national emissions by 3% of the 1980 total, a 15% reduction would mean 10 GW - at a cost of £0.8bn. Although I have to stress that in my judgement nothing short of the "30% Club" will calm our international critics, the calculation leads me to look at the alternative.

The ingredients of a package

11. I start from a point evident at the Chequers presentation - that sulphur dioxide abatement deals with only one of the components of acid deposition (the generally accepted ratio is 70:30 sulphuric:nitric acids). The Large Plant Directive is in this respect more sensible than the 30% Club in dealing with nitrogen oxides as well as SO₂. I believe that there are political advantages in our emphasising our concern to tackle both - and also the hydrocarbons that, with nitrogen oxides in sunlight, generate the ozone that is increasingly emerging as a cause of forest damage.

12. I have asked how far we might get by 1995 and then by 2000 if we do not commit any investment to flue gas desulphurisation (or the equally expensive and less proven Japanese technology for removing nitrogen oxides from flue gases).

13. For the purposes of this calculation I will make the optimistic assumption that we can hold onto the 20% reduction in national SO₂ emissions between 1980 and 1983. From then

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on, analysis of future trends in emissions and of the most cost-effective options open to us depends crucially upon assumptions about changes in demand for electricity and about the growth of nuclear power. There are considerable uncertainties here. The CEGB's "medium nuclear scenario", prepared for Sizewell, envisaged a 0.75% per annum increase in electricity demand and the construction of a further 10GW (the equivalent of 9 Sizewell Bs) of nuclear capacity by 2000. If this were achieved, CEGB SO₂ emissions would fall by 20% by 2000 and 30% by 2002/3 - bringing national totals down by 14% - 20% and giving us a gain of 34% to 40% since 1980. CEGB are uncertain of achieving this and have referred to the possibility of no more than 5 or 6GW being commissioned by 2000, and in this case the improvement on 1980 falls to 27% to 30%. The gap could be narrowed by other technical advances, like the substitution of low sulphur coal - water slurries for heavy fuel oils, coal pre-treatment, the adoption of small scale atmospheric fluidised bed furnaces in industry and even the importation of some low-sulphur coal, but it is hard to estimate the gains from such a package. Taking all the data together, however, I remain optimistic that we could look for a 30% reduction in national SO₂ emissions by 2000, and possibly more, without the use of FGD and without major investment above that already planned. I suggest that we make this a stated objective of our policy. It will not get us into the "30% Club" as currently defined, but it will display a positive commitment and make our international and domestic position easier.

14. At present we do not envisage building any new coal-burning power stations until the early years of the next century. When we do, I take it for granted that they will be designed with whatever technology for sulphur and nitrogen oxide control has emerged by then as "best practicable means". We have encouraged research on more cost-effective technology in this area, and much is going on, so that I am confident we shall

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end up with something considerably cheaper than the £120m cost of FGD in a new 2GW station. All we need to say now is that we envisage such technology as part of the design of such stations - when we build them.

15. The nitrogen oxide position appears a little more tractable. Our "baseline" however has changed little between 1980 and 1983 (it is to our credit that our emissions have stayed more or less level while the Germans' have increased by some 50% over 15 years). The CEGB, in partnership with private industry, are developing low - NOX burners suited to UK conditions and if even partly successful these might allow a 10-20% reduction in these emissions from CEGB fossil-fuelled plants by 2000. Other equipment might be applicable to the 19% of national emissions from other industry: nuclear substitution at 5 and 10 GW would give the CEGB a 10% and 20% NOX reduction respectively. Given a parallel attack on the 19% of NOX from petrol engined cars (and the measures I advocate below would allow this to be halved by comparison with the current European standard), we might well achieve a 20% - 30% reduction in national emissions by 2000. I suggest we should declare 30% as our goal, and proclaim a positive initiative in that direction. We would then be mounting an attack on total acidity, which the members of the 30% Club are not.

16. Vehicle emissions should be the other component of our package. We are agreed that we must not accept the extremely expensive United States 3-way catalyst system (which could add £2.01bn to annual UK motoring costs) - but a reduction of 85% carbon monoxide, 60% hydrocarbons and 40% NOX emissions by comparison with an uncontrolled vehicle could be gained by a "lean burn" engine tuned for minimum pollution at a benefit in operating costs (from improved fuel economy) of £30 per car per year. The first stage of the Commission's current proposals for new petrol driven vehicle emissions could be met by this technology and I believe we should support them. We shall naturally go on pressing, in this context, for the

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earliest possible achievement of unleaded petrol. The Commission's second stage proposals (for 1995) are not due to be confirmed until 1988 but it is most unlikely that further "lean-burn" engine development will suffice to meet them, though some further reduction in hydrocarbon emissions (which scientific studies indicate as the key factor in ozone formation) will probably be feasible at relatively small cost. I suggest that our policy should be to accept tighter standards provided that these can be achieved by engineered solutions that do not require costly, fragile and energy-wasteful systems such as the USA 3-way catalyst.

17. I accept that there is an element of optimism in this package. We shall need to monitor our performance carefully as we go along. Technology should be working for us, especially if we set clear goals for industry (including the CEE). Should it become apparent that we shall miss the 30% objectives we have two options: to resile from the policy or to commit additional investment - and the case for the latter will be easier to judge as our research programme clarifies the issues. I therefore have no hesitation in embarking upon this course.

Negotiations at forthcoming meetings

18. I have deliberately left until now proposals for our stance at the Munich Conference, and in the Environment Council on 28 June when the Large Plant Directive comes forward for discussion for the first time. I believe that if we can agree the broad lines of policy set out here before the Munich Conference, a credible negotiating position will follow both there and in the Environment Council. Clearly we have to reject the Directive as drafted, but I believe we shall be well placed to explore the prospects of securing changes in the percentages, dates and industrial scope so as to achieve an acceptable final text. That would allow us to be positive (whereas outright opposition to the whole concept could undermine the gains we may hope for from the package of policies I set out above), without binding an economic millstone about our necks.

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Conclusions

19. On the basis of this analysis I propose that we:

(a) continue to support and publicise a well-balanced programme of research on air pollutants, their effects and the technology for their control, participating in the international exchanges that will make the most of all our national efforts;

(b) announce our intention to achieve further reductions in national sulphur dioxide emissions, consolidating the remarkable gains of recent years and aiming at a reduction of at least 30% by 2000;

(c) announce that we shall pursue available measures to reduce nitrogen oxide emissions, aiming at a 30% abatement by 2000;

(d) make it clear to the public that the development of the nuclear component is an important element in our strategy, but that we also seek gains in a variety of other ways, and will expect any new fossil fuelled power stations to adopt the most cost-effective sulphur and nitrogen oxide abatement then available;

(e) support stricter emission standards for petrol-engined cars - but ensure that the latter do not require 3-way catalysts.

20. I am sending copies of this minute to Willie Whitelaw, Geoffrey Howe, Peter Walker, George Younger, Nick Edwards, Norman Tebbit, Tom King, Michael Jopling, Peter Rees, and Nicholas Ridley, and to Sir Robert Armstrong.

William Waldegrave

(William Waldegrave for Patrick Jenkin)

15 June 1984

2.4 Sulphur dioxide: estimated emissions from fuel combustion: by type of consumer and fuel¹

(a) By type of consumer

Million tonnes

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^P	Percentage of total in 1982
Domestic	0.37	0.36	0.35	0.30	0.28	0.29	0.26	0.26	0.22	0.21	0.20	5
Commercial/ public service ²	0.31	0.29	0.26	0.24	0.24	0.24	0.23	0.24	0.20	0.18	0.17	4
Power stations	2.87	3.02	2.78	2.82	2.69	2.74	2.81	3.10	2.87	2.71	2.65	66
Refineries	0.26	0.29	0.30	0.26	0.28	0.27	0.29	0.29	0.28	0.22 ^R	0.21	5
Other industry ³	1.75 ^R	1.77 ^R	1.59	1.44 ^R	1.42 ^R	1.37 ^R	1.36 ^R	1.38 ^R	1.05 ^R	0.84 ^R	0.76	19
Rail transport	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	< 1
Road transport	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.04	0.05	0.05	1
All consumers	5.64 ^R	5.80 ^R	5.35 ^R	5.13 ^R	4.98 ^R	4.98 ^R	5.02 ^R	5.34 ^R	4.67	4.23 ^R	4.04	100

2.7 Nitrogen oxides

estimated emissions¹ by sourceNitrogen oxides²

Thousand tonnes

	1972 ^R	1973 ^R	1974 ^R	1975 ^R	1976 ^R	1977 ^R	1978 ^R	1979 ^R	1980 ^R	1981 ^R	1982	Percentage of total in 1982
Domestic	51	53	53	51	50	52	52	56	52	52	51	3
Commercial and Industrial	470	486	449	408	419	415	405	417	338	318	309	19
Power stations	731	808	722	760	770	793	806	876	851	818	769	46
Incineration and agricultural burning	8	8	8	10	12	12	12	12	12	12	12	1
Road vehicles												
petrol engine	262	279	272	266	279	286	303	308	316	309	318	19
diesel engine	158	170	166	162	168	171	176	182	176	167	172	10
Railways	48	50	47	44	41	42	42	41	40	39	35	2
All emissions	1,728	1,854	1,716	1,700	1,739	1,771	1,796	1,893	1,785	1,714	1,666	100

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