PREM 19/2969

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Royal Commission on Environmental Pollution Effects of Acid Rain

Ozone layer conference

Agriculture and conservation

climatic change

Environmental Protection Bill

FOIDER: Environmental Issues Briefing + boarding

AFFAIRS

Part 1: Sept 1979

Pare 17: July 1990

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PART 18 begins:-

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10 DOWNING STREET ...

LONDON SWIA 2AA

From the Private Secretary

30 August 1990

WORLD CLIMATE CONFERENCE

Now that the State Opening of Parliament has been set for Wednesday 7 November, the Prime Minister is uneasy about delivering the World Opening speech at the Climate Conference in Geneva the previous day, feeling that she will need the time to finalise her speech in the Debate on the Address. I have (I think) persuaded her to keep the Geneva engagement, but on two conditions:

- we shall need to have a draft of her opening speech in very good time. I suggest we should aim for Monday 15 October, that is immediately after the Party Conference. I hope you will work to this deadline
 - she would be very grateful if your Secretary of State could involve himself personally in the drafting. I realise this is an imposition, but it will be very much appreciated.

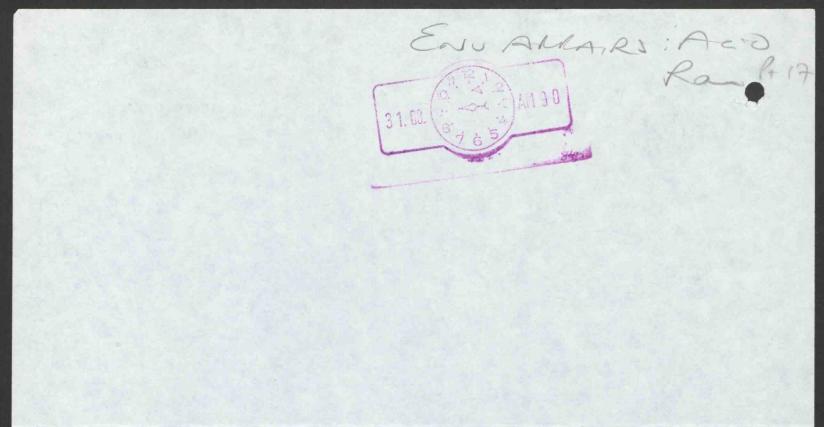
I am copying this letter on a personal basis to Stephen Wall (Foreign and Commonwealth Office).

(C. D. POWELL)

Phillip Ward, Esq., Department of the Environment.

S

PRIVY COUNCIL OFFICE WHITEHALL, LONDON SWIAZAT 30 August 1990 Lhal ENVIRONMENT PROTECTION BILL The Lord Privy Seal has seen a copy of Sandy Bishop's letter to you of 21 August about the proposal to add a new provision to the Environmental Protection Bill to increase penalties for water pollution offences. The Lord Privy Seal agrees that in the light of the reasons set out in Stephen Stringer's letter to Douglas Slater of 30 July, Government amendments can be tabled on 24 September and not by 19 September as originally intended. As you know, the Lord Privy Seal is also concerned to keep a check on the number of Government amendments to be tabled at the Report Stage in the House of Lords and he has therefore requested to be present at any meeting which may be arranged to discuss the water pollution amendments. I am copying this to the recipients of Sandy Bishop's letter. Private Secretary Tim Sutton Esq



MISS SINCLAIR

ACID RAIN

Walley Commencer Street, Spirit

The Prime Minister saw over the weekend your note of 16 August and its attachments which she noted carefully but without specific comment.

(CAROLINE SLOCOCK)
28 August 1990

METEOROLOGICAL OFFICE London Road, Bracknell, Berkshire RG12 2SZ **Chief Executive** Telephone: Bracknell (0344) 85460 Telex: 849801 WEABKA G Dr John T. Houghton CBE, FRS Fax: Bracknell (0344) 856909 29 August 1990 Private Secretary Prime Minister's Office No 10 Downing Street Whitehall Dear Sir, Dr J T Houghton, Chief Executive, at present attending the IPCC Plenary Meeting at Sundsvalle, Sweden has asked me to send the enclosed publications to the Prime Minister with the additional request that she receives them today. Yours faithfully Bunda Bell (Ks) Brenda Bell SPS/Chief Executive

Dury Clerk Pl JY PRIME MINISTER WORLD CLIMATE CONFERENCE, 6 NOVEMBER _ CAS 68M 6 6 90 PT16 I attach the original note about this, which you approved at the time. You said last week that you now preferred to cancel your attendance at the World Climate Conference, to leave more time to prepare for the State Opening. I will put that in hand tomorrow. That said, it is a pity. You are the only Minister or Prime Minister of any country invited to address the World Climate Conference: and I think you would get more publicity for your speech than for opening in the Debate on the Address. I think we could get the speech written well in advance. But I quite understand that you will not want to feel hassled and under pressure when the time comes over the Debate on the Address. More prosport CD? CHARLES POWELL 26 August 1990

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SCOTTISH OFFICE WHITEHALL LONDON SWIA 2AU

John Neilson Esq Private Secretary Secretary of State for Energy Department of Energy 1 Palace Street LONDON SW1E 5HE

24 August 1990

Dear John,

In accordance with arrangements agreed at MISC 141 my Secretary of State has asked me to clear with yours the arrangements he proposes for presentational and publicity aspects of the Environment White Paper.

I understand that a firm decision has already been taken to publish the White Paper on 25 September. As SDD officials had already indicated to their counterparts in DOE, this is very difficult for my Secretary of State and his junior Minister Lord James Douglas-Hamilton. They both have long standing engagements which begin on that day. Mr Rifkind is due to be in Argyll and Lord James has a series of meetings in Dumfries and Galloway and they would not wish to cancel these. Moreover, they anticipate that Mr Patten's news conference will attract the main coverage on TV that evening and in the next morning's Press, even in the Scottish

My Secretary of State has therefore concluded that he can offer effective publicity support on 25 September without a news conference. It is in the weeks immediately after publication that we can expect a more informed and probing analysis from the media. Scottish Ministers will then ensure that the Government's case is confidently presented in Scotland.

So far as the arrangements immediately prior to and on publication day are concerned, we envisage the following package of publicity support:

Sunday 16 September: extensive Press coverage in the Scottish Sunday Press is anticipated from the issue of the biennial digest of Scottish environmental statistics.

Tuesday 18 September: favourable Press coverage is expected on my Secretary of State's speech the previous day, opening an

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international conference in Glasgow on acidification. This will provide an opportunity to emphasise the impressive Scottish research effort in this field and to look forward to the important scene-setting which the White Paper can provide to a range of environmental issues.

Tuesday 25 September: a news release summarising the Scottish Chapter will be issued, including a statement from my Secretary of State.

Immediately after the DOE news conference, professional and administrative officials from the relevant Scottish Office Departments will provide a non-attributable briefing in Edinburgh on the Scottish chapter. We will also explore the possibility of a Ministerial picture facility that day to illustrate one of the themes of the Scottish Chapter.

Post-publication

Scottish Ministers- will make themselves available for TV, radio and Press interviews in the next few weeks. We will explore any interest in signed articles, particularly for the popular Sunday Press in Scotland.

Late Autumn

My Secretary of State would announce his decision to rename the Scottish Development Department as the Scottish Office Environment Department as part of a package relating to the Scottish Office corporate image. There are also a number of speaking engagements at which Scottish Ministers can highlight environmental issues and the main themes of the White Paper.

I hope that Mr Wakeham is content with these arrangements. If there are particular improvements which he wishes to suggest, perhaps we could have an early word.

I am copying this letter to Andrew Turnbull, Shirley Oxenberg, Roger Bright, Lawrence Conway and Stephen Leitch.

John Sucally.

While Direct

Private Secretary

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Minister for the Environment and Countryside

DAVID A TRIPPIER RD JP MP

NBPM

Department of the Environment 2 Marsham Street London SW1P 3EB

Telephone 01-276 3440

T/PSO/32807/90

21 AUG 1990

Dear New Sutton.

The Lord President wrote to my Minister on a August about our request to add a new provision to the Environmental Protection Bill to increase penalties for water pollution offences. The Lord President expressed concern about this proposal and, more generally, the number of possible Government amendments to the Bill at Lords Report Stage. He suggested that it would be helpful to meet to discuss these issues before 19 September which is the date the Lords Business Managers have set as the deadline for tabling of Government amendments.

My Minister would of course be more than happy to meet the Lord President and I have therefore asked our diary secretary to contact yours. In advance of the meeting, however, the Lord President will wish to be aware that before he moved to the Department of Trade and Industry Lord Hesketh agreed with Lord McIntosh that Counsel would not table any Government amendments to the Bill until after 24 September. The attached letter from Lord Hesketh's Private Secretary to Douglas Slater in the Whips Office explains the reasoning behind the Minister's agreement. Subject to the views of the Lord Privy Seal and the Chief Whip, Douglas has agreed to our suggested date, provided all our amendments are tabled on 24 September. Any Government amendments proposed after this date would not be tabled.

I am copying this letter to the Private Secretaries of the Prime Minister, Secretary of State for Trade & Industry, Secretary of State for Wales, Chief Secretary to the Treasury, Secretary of State for Energy, the Minister of Agriculture Fisheries & Food, and other members of L Committee, and to Sir Robin Butler and First Parliamentary Counsel.

Your sicerely,

SANDY BISHOP Private Secretary





DEPARTMENT OF THE ENVIRONMENT 2 MARSHAM STREET LONDON SWIP 3EB 01-276 3000

My ref

ST/PSO/31459/90

Your ref

30 July 1990

Dear Douglas

Thank you for your letter of 24 July about Report Stage of the Environmental Protection Bill.

We are very conscious of the reasons why you are concerned about the tabling of Government amendments for Report Stage. The deadline you suggest of 19 September for tabling Government amendments would nevertheless be extremely tight - perhaps, in practice, impossibly so. Officials here have however discussed this problem with your office and I believe as a result that we can meet the various operational requirements without the necessity of that deadline.

As you know, Lord Hesketh, before he moved to DTI, secured Lord McIntosh's agreement to the proposition that the Government should not table any amendments before 24 September. They both felt this would secure the great advantage of not requiring the Opposition to keep watch for a long, thin trickle of Government amendments during the summer but rather would ensure that Government amendments would be tabled in an orderly fashion at the time when all parties would be best placed to take action accordingly. We would in any case have great difficulty in tabling amendments by the deadline you have proposed, because of the annual leave of officials and in particular of Parliamentary Counsel himself.

Having asked officials to survey the ground of expected Government amendments for Report stage, I am able to reassure you that the agreement with Lord McIntosh should not present problems in practice. We expect to propose only a relatively small number of Government amendments at Report stage. That number includes amendments in response to the points which the Government promised to consider during Committee stage. Neither these nor the others we need to make should prove in any way controversial. Our current expectation of numbers is, in rough terms:

Part I: 3 amendments Part II: 14 amendments

Part III: up to 9 amendments

Part IV: 3 amendments



Part V: 4 amendments
Part IV: 4 amendments
Part VII: 5 amendments
Part VIII: no amendments (save that we may want to ensure that some technical amendments are made to Clause 141 - Dogs - irrespective of what our final position on the Clause itself is to be).

Although we are exercising a self-denying ordinance as regards Government amendments at this late stage in the Bill, we cannot of course be certain that other matters will not emerge over the summer which require additions to these numbers. At present, however, we are optimistic that the risk of significant increases in these estimates is slight. The figures also exclude any drafting amendments which Parliamentary Counsel may wish to propose, and also any to be put forward by Territorial departments. But amendments in these two categories are more than likely to be small and purely technical.

Subject to the usual caveats, officials will be making every effort to ensure that all Government amendments are down on or as soon as possible after 24 September.

I hope all this good news will contribute to the happy summer which I in turn now wish you!

Yours ever

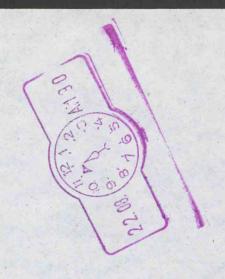
Otophon

S E S STRINGER Private Secretary

Douglas F Slater Esq



ENU AFFAIRS: Acid Lawn PTA



MISS SLOCOCK

THE GREAT CLIMATE DEBATE

- 1. The Prime Minister may be interested to see the attached article on global warming from a recent edition of "Scientific American".
- 2. It is commendably balanced, warning policy-makers equally against apocalyptic thinking and ostrich-like behaviour. The concluding paragraphs very much support the line we are taking in the Environment White Paper.

CAROLYN SINCLAIR

The Great Climate Debate

Greenhouse effect and the prospect of global warming is the subject of scientific and political controversy. Should we take steps now to avoid consequences we cannot foresee?

by Robert M. White

In the waning years of the 10th century, millions braced themselves for the apocalypse, believing that the approaching year 1000 was the very millennium—the end of the heavens and the earth prophesied in the Bible's Book of Revelation. Not surprisingly, the prospect of the impending Day of Wrath terrified normally sane people into rash and (in retrospect) foolish actions. Some gave away all of their possessions; others hastened to do harsh penance for their deeds.

In this final decade of the 20th century, a different kind of apocalypse causes widespread concern. This time the hand of God has been replaced by more visible agents: belching smokestacks, gasoline-powered automobiles, power-generating stations and the voracious destruction of forests, all of which may be turning up the heat on an overburdened environment. Global climate warming, some claim, threatens the very habitability of the planet. Others hold that the predictions of environmental collapse are not well founded and are goading us into hasty political action. Is our planet the "Endangered Earth," as *Time* magazine would have it in its 1988 year-end cover story? Or is it as *Forbes* magazine put it, "The Global Warming Panic: A Classic Case of Overreaction"?

Debate in the media reflects uncertainty among climatologists and geophysicists. Some of the world's eminent authorities on the atmosphere recently hurled verbal brickbats at one another in the pages of the prestigious journal Science. Their charges of "junk science" and "science by consensus" reflect the acrimonious nature of the debate within the scientific community. Some members of the National Academy of Sciences, including one of its former presidents, charge that policymakers are being induced to take unwise actions on the basis of uncertain scientific evidence. Set against this view is the recent statement of the Union of Concerned Scientists urging action by the government. It was signed by 52 Nobel laureates and more than 700 members of the NAS.

In spite of the scientific uncertainty, government and nongovernment groups are rushing to outdo one another in urging drastic action now to "stabilize" the global climate. From Washington to Toronto and The Hague, from Cairo to Moscow, international conferences of experts and political leaders have called for action. Soviet President Mikhail S. Gorbachev, President George Bush, British Prime Minister Margaret Thatcher and French President François Mitterand share similar views on the climate-warming issue.

Back home, debate within the Bush administration on how the U.S. government should act is intense. Caught between the urgings for action from the Environmental Protection Agency and Congress and cautions from his science adviser and chief of staff, President Bush called two major conferences to address the issue of climate warming. The first, held in April, brought together the heads of scientific, economic and environmental agencies of many governments. The second will be an initial meeting of governments, scheduled for early 1991, to begin negotiation of an international convention to stabilize global climate.

hile there are still doubts in the White House, Congress has been environmentally hyperactive. Many pieces of legislation have been introduced to address the predicted climate warming. Leading the bipartisan effort have been Senator Timothy E. Wirth of Colorado, Senator Al Gore of Tennessee and Congresswoman Claudine Schneider of Rhode Island. Some of this legislation is comprehensive and far-reaching. It offers suggestions for action on the energy, agriculture and transportation fronts as well as for intensified research.

The actions proposed would radically change the most vital functions of human economies. They could include such diverse actions as using energy more efficiently, shifting the fossil-fuel mix from oil and coal to natural gas, relying more heavily on renewable energy sources and using more nuclear and solar energy. Measures could also include implementing reforestation, phasing out use of chlorofluorocarbons (CFC's) and changing agricultural practices.

Policy initiatives of this kind would

ROBERT M. WHITE is president of the National Academy of Engineering. He was formerly chief of the U.S. Weather Bureau and administrator of the National Oceanic and Atmospheric Administration. He has also served as president of both the University Corporation for Atmospheric Research and the American Meteorological Society. In 1979 he was chairman of the first World Climate Conference of the World Meteorological Organization.

36

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FORTRAN Benchmark Results

Type Of System	Double- Precision Whetstone*	Sieve*	Livermore Loops*
80386 DOS PC, 25Mhz, 80387	9.7,1.5	4.3,1.8	63.8,63.4
VAX/VMS 11/780	13.2,3.0	7.1,3.5	59.2,52.5
Sun 3 w/ Sun IV OS, 68881	23.1,2.0	9.2,1.5	225,2,103.0
*Compile/Link, R	untime in sec	onds.	/

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 OS/2 Dynamic Link Libraries let you share libraries among multiple applications and update libraries without relinking.

 Use OS/2 multithreads to execute multiple routines simultaneously. with ease if the energy of the transition states is low and with difficulty if it is high. The Woodward-Hoffmann rule is a procedure for relating the energy of the transition states to the number of electrons involved in the reaction and their motions.

During his collaboration with Woodward, Hoffmann developed and refined a distinctive research style. "I don't start with big tasks or the great questions of chemistry," he remarked. "I do many small problems inspired by experimental work. I try to explain the shape of a molecule or some reaction. Everything in the world is connected to everything else. I know I will begin to see connections."

Hoffmann has successfully applied his methods to organic, inorganic and solid-state chemistry. He has devoted roughly 10 years of his life to each, but he confesses that his decisions to switch were not conscious or sudden. "I have always done the next interesting thing."

At times when Hoffmann has just entered a new field, his colleagues have criticized his work for being too simplistic. But propelled by his early successes, Hoffmann has managed to excel. In inorganic chemistry, he developed a technique to predict the structure and reactions of organometallic compounds. In solid-state chemistry. he translated the physicist's concept of densities of electron states into the chemist's idea of molecular orbitals. Indeed, Hoffmann is the only person in the history of the American Chemical Society to be honored for work in both organic and inorganic chemistry.

Hoffmann was only 44 when he shared the Nobel prize with physicist Kenichi Fukui of Kyoto University. Hoffmann received the prize in part for his contribution to the Woodward-Hoffmann rule. Had Woodward not died two years before the Nobel committee's announcement, Hoffmann believes, Woodward would have also been awarded the prize.

In many ways, Hoffmann's style of chemistry pervades his teaching. Even in introductory courses, he feels it is important to communicate what modern chemists find exciting. He prefers to begin a lecture with a discussion of a paper from the current chemical literature. He then highlights the connections between the paper and the curriculum. Nearly every year since starting at Cornell in 1965, he has taught introductory chemistry, which was attended this spring by 740 students.

Hoffmann believes that teaching complements his research efforts. "The desire to teach others, enhanced by being *obliged* to teach others, leads to greater creativity in research," he wrote in a column for the *Boston Globe* last November.

Out of a desire to express the beauty of chemistry and his own emotions, Hoffmann at the age of 40 began to write poetry. He was inspired by Mark Van Doren, a professor of poetry at Columbia, and Pulitzer prize-winning poet Wallace Stevens. "I should have taken a course, but I thought I was too old." Today his source of "valuable criticism and support" comes from a group of Cornell poets, including A. ("Archie") R. Ammons.

Hoffmann recently finished his second volume of poetry, *Gaps and Verges*, published by the University of Central Florida Press. Among his topics are his childhood experiences, romance, natural beauty and, of course, chemistry. Peter Harris wrote of his work in the *Virginia Quarterly Review*, "At times, Hoffmann's treatment of the scientific seems prosy.... But, in general, his poetry is distinguished by the appreciative ease [with] which it moves between scientific and nonscientific understanding."

Branching out from his poetry projects, Hoffmann has written several articles on science policy and many essays for the magazine *American Scientist*. Recently he teamed up with artist Vivian Torrence to produce a book entitled *Chemistry Imagined*. Torrence is creating some 25 collages on chemical themes. To accompany these images, Hoffmann is composing related essays and poems.

In 1986 Hoffmann began taping the television series *The World of Chemistry*, produced by the Educational Film Center in Annandale, Va. The program introduces a variety of chemical principles and theories, which are placed in historical context and are presented through experimental demonstrations and computer animation.

In front of a camera, Hoffmann seems awkward; his voice, which is usually soft and soothing, becomes high-pitched. "Our budget was too small to send me to acting school," he explained. Nevertheless, he has embarked on a new television project called *The Molecular World*. Still in the planning stages, it will include three prime-time programs.

Having made the transition from poetry to television and from organic to solid-state chemistry, Hoffmann, now 53, has earned celebrity status among chemists. In spite of his fame, he remarked that "it has not become any easier to publish a paper, nor, for that matter, a poem."

—Russell Ruthen

alter the technology and economics of energy. Our use of land and water would also need to change. Economic growth in nations dependent on fossil fuels might be slowed. And the problems of arresting the growth of global population would become even more pressing. How can national and international policy formulation be moving so rapidly to address the specter of climate warming when agreement about the science is lacking and the economic and social costs of action have hardly been tallied? At the root of this thinking is a confluence of diverse scientific, economic and environmental forces.

The idea that the actions of humanity might change the composition of the atmosphere and hence the world's climate has deep historical roots. As early as the 1860's, it was suggested that slight changes in atmospheric composition might bring about major variations in climate. Increases in carbon dioxide ($\rm CO_2$) and other atmospheric trace gases can contribute to what has been called greenhouse warming because these compounds allow the sun's energy to reach the surface of the earth, thereby warming it, while pre-

venting much of that energy from being reradiated to outer space.

At the end of the 19th century the Swedish scientist Svante A. Arrhenius calculated how changes in carbon dioxide content would affect the temperature at the earth's surface. He estimated that a doubling of carbon dioxide would produce a global warming of about seven to 11 degrees Fahrenheit (four to six degrees Celsius), not too far off modern calculations. Yet it was only with the inception of the International Geophysical Year, a worldwide periment in 1957 to monitor the global environment, that scientific data validating the increase of carbon dioxide in the atmosphere became available.

Roger Revelle, then director of the Scripps Institution of Oceanography, his colleague Hans E. Suess and C. David Keeling, his student, undertook such measurements. Revelle had long contended that humans were carrying out an unintended geophysical experiment on the atmosphere by burning fossil fuels. Determined to monitor the carbon dioxide content of the atmosphere, he persuaded Keeling to develop the instrumentation.

The measuring devices were placed in the Mauna Loa climate observatory in Hawaii at an altitude of about 11,000 feet. Beginning in 1957, the data they collected revealed a systematic increase in atmospheric carbon dioxide. Keeling's observations were verified at the South Pole and at other locations around the world. To date, the change from 290 parts per million in 1880 to 352 parts per million in 1989 represents more than a 20 percent increase over the course of the past century.

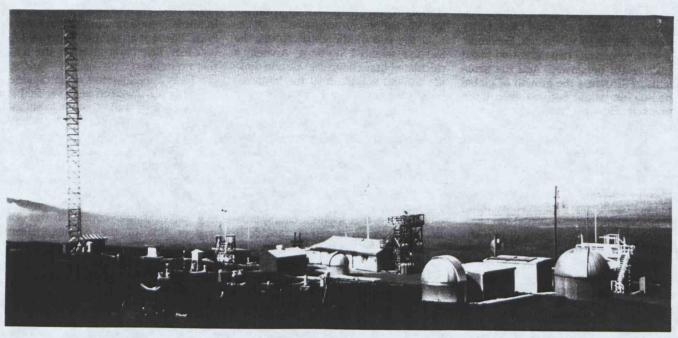
ust before the International Geophysical Year began, on the other side of the continent from Scripps, another development key to unraveling the climatic consequences of increasing carbon dioxide emissions was taking place. Under the leadership of the world-famous mathematician John von Neumann at the Institute for Advanced Study in Princeton, N.J., the first attempts were made to represent the atmosphere mathematically on digital computers.

Von Neumann's team of brilliant young scientists was headed by Jule G. Charney. Later known as the father of



BARGES STRANDED by all-time low water levels on the Mississippi River were one effect of the record-breaking drought

of 1988. That long, hot summer thrust the greenhouse effect into the public eye and set off the present policy debate.



MAUNA LOA CLIMATE OBSERVATORY in Hawaii is located at about 11,000 feet. Data collected here, beginning in 1957

and continuing through the present, were the first to document a steady increase in atmospheric carbon dioxide levels.

numerical weather prediction and arguably the most important American figure in the transformation of weather prediction from art to science, Charney demonstrated the feasibility of using computers to perform the task. Von Neumann and Charney calculated the first 24-hour weather forecast in 1950 on a primitive digital computer, the ENIAC, maintained by the U.S. Army Signal Corps in New Jersey.

Looking beyond these efforts, von Neumann called climate forecasting the "infinite prediction." One of the young scientists in the Princeton group, Norman Phillips, made the first attempt at modeling the global atmosphere in 1956. It was coincidence that later, in 1963, an unusual laboratory of the National Oceanic and Atmospheric Administration (NOAA) was established on the campus of Princeton University under the leadership of Joseph Smagorinsky, a strong-willed and hard-driving young scientist who had been one of von Neumann's group. The laboratory was totally devoted to the mathematical modeling of the atmosphere using the largest and fastest digital computers available.

Called the Geophysical Fluid Dynamics Laboratory, the center harbored researchers from many nations interested in this new approach to the study of the atmosphere. Among them was a young Japanese scientist, Syukuro Manabe. Modest and retiring but completely dedicated to the work, he developed the first climate model in collaboration with his colleague Richard T. Wetherald

in the 1960's. In 1975 they calculated that a doubling of the carbon dioxide content of the atmosphere would produce a global climate warming of about five degrees F (three degrees C), averaged over the surface of the earth. This calculation has been verified in many different laboratories and has not changed substantially.

Keeling's observations, together with the calculation of Manabe and Wetherald, triggered the wave of climatechange research that has marked the past two decades. Studies have since been undertaken in many parts of the world, including Europe and the Soviet Union. In the U.S. the National Research Council conducted studies in 1966, 1977, 1979, 1983 and 1987. These inquiries were chaired by such leading scientists as Gordon J. F. MacDonald, Revelle, Thomas F. Malone, Charney, William A. Nierenberg and economist William D. Nordhaus.

Yet because there were no immediate consequences for human health and no evident manifestation of climate change, the work was slow to arouse political concern. The most politically influential study was the one prepared in 1979 at the request of Frank Press, now president of the NAS. who was then White House science adviser to President Jimmy Carter. It was also in 1979 that the World Meteorological Organization in Geneva, recognizing the potential global significance of the issue, convened the first World Climate Conference.

Gradually, scientific awareness that

humanity might actually be causing a planetary disruption began to register in the political world. Although there was much debate over the validity of projections from computer models, the observations of greenhouse-gas increases, however, were precise, well measured and verified in many parts of the world. These were corroborated by additional data that documented increases in other greenhouse gases such as methane, or natural gas, and CFC's.

eanwhile mathematical-modeling groups in this country had been established not only by the NOAA but also by the National Aeronautics and Space Administration, the Department of Energy and the National Science Foundation. The leaders of these laboratories became the "gurus" of climate warming. Incisive and original in their work, Stephen H. Schneider of the NSF's National Center for Atmospheric Research in Boulder, Colo., and James E. Hansen, the leader of NASA's Goddard Institute for Space Studies, were soon to become frequent witnesses at innumerable congressional committee hearings on the subject.

Although the mathematical models of all the groups yielded similar results, the details of the geographic distribution of climate changes differed from one model to the other. All projected that an increase in carbon dioxide would bring about a gradual warming, but the timing of this warming would depend on the rate of global energy use. They all agreed that if reasonable assumptions were made about future global energy consumption, it would be around the middle of the next century that the carbon dioxide content of the atmosphere might double.

Just how much this doubling of carbon dioxide would increase temperatures, however, varied greatly from model to model. Some predicted as little as a two-degree F (one-degree C) increase, whereas others predicted increases of as much as nine degrees F (five degrees C). The differences in predictions became central elements in the debate about whether the models were sufficiently reliable to warrant policy actions. Further, it made a great difference whether the actual increase was at one or the other end of this range. At the low end, the normal resilience of society would probably be sufficient to accommodate the changed climate. Changes at the high end portended severe disruptions.

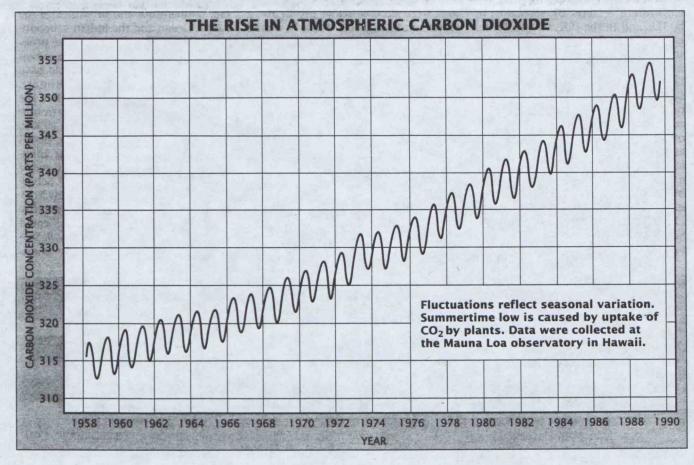
These projected temperature changes may appear innocuous because variations of this magnitude are experienced in the normal course of daily and seasonal weather. Their full implications can be appreciated by noting that it took only a two-degree F average decrease in temperatures in Europe to cause the run of several frigid centuries (from the 1400's to the 1800's)

known as the Little Ice Age. Nine degrees F is believed to be the difference in temperature that separates the end of the last great ice age 12,000 years ago from the present. Further, the projections indicate that the Northern Hemisphere would experience in just a half century an unprecedented temperature change, 10 to 50 times faster than the change since the last ice age.

Those who are not familiar with mathematical models or the way computers are used to make these projections can be forgiven for being confused-or even annoyed-by the great disparities in the results. Among investigators it is understood that mathematical models are only approximations that attempt to simulate the processes that govern atmospheric behavior. The atmosphere is so complex that it is impossible to represent it in very great detail in these mathematical models. It is possible to represent only certain features and to make assumptions about how the oceans and the atmosphere interact, how the rate at which the oceans take up carbon dioxide varies and how clouds affect the exchange of energy between the earth and the atmosphere. Even the largest computers cannot represent the atmosphere, oceans and land surface in fine detail. Indeed, scientists approximate the conditions in the atmosphere by thinking of it as a set of observations spaced about 500 kilometers apart.

The political calls for action are being played out against the backdrop of that uncertainty. On one side, the view is that if there is a chance that model predictions could be correct, the consequences could be so dire that immediate action to arrest climate change would be imperative. The alternative view, equally cogent, is that commitment to action with vast economic and social consequences is unwarranted in light of both the scientific uncertainty and the absence of knowledge of the economic costs. John H. Sununu, White House chief of staff, in remarks he made at the annual meeting of the National Academy of Engineering in the fall of 1989 gave voice to this

Although I agree that [global warming] is a critical issue, the fact is that the models with which analysis is being done and with which policy is being moved, as good as they may be, still are based on element sizes measured in hundreds of kilometers in length and width, and tens of kilometers in thickness. I suspect that no one who has ever been involved in engineering simulation would feel comfortable making major



decisions in which the elements were orders of magnitude greater than the details on which they were looking for information. And yet the fact is that we are moving toward binding international policy based on conclusions being drawn by policymakers who have no sense at all of the difference between the levels of confidence they should have and levels of confidence they want to have. A system is not valid just because it gives you the answers you want. And yet so much policy is being made in reaction to that principle.

The solution to the dilemma should be simple: Since the carbon dioxide content of the atmosphere has increased by more than 20 percent over the past century, we ought to be able to detect the climate warming in the global temperature record during the same period. Researchers have sought to do this, but it is a much more difficult task than it first appears. The problem is that climate is always in a state of natural fluctuation. Separating out the changes that are caused by increasing carbon dioxide from the natural changes is tricky scientific business. Moreover, the climatic temperature record is based on scattered and irregular observations not taken specifically for the purposes of determining climatic conditions.

Even so, careful analysis of these temperature records by scientists in the U.S. and in the U.K. sought to detect whether a climate warming has occurred and whether such warming is consistent with the prediction of the models. The prevailing view is that the climatic record over the past century for the entire globe reveals a net increase in temperature ranging from .5 to 1.0 degree F (from .3 to .8 degree C). But set against this conclusion is the disturbing result that similar increases in temperature cannot be detected over the past century in the U.S., where observations are numerous and accurate.

Even if the temperature rise is real, a puzzle remains that workers have been unable to unravel: Is the rise in global

temperatures a natural fluctuation or a result of the increase in greenhouse gases? All that can be said is that the observed increase is consistent with the lower end of the temperature increases predicted by the computer models. Consequently, the temperature records, as well as the predictions of mathematical models, provide substance both to those who believe the evidence warrants action now and to those who believe the evidence is still too weak.

The rush to policy action was, I believe, catalyzed by the disastrous drought of the summer of 1988. During this drought, one of the worst on record, the water in the Mississippi River fell so low that navigation was impossible over long stretches, urban water supplies were threatened and crops throughout the grain belt were devastated. Both officials and the public wondered whether this was the greenhouse effect manifest. Indeed, records show that in the U.S. five of the years of the 1980's were among the hottest on record, and the average temperature for the decade as a whole was the warmest since instrumental records have been kept.

rompted by heat and drought, congressional hearings addressed the question of whether the greenhouse effect had arrived. These hearings were unremarkable except for a statement by Hansen. When he stated that he was 99 percent certain that the greenhouse warming had begun, as evidenced by the sequence of warm years in the 1980's, the public took notice. His opinion prompted members of Congress to consider whether the prudent course was to move rapidly to legislation aimed at protecting the habitability of the planet from catastrophic consequences.

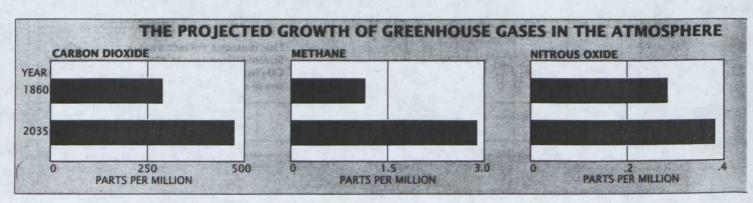
Hearings followed hearings. Both the atmospheric researchers and the more general environmental community began to choose sides on whether immediate policy action was justified. The reaction from environmentalists was

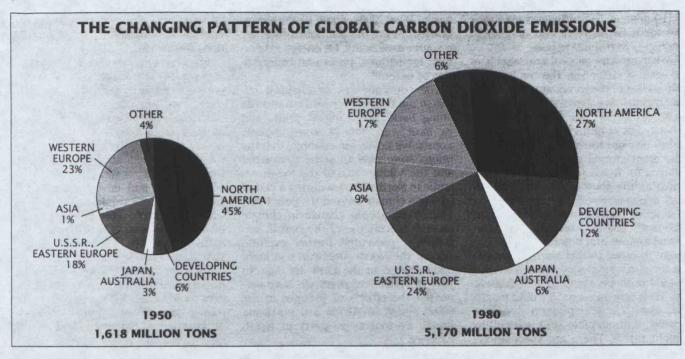
quick and vociferous. Several environmental and scientific groups began to advocate international agreements restricting the emissions of greenhouse gases.

At this point, some influential atmospheric researchers, who believed that policy actions were beginning to outrun the scientific evidence, weighed in with their views. Richard S. Lindzen of the Massachusetts Institute of Technology and Jerome Namias of Scripps, the nation's most distinguished long-range weather-forecasting expert, wrote a letter to President Bush urging that no action be taken. Three other members of the NAS, including its former president Frederick Seitz, joined in a report, published under the auspices of the Marshall Institute, calling into question the scientific basis for policy actions. They recommended a major research program in mathematical modeling. They pointed out that there might be alternative explanations for the climate warming that had taken place. Thus, the great climate debate had been joined.

Meteorologists did not look with favor on the prospect of yet another public debate involving their field: they had been proved wrong many times before. As long ago as 1924, Sir Gilbert Walker, then head of the British government's Indian weather service, discerned unusually close connections between rainfall, temperature and pressures in the Pacific Ocean and the Indian subcontinent. Claims were made that the problem of forecasting the Indian monsoon was solved. Were it true, it would have been a great boon to Indian agriculture. But it was soon recognized that the correlations had little predictive power.

Later, in the 1940's and 1950's, widespread claims were made, based on the work of the late Irving Langmuir, Nobel laureate from the General Electric Company, and Vincent J. Schaefer of the State University of New York at Albany, that seeding clouds with dry ice or crystals of silver iodide could bring about an increase in rainfall. Several decades of research into the possi-





bilities of increasing rainfall, changing the intensity of hurricanes and modifying hailstorms by cloud-seeding techniques proved abortive.

Then, in the early 1980's, it was postulated that dust thrown into the atmosphere by a nuclear exchange between the Soviet Union and the U.S. would result in a "nuclear winter." This idea was deflated by Schneider and his colleague Stanley L. Thompson, who showed with the same models used in the prediction of climate that the "initial nuclear winter hypothesis can now be relegated to a vanishingly low level of probability."

Given this "cry wolf" history, it is not surprising that many meteorologists harbor deep reservations about taking costly actions on the basis of the predictions of a climate warming. But the push for policy has other constituents. Climate warming also unites those who are concerned about biodiversity and species extinction, economic development, human population growth, urban air pollution, acid precipitation and ozone depletion.

Political leaders stimulated by public

concerns about environmental deterioration see these issues as important platforms and as springboards to public office. Those interested in increasing the competitiveness of American industry see greater energy efficiency as an important step toward that goal. It also serves the interest of those concerned about U.S. dependence on foreign energy sources. The issue of nuclear power is also underscored. Because fossil fuels are the main source of atmospheric carbon dioxide, strategies for stabilizing climate must envision non-fossil-fuel sources. Here at last is justification that proponents of nuclear power can forcefully advance to support expansion of nuclear power facilities throughout the world.

The issue of global climate warming also offers an opportunity for advancing the "new economic order" long advocated by Third World nations. International action will require technological and economic assistance to such nations if they are to participate in a global effort to reduce atmospheric pollution or arrest deforestation. In fact, the world faces the prospect that the greatest increases in emissions of carbon dioxide will occur in developing countries as their need for economic growth is followed by increased demand for energy.

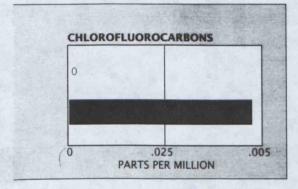
In like manner, those interested in arresting population growth, especially in the Third World, point out that the climate-warming problem is probably not solvable as long as the number of human beings continues to rise. After all, it is people who consume natural resources and energy and who farm the land. Without population control, prospects for stabilizing the climate and arresting the deterioration of the habitability of the planet are abysmal.

re the consequences of climate warming to be feared? People experience extremes of temperature in the natural course of events. The fact is that we do not know enough to predict the severity of the consequences. Because the warming would not be uniform over the surface of the earth, it would probably produce both winners and losers among regions and nations. Some parts of the earth would become warmer, some wetter and some drier. It is not possible on the basis of the evidence at hand to predict who would benefit and who would lose in such a global redistribution of so-called climatic resources.

Some aspects of global climate warming would be greatly beneficial in the view of agricultural researchers. Increased carbon dioxide will foster more active photosynthesis and enhance crop growth, to say nothing about the lowered plant requirements for water in a CO2-enhanced atmosphere. In the words of Jerry D. Mahlman, director of the Geophysical Fluid Dynamics Laboratory, "The things we can say with confidence, the policymakers are not interested in. And the things [they] are interested in, we don't know with confidence."

Models do, however, agree that the

polar regions of the world would undergo greater increases in temperature than would the tropics. Some of the projections of temperature increases in polar areas are startling in their magnitude, predicting as much as 18 degrees



F (10 degrees C) on the average in the Northern Hemisphere and only slight increases in tropical regions.

What are the general consequences of such a change in the temperature difference between equatorial and polar regions? We experience similar differences every year as the seasons change. In summer when arctic temperatures are warm, we do not suffer the great storms of winter; precipitation belts move farther north. Areas such as the southwestern part of the U.S. experience very dry conditions.

If arctic regions were to undergo significantly greater warming than equatorial regions and if precipitation belts were to move farther north, countries in the north temperate and polar zones would probably stand to benefit greatly. Their growing season would lengthen, and their precipitation would increase. With suitable soils, agriculture might thrive. These are speculations, however.

Such speculations are formulated in "scenarios" asking the question, What if? Unfortunately, an infinite number of such "what if" questions may be asked. What if the flow of rivers in the American Southwest, already fully utilized, were to be reduced by 20 percent? What if temperatures were to increase in the corn belt and precipitation were to move farther

north? What, then, would be the consequences in the U.S. for agriculture, for resource availability, for energy generation, for national parks and conservation of nature?

The consequences of changed climates can be seen in historical records going back thousands of years, and we have seen them in recent climatic events. We know, for example, that the Danes were able to settle Greenland and the Vikings to sail the North Atlantic to North America during a period of warm climate around the year 1000. Then a significant change in climate caused the collapse of the Danish settlements, prevented further exploration of the North American continent and ushered in the Little Ice Age. In just the past few years we have witnessed the effects of drought in the Sahel region of Africa and northeast Brazil, as well as in parts of North America.

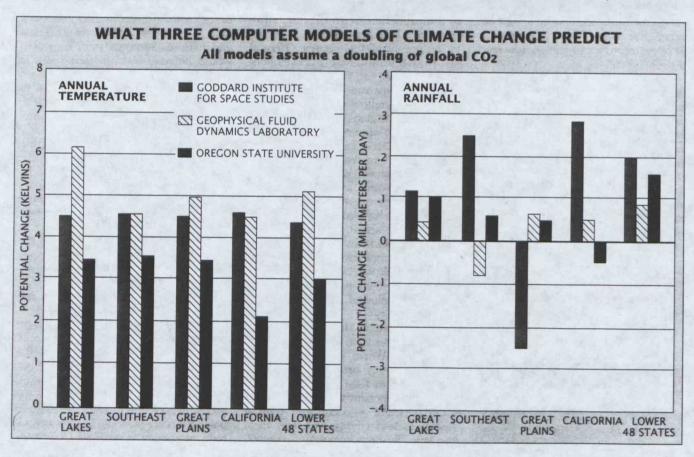
Such scenarios can suggest apocalyptic possibilities. A recent film in the *Infinite Voyage* television series showed the U.S. Capitol under water as the result of one possible climate-warming scenario. Some foresee vast migrations of people as areas of the world become uninhabitable. Others see threats to national sovereignty and national security. President Gorbachev has stated that ecological security, not military security, will be the principal concern of

all nations in the next century as environmental conditions cause disruptions worldwide.

But scenarios should be qualified with the caveat that although the events portrayed might in some cases be plausible, they are not real predictions. What, then, is a wise course in the face of great uncertainty? Clearly, it would be one that recognized uncertainty but would not permit that uncertainty to forestall action. Steps for which other economic and environmental reasons make sense would be taken first, whether or not a climate warming is taking place [see "The Changing Climate," by Stephen H. Schneider; SCIENTIFIC AMERICAN, September, 1989].

Then, as scientific knowledge reduced uncertainties, more costly measures could be taken if warranted, hence closely tying policy actions to the state of knowledge. Scientists and others have called this a "no regrets" policy. In gambling it would be known as "spreading your bets."

A recent report of the Council of Economic Advisers lends weight to this approach. It states that the cost of controlling carbon dioxide emissions and of taking other actions to address climate change would run into hundreds of billions of dollars. Because such reallocations of resources raise the specter of grave economic consequences, we need to be reasonably sure such ac-



tions are worth the cost. Any rational no-regrets policy would foster as one of its prime objectives adequate investment by governments in global monitoring and mathematical modeling to reduce the scientific uncertainties.

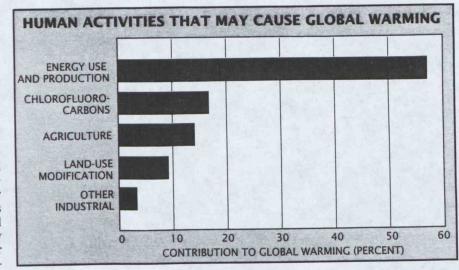
Where might we start? Energy conservation and efficiency along with the phaseout of CFC production would be the first priority for national and international action. Achieving greater energy efficiency justifies itself handily in economic terms. Increased energy efficiency would also ameliorate urban air pollution and acid precipitation. Shifts in the fossil-fuel mix from coal and oil to natural gas could significantly reduce carbon dioxide emissions per thermal unit. Technology is also available for more efficient power generation and for increased gasoline mileage.

isdom would also dictate major investments in nonfossil-energy sources. The circumstances favor significant new investments in passively safe, publicly acceptable nuclear power. Further development of forms of solar energy—photovoltaics or biomass, for example—makes good sense. Reforestation and forest preservation constitute a benign policy that yields many ecological and climatic benefits. Research aimed at producing stress- and disease-resistant crops would also be wise.

The public, however, must not be misled. These no-regrets initial policy steps will not solve the climate-warming problem. Their effectiveness will only modestly retard climate warming, and the future may require more drastic actions. No matter what policy actions we take, fully arresting the climate warming just does not seem to be in the cards.

The difficulties of reaching an international agreement on procedures for mitigating climate warming will be difficult and lengthy. The negotiations for the Law of the Sea Treaty provide a good lesson. They consumed 15 years and produced a treaty that the U.S. has yet to sign because of demands by developing nations for significant technology transfer and economic assistance. These issues will be even more complicated and more pervasive in any "Law of the Atmosphere Treaty."

It is likely that humanity will have to adapt to some climate changes. Modes of adaptation by society have not been well studied. Individuals, corporations and communities can adapt to climatic vicissitudes in myriad ways. Farmers can change crops, water use can be regulated and management practices can be altered.



Other modes of adaptation would be needed if climate changes were severe. Sea-level rise, which is one of the predicted concomitants of a climate warming, might inundate low-lying coastal areas and cause salt water to intrude into freshwater bodies. Were this to occur, society would have to decide whether to invest in protective structures along coasts or adapt by changing land-use patterns. The North Sea dikes in the Netherlands are an outstanding example of adaptation to relative rise in sea level.

Some adaptations would take considerable time to implement. If the price of energy were to escalate, energy-efficient habitations would be necessary. Present cities with their great suburban sprawl are not energy efficient, and so we might return to more compact cities. If we chose to maintain agriculture in dry areas, society would need to decide whether to invest in the necessary irrigation systems. In fact, the economic growth of the entire western part of the U.S. has been based on major investments in water storage and transport for irrigation and industrial use.

Fortunately, time may for once be on our side. Governments generally act only when threats become real. They act in the face of military threats or when areas are endangered and destroyed by natural disasters. If the climate changes, the expectation is that it will do so gradually. We should be able to see the initial evidence of coastal inundation in an increasing frequency of high tides and in the undercutting of seacoasts. Climate warming itself should be evident in a rising frequency of heat waves or in other weather anomalies. The effects of a global climate warming are likely to take 30 to 50 years to become serious, and that is a long enough span in which ac-

tions to adapt to these changes should be possible.

What of the debate in the atmospheric, environmental and political communities? Our global environment is under attack on many fronts. Climate warming is but one, perhaps the most complex, of these issues. If the changes occurring in our atmosphere are likely to cause consequences, we must understand the problems and promote sensible policies to remedy them. What would be unwise is to lapse into apocalyptic thinking or ostrichlike denial. We like to believe ourselves far more sophisticated, more enlightened, than preceding generations. Until we can calmly and objectively approach our environmental challenges without promoting public hysteria and exciting shortsighted, self-interested reaction, we cannot claim that we are.

FURTHER READING

THERMAL EQUILIBRIUM OF THE ATMOSPHERE WITH A GIVEN DISTRIBUTION OF RELATIVE HUMIDITY. Syukuro Manabe and Richard T. Wetherald in *Journal of Atmospheric Science*, Vol. 24, pages 241-259; May, 1967.

CHANGING CLIMATE: REPORT OF THE CARBON DIOXIDE ASSESSMENT COM-MITTEE. National Research Council, Carbon Dioxide Assessment Committee. National Academy Press, 1983.

THE GREENHOUSE EFFECT, CLIMATIC CHANGE, AND ECOSYSTEMS. Edited by Bert Bolin and Bo R. Doos. John Wiley & Sons, Inc., 1986.

GLOBAL TRENDS OF MEASURED SURFACE AIR TEMPERATURE. James Hansen and Sergej Lebedeff in *Journal of Geophysical Research*, Vol. 92, D11, pages 13345–13372; November 20, 1987.

THE GREENHOUSE EFFECT: SCIENCE AND POLICY. Stephen H. Schneider in *Science*, Vol. 243, No. 4892, pages 771–781; February 10, 1989.

PRIME MINISTER

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Joit kras whether you will want to dif into the drheles abtached - but you may 16 August 1990 whe so note Carryhor conclusion.

ACID RAIN No WR 24/8

You may be interested in the attached material on acid rain:

- a paper given recently in Amsterdam by Professor Sir James
 Beament;
- the report of the Management Group of the British/Swedish/Norwegian Surface Water Acidification Programme (SWAP) you addressed their final conference last March.

Both papers stress the complexity of the factors involved in acidification. Some aspects are not yet fully understood (for example, the extent of sulphate reservoirs in the soil). Acidification of lakes and rivers happens naturally without man's intervention. There is still more work to be done to disentangle the effect of man-made acid depositions, and other factors.

Nevertheless, the SWAP participants believe that the link with the industrial revolution is strong. They base their case

- on the magnitude of acidification in some waters since 1850.

 Examination of lake and river beds show that this is greater than at any other time over the last 10,000 years;
- on the presence of other trace pollutants.

Beament draws more sceptical conclusions. He questions the value of expensive policy action designed to counteract the acidification of a few areas which are especially sensitive.

CONCLUSION

We will want to ensure that the complexity of changes to water and

troops is brought to the fore when the Community comes to review the Large Combustion Plants Directive in 1994. We need a more accurate diagnosis before taking further steps, over and above those to which we are already committed, which would add to industry's costs.

CAROLYN SINCLAIR

ACID RAIN:

THE BACKGROUND TO A DISCUSSION OF BROADER STRATEGY

Professor Sir James Beament, ScD, FRS, Queens' College, Cambridge, CB3 9ET, United Kingdom.

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Preliminary Conclusions: page 9.

The belief that 'acid rain' causes universal damage to the environment has been firmly established in the public mind. Sulphur dioxide (SO2) was linked with the decline of some . fisheries around 1970 but it was the claim in 1981 that 'acid rain' caused widespread damage to forests in central Europe which raised matters to sensational levels. Damage to crops was suggested too, but recreational and emotional regard for forests and lakes dominated the issue. Does it damage forests? Schools and even universities now teach as fact what was a plausible correlation: a cardinal sin in biology, especially when the real lesson is that it was not true! The link with the desline of certain trout and salmon fisheries has emphasised that in ecology, one must not take the simplistic view that if an increase in X has damaged Y, a decrease in X will rapidly restore Y. That may be true of artefact pollutants. Changes in levels of substances which are essential for life to exist on this planet do not work in that way, as the subsequent massive research effort has shown. This paper is background to a lecture which argues that we must recognise why some areas, commonly said to be 'natural', are so sensitive to environmental change, and then decide whether managing them has a better prospect, at least in the foreseeable future, than any realisable change in the level of effluents.

FORESTS

Initial claims were 98% of fir and 94% of spruce damaged; adequate criteria were lacking. Once some were defined, the German Forest Inventories for 1982-6 give 1% of trees severely damaged or dead; 16% with medium to severe damage, from all causes. Five sickness types are now recognised and damage does not appear to be increasing. In the U.K. and Germany initial laboratory experiments applying SO₂ and sulphuric acid to conifers, failed to produce the particular symptoms attributed to 'acid rain'. The original theory that it acted directly through aluminium toxicity in soil, was withdrawn three years ago.

Healthy plants withstand a variety of stresses in nature: was acidity intensifying other stresses in areas where tree sickness occurred? This is difficult to investigate, but ozone levels are high in upland central Europe and America. A link between ozone and acid mist has been examined. In greenhouses, spruce have been misted daily with pH 3.5 sulphuric acid in 100 ppb ozone for many months but have shown no foliar symptoms. Such experiments do not expose trees to natural stresses. I will describe briefly trials exposing conifers in a forest to ozone and SO, for four years. None of the foliar symptoms associated with the major types of forest decline have appeared. In America it has now been established that ozone alone is a cause of damage some had attributed to 'acid rain'. All these researches have contributed to a substantial advance in the science of forestry if noithing else.

9

To an ecologist it was not convincing that forests should sicken rather suddenly in response to a reasonably constant stress, and two consistent features of the commonest damage attributed to 'acid rain' might have suggested a simpler explanation from the start. Poor roots are caused by lack of water, and they have reduced ability to take up essentials from the soil. There was an extended period of drought in Europe in the mid-1970s which would particularly affect plants on many of these forest soils. Unlike shortlived plants, trees can withstand drought but take time to recover. Getting good retrospective evidence of change in ecosystems has bedevilled the 'acid rain' saga, but growth rings in trees give a direct measure of annual productivity over many years in the same plant. Rings showed that average growth was maintained until 1973, then dropped, but increased again from 1982 and good correlation with rainfall has been confirmed. Also, the needle loss and crown damage which caused such alarm in the earliest surveys are not correlated with poor growth except where there are the most severe symptoms of foliar damage.

Another specific symptom of the main form of sickness was that older and particularly second-year needles of trees turned yellow, whereas new growth is usually the most sensitive to adverse conditions. That suggests magnesium deficiency. By 1985 German workers correlated needle colour change in affected areas with lack of soil magnesium and in 1987 the degree of change in needles was directly related to their magnesium content. Rapidly growing leaves demand

magnesium and if this first-year growth of a tree cannot obtain essentials via roots, it will rob the nearest source: the previous year's leaves. By grafting affected branches onto trees with adequate magnesium supplies, recovery can be rapid and complete. Characteristic symptoms of this 'acid rain' damage have now been induced in spruce by growing in magnesium deficient forest soils. Sulphuric acid increases leaching of magnesium from some Black Forest soils. In an affected area, heavy liming of soil to neutralise accumulated acidity did not produce recovery unless the limestone contained magnesium. Magnesium deficiency also itself reduces root growth.

So the most common form of damage is a disease caused by soil deficient in magnesium. It is reasonable to argue that where circumstances are marginal and stressed by drought, leaching by rain acid could exacerbate the position. Of the other damage types, one is a fungal disease, which could be linked with malnutrition. One, on calcareous soils, is due to potassium and manganese deficit and cannot possibly be related to acid. And one seems due to excess nitrogen. Ammonia as well as nitrogen oxides (NO_X) can cause this and on some soils trees have yellow needles, apparently because the nitrogen stimulates growth faster than the soil can supply magnesium. All have one thing in common: mineral deficient soil, particularly in magnesium.

This summary is based on some fifty research reports of the past ten years, mostly by German workers; detailed reviews have been published: e.g. Blank et al. 1

FISHERIES

The degrading of trout fisheries led to major conferences; one in London² led to the £5M Surface Waters Acidification Programme (SWAP) under the aegis of the Royal Society of London and the Swedish and Norwegian Academies, funded by the U.K. electricity and coal industries. It reported in the week before this paper's deadline. A larger American conference discussed a ten year programme in February. Full accounts will not be published for some time. They have produced much detail of processes, but it appears that nothing fundamentally new has been discovered which contradicts the summary which follows.

The pH of rain from natural SO₂, NO_x and carbon dioxide (CO₂) without man's input was about 5. Trout fisheries have been changing where river and lake water is now below 5. The connection with increased rain acidity therefore appears simple. It is actually complex because rain falls on and passes through the vegetation, soil and often lower depths of the catchment, and the processes which occur there produce the water properties determining its ecological potential. Unlike forests, huge amounts of solutes must be continuously supplied, and are eventually wasted to the sea. The pH is determined by inorganic ions from rain, soil minerals and organic acids from the biological systems on the catchment.

A trout fishery has two minimum threshold levels³: water in which fish grow efficiently, and that in which they can reproduce. For active stages of fish, water must attain pH

>5, calcium around 2 mg/l and aluminium < 100 ug/l. Those conditions also meet the needs of the food chain which provides the fish with food. The more critical requirement is that trout eggs must have water with pH around 6.5 which contains at least 4 mg/l of calcium. These conditions need occur only in streams in a catchment system where trout lay their eggs; they are essential to have a self-sustaining trout fishery. Water calcium is inversely correlated with aluminium content. Fisheries have not been affected where catchments have an ample supply of calcium carbonate which maintains water pH around 6.5. The areas where diminution and demise of trout stocks have occurred are low in available calcium, and are typically of the granitic type. Indeed it may be suggested that where pH is below 5 now, calcium has always been very marginal for eggs, or, at least in the past, trout have been restocked.

when did the pH of these sensitive river systems begin to change? Past records, if any, are unreliable because pH varies with depth, season, etc., and regretfully, with the technique used. Good evidence comes from identifying the species of diatoms which were dominant in the past, from their skeletons in layers of lake sediments. Where acidity has increased, this has extended over 200 years or more. It proves to be a significant finding.

Two factors are responsible: their scale was not realised until the recent investigations. The decomposition of plant material on a catchment generates antities of organic acids. These are added to the water system. Humic acids

from the tree litter of forestry can make a substantial difference to river pH in catchments which are sensitive because the soil has poor neutralising capacity. On such soils, Sphagnum mosses can create bogs holding huge volumes of water in which organic acids are generated. They can acidify water to pH 3.5. and cause total fishlessness.

The other acid factor is, of course, the rate of transfer of rain sulphate through catchments lacking adequate reserves of neutralising mineral, especially calcium carbonate. When rate of input to catchment was compared with rate of transfer to river system, some budgets balanced; some did not match well even on ten-year periods, and some actually showed inverse correlation. A detailed investigation of this has revealed the most important new fact: the size of the sulphate deposits in the soils. For example, in experiments of the Norwegian RAIN Project, massive quantities of sulphate solutions have been added to large units of soils, set up so that drainage outflows can be analysed; over half the sulphate has been retained in the soil. In an area of catchment protected by a roof, neutral water has been added over a period of years at rates corresponding to surrounding rainfall; the outflow has not changed by more than 0.04 of a pH unit. Most startling of all, the amount of potentially available sulphate now in some of these areas of Europe is over 1000 Kg/ha. 4 This confirms the evidence from lake sediments that acid levels in these catchments here been increasing over at least the past 200 years. Sediments of course show

only total acidity change due to sulphate, organic and other acids in the water, and not the state of the soils.

when this information is fed into models, they suggest that to recreate quality conditions appropriate for trout by lowering soil sulphate, a resevoir amounting to something like the whole of the man-contributed material over the past 50 years must be removed. So a very great reduction in that part of atmospheric SO₂ which is contributed by developed countries, may not cause sufficient lowering of sulphate entering the water systems of these areas to allow re-establishing trout fisheries where they have been damaged, for half century. The added problem is that these catchments have always been meagre in calcium supply, and whether lowering sulphate levels will necessarily restore calcium to threshold levels.

PRELIMINARY CONCLUSIONS

The specific problems have arisen in marginal areas, sensitive not only to rain acidity but to drought and other incidents and changes; waters are sensitive to forestry and on some catchments the forests are sensitive too. The rate of availability of magnesium and/or calcium stands out as critical: their release by soil weathering is marginal. Acid (cation) input has always leached these elements, and the crisis occurs when that loss exceeds the release rate, by an amount which leaves the supply deficient for the particular life man wants there. The has given rise to the Critical Load (C.L.) concept: establishing for each

area the load of sulphur and acid it could accept without tipping that balance. It is a pretty - and a dangerous - concept: pretty because in principle one could assess rate of weathering replacement for a geological structure, and rate of leach acceptable, for a chosen biological demand at equilibrium. But as well as the multiplicity of geological types, this theoretical C.L. does not take account of the contribution of the sulphate resevoirs. Since we do not know the extent of the resevoirs, but only that in some areas they are huge, what is the interim load which will allow each region to achieve the C.L. level - and how long will it take? Obviously in some areas it will be many many years even if we turn all rain into distilled water!

The danger of the C.L. concept, whether you adopt the equilibrium value, or one which might possibly enable a district to return to that equilibrium, is that the most sensitive area needs the smallest load. Man determines where he adds to nature's vast input of SO_2 and NO_X , but global circulation decides where it is deposited: so is the lowest C.L. to be taken as the yardstick? This is a version of the ever-green problem: whether the whole world must be governed by the needs of the most sensitive — or whether one should lower the 'acid' input to the surface of the entire globe to meet the problems of some comparatively unproductive areas occupying a quite small fraction of that surface? Those extreme views are stated only to introduce some themes of my address.

Should we not begin to put these things into perspective by recognising that atmospheric sulphur is a normal source of this vital element for plants: that vast areas of the tropics have sulphur deficient soils and are dependent on atmospheric sulphur. In some parts of the U.K. crops still require sulphate fertilisers. I will briefly describe some experiments triggered by the 'acid rain' crisis showing how beneficial the acid-producing gases are, in this case to that important crop: cereals, no doubt reducing the need for pesticides. I pointed out that it is impoverished soil which prevents atmospheric NO_x from increasing the productivity of some forests. We do not know quantitatively the benefits of 'acid rain', perhaps because we take food for granted, and indeed, like energy generation, some view it primarily as 'damaging the environment'.

with or without man, the world does not remain constant, and all land tends to become more acid; naturally-acid rain acting on carbonates replaces the CO₂ which is removed and deposited in skeletons on the seabed - or there would be no plants, no life. If man wants to make any natural system stand still, he has to manage it whether garden or nature reserve. Some of the emotional concern for the affected areas comes from the belief that many of them are 'natural'. Of course they are not: part of today's problem is that man changed them long ago, abandoned them, then changed them again. In view of that, is it not somewhat surprising that people now expect them to continue unchanging for ever?

we understand much more now about these affected areas, and of some of them we know how very long term, if at all, is the prospect of effective restoration by reduced emissions: leaving generating methods on one side, surely we must begin to consider whether any additional strategies are possible: whether they may in part be an alternative course. There is a persuasive correlation which could explain why widespread forest damage did not appear in some areas, despite having similar trees, soil, rainfall – and sulphate input. It suggests how a modest strategy may help the damaged forests. So far as fisheries are concerned, additional strategy is being investigated, and I will describe a very successful one.

I am grateful to the Central Electricity Research Laboratories, Leatherhead, U.K. for facilitating visits to sites where they sponsor research, and to their staff and my colleagues in the University of Cambridge and elsewhere for many discussions on forests, rivers and the atmosphere.

¹ Blank, L.W. et al.: Nature, Lond., 336, 27-30. 1988.

² Ecological Effects of deposited Sulphur and Nitrogen Compounds: Ed. Beament, J., et al., Phil.Trans.Roy.Soc. B. 305, 255-557, 1984.

³ Howells, G., et al.: J.Sci.Food Agric. 34, 559-570. 1983.

⁴ Wright, R.F., & Gjessing, E., RAIN Project Annual Report. NIVA 0-082073 I, Oslo, Norway. 1986.

The Royal Society

· The Norwegian Academy of Science and Letters

The Royal Swedish Academy of Sciences

SURFACE WATER ACIDIFICATION PROGRAMME

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REPORT ON THE SURFACE WATER ACIDIFICATION PROGRAMME (SWAP) BY THE MANAGEMENT GROUP OF THE SWAP BASED ON THE RESULTS PRESENTED AND DISCUSSED AT THE FINAL CONFERENCE HELD AT THE ROYAL SOCIETY, 19-23 MARCH 1990

> The is the version that composites corrections of 216/90.

MANAGEMENT GROUP

MEMBERS

Sir Richard Southwood (Chairman)

Professor P. Brink Sir Eric Denton Professor P. Enger Professor C. W. Suckling Dr. J. F. Talling Professor C. O. Tamm Professor L. Wallpe Professor T. S. West

Programme Director Sir John Mason

Consultant to the Programme Director Professor H. M. Seip

Observers

Dr. P. F. Chester

Dr. J. Harrisop

Secretariat

Mr. G. E. Hemmen

Dr. H. Lundberg

INTRODUCTION

The work funded by SWAP and other research in this area has added significantly to the understanding we had in 1983 when the programme was established. The results of an important element in this work, the palaeolimnological studies of lake sediments, were reported to a Discussion Meeting and have already been published (Palaeolimnology and Lake Acidification, The Royal Society, 1990). The final conference to review all aspects of the work was held at the Royal Society on 19-23 March 1990, and the papers and discussions will be published within about 6 months by the Cambridge University Press.

In the view of the Management Committee, the programme has been most successful. Not only have the questions posed in the objectives largely been answered, but a significant contribution has been made to a broad area of science underlying the problems of water acidification.

A noteworthy aspect of the work has been the extent and cordiality of the international and interdisciplinary co-operation between scientists within and beyond the SWAP programme.

Comprehensive data sets have been obtained from several carefully chosen sites in Norway, Sweden and Scotland differing in topography, geology, soil composition and vegetation and receiving very different levels of acidic deposition. Strongly acidified, pristine and intermediate sites have been comprehensively instrumented to aid simultaneous investigations of acid inputs, hydrology and stream flow, soil structure and composition, soil and soil-water chemistry, stream-and lake-water chemistry and biology.

An important feature of the programme has been the development and adoption of common methods of analytical quality control, and of standard protocols and procedures that have greatly facilitated comparison and interpretation of the data from the different sites. This has been particularly important in relation to aluminium chemistry, pH measurement, and the work on weathering and palaeolimnology.

In the first section of this report we present a summary of our conclusions on the present state of knowledge concerning surface water acidification and the fish status of freshwaters in Norway and Sweden, and in the second we address the questions posed to us by the sponsors in the objectives of the programme.

I. MAIN CONCLUSIONS OF RESEARCH PROGRAMME

- 1. Acidified lakes and streams without, or with impoverished fish populations, occur mainly in areas that receive high levels of acid deposition from the atmosphere and have soils derived from granite or other rocks of similar composition which are resistant to weathering and low in exchangeable elements such as calcium and magnesium. Catchments with thin soils are particularly sensitive with respect to the rate and extent of acidification.
- 2. Examination of the remains of diatoms and other biological material in lake sediments laid down over centuries has established that many lakes in southern Norway and Sweden and in the UK have undergone progressive acidification from about 1850 until very recently. The magnitude of this acidification is appreciably greater than any that has occurred in the last 10,000 years and has marched in parallel with accelerated industrial development, as indicated by increases in several trace pollutants in the sediments. These changes and the extent of inferred acidification are geographically correlated with the intensity of acid deposition and with the geo-chemical status of the catchment.
- 3. For a given input of acid deposition, the degree of acidification of lakes and streams is largely determined by the structure and chemistry of the mineral and organic soils, and the pathways which the incoming rain water takes through the soil. These factors determine both the nature and duration of the many chemical and biological reactions that influence the final quality of the water which emerges in the streams.

6.

- 4. The evidence overall points convincingly to atmospheric deposition, largely of acidifying compounds of sulphur and, to a lesser extent, of nitrogen as the main cause of acidification. However, forests may enhance acidification by acting as efficient filters and collectors of acid from the atmosphere in polluted areas, and by taking up metal cations, and the acidification of some lakes may be attributed to changes in land use or agricultural practice.
- 5. There is evidence that, in the last decade, there has been a significant decrease in the acidity of rain and snow as a result of reduced emissions of sulphur dioxide, and that this is reflected in a small decline in the acidity and sulphate content of some lakes.

 However, there are signs, especially in Norwegian lakes, that the effects of reduced concentrations of sulphate are being partially offset by increases in nitrate.
 - Fish populations, especially salmon and trout, cannot survive in lakes and streams if the pH of the water remains for long below a critical level of about 5 (depending on the species and age of the fish and the chemical composition of the water). The fish are killed by the action of increased acidity and of inorganic forms of aluminium leached out of the soil by the acidified water. The effects of aluminium are ameliorated by the presence of organic acids (e.g. from peat) which complex the aluminium and render it less toxic to fish, and possibly if calcium is present in sufficiently high concentration. However, in regression analyses based on a survey of over 1000 lakes in southern Norway in which 14 variables in the regressions were studied, most of the variance in fishery status could be accounted for by pH, inorganic aluminium and altitude.

- 7. Fish are very vulnerable to the short, sharp episodes of high acidity and aluminium that occur in streams following heavy rains or snow melt. In these episodes much of the water flows through acid soils where it is enriched in available aluminium but spends relatively little or no time in the deeper layers where it would be neutralized.
- 8. From carefully controlled laboratory experiments and intensive field studies, it is now possible to relate fish survival to the concentrations of acid, aluminium and calcium in the water and to estimate the likely toxic effects of acidic episodes of differing severity, frequency and duration. The detailed mechanisms of fish death are complex. Some forms of aluminium and H+ ions inhibit sodium uptake and increase sodium loss, so reducing body sodium content leading, eventually, to circulatory failure. The deleterious effects of inorganic aluminium can be largely counteracted if calcium is present in sufficient concentrations.
- 9. Acidification and release of aluminium also leads to changes in the populations of micro-organisms, lower plants and aquatic invertebrates. The effects of such changes in the ecosystem can include the availability of food for some life stages of brown trout and other fish.
- 10. The possibilities of the recovery of streams and lakes depend on the long-term balance between the catchment input and output of cations, such as Ca and Mg that are exchangeable for H+ ions. The main input of these cations in the affected parts of Scandinavia and the UK is normally by chemical weathering; the supply by atmospheric deposition is much less than that of acidifying substances. The direct cause of

acidification of lakes and streams is the excess anions of strong acids, as sulphate reduction and denitrification play only a minor role in most of the affected ecosystems. The long-term resistance of a catchment area is therefore closely related to the release of cations such as Ca, Mg, Na, K. In regions covered by the last glaciation, these cations are produced mainly by weathering of minerals. Considerable progress has been made within SWAP in the determination of weathering rates as a function of mineral species, particle size, pH, production of organic ligands in the ecosystem and the history of the soil. Estimates by different methods agree in most cases within a factor of two or three. It appears that even a reduction by 60% of acid deposition would not be enough to create steady state conditions suitable for fish in those areas that are most sensitive.

The rate at which streams and lakes will recover in response to reduced emission and deposition of acidic substances will also depend on such factors as the residence time of water in groundwater and lakes, on the release of sulphate from earlier deposition which is retained in the soil, and on changes in the land use within the catchment. In thin soils with little storage of sulphur compounds, recovery may be quite rapid. In deeper soils containing large accumulated stores of sulphur compounds, it may take several years or even decades for this to be leached out and recovery may be much slower. Recovery or restoration may be aided by liming the catchment, but this may have undesirable effects such as increased nitrification.

12. There is evidence of increased nitrate deposition but this has been only partially reflected by the increase in its concentration in surface waters, mainly because of uptake by vegetation. Since the system has limited storage capacity, an additional burden of acidification could develop over years.

II. RESPONSES TO THE QUESTIONS IN THE OBJECTIVES

OBJECTIVE 1.

In the affected areas of Norway and Sweden, what are the factors, in addition to pH that, in practice, determine the fishery status of lakes?

Intensive field observations and well-designed laboratory experiments indicate strongly that pH, together with the concentrations of monomeric inorganic aluminium and calcium, are the most important chemical factors in determining the survival of fish in lakes and streams. The deleterious effects of aluminium are ameliorated if calcium is present in sufficiently high concentrations. In waters containing organic acids, some of the aluminium is sequestered in organic complexes which are much less toxic to fish.

The responses of fish to changes in water chemistry depend on the species, age, size and maturity. Fish populations, especially salmon and trout, fail to survive if the pH stays for long below 5. During periods of high stream flow, induced by storms or snow melt, the acid and aluminium concentrations rise sharply while the calcium concentration falls. These episodic changes often result in large fish kills and may reduce the ability of fish to withstand later stress. For example, salmon smolts may survive such exposure and appear healthy, but die when they migrate into sea water. The effect of acidity and aluminium combined is greater than that of acidity alone.

The causes of fish death are complex. Some forms of inorganic aluminium and H+ ions inhibit sodium uptake and increase sodium loss, thus reducing body sodium content leading eventually to circulatory failure.

Once the lakes and streams have become acidic, considerable changes may occur in the composition of the whole ecosystem. Some invertebrate populations, important links of the fish food chain, are reduced. Some crustaceans are killed by the combined action of acidity and aluminium affecting their salt balance, while certain benthic invertebrates, such as mayflies, are killed by acidity alone and also may suffer because the acid water kills algae and bacteria which affect their food supply. Mosses and fungal mats often develop and reduce the exchange of nutrients between the sediments and the lake water leading to loss of biological production in the water column. The mosses and liverworts may also serve as reservoirs for aluminium that can be mobilised if pH is reduced, as in a storm or snow melt episode.

At the practical level, the toxic action of monomeric inorganic aluminium, the low toxicity of organically complexed aluminium and the protective effect of calcium ions, are not fully understood. Nevertheless, it now appears possible to relate fish survival to pH and to the concentrations of inorganic aluminium and calcium, and to estimate the likely toxic effects of acidic episodes differing in severity, frequency and duration. In regression analyses based on a survey of over 1000 lakes in southern Norway in which 14 variables were studied, most of the variance in fishery status could be accounted for by just pH, inorganic aluminium and altitude.

OBJECTIVE 2

What are the biological, chemical and hydrogeological characteristics of catchments which determine whether the composition of surface water falls within a range acceptable to fish?

The biological, chemical, and hydrogeological characteristics of catchments which determine whether the composition of surface waters falls within the range acceptable to fish are those which have an influence on the input of acidity, the liberation of monomeric inorganic aluminium species, calcium and heavy metals. Fish death occurs in surface waters at pH<5; with inorganic monomeric A1>50µgl-1. Calcium has ameliorating effects in the presence of critical amounts of aluminium. Severe episodic events over short periods of time may be more lethal than prolonged exposure at lower levels.

The major terrestrial biological components are trees and other natural vegetation. The major aquatic biological components are stream and lake bed organisms, e.g. mosses, liverworts and algae. Trees scour acid particles and gases from the atmosphere and thereby increase acidic input to the catchment, but all vegetation may remove cations such as calcium and magnesium from the soil. Streambed organisms and the streambeds themselves may act as sinks for aluminium hydroxides washed out from the soil, but may be significant sources of bioavailable aluminium when acidic episodes occur. Modifications to the ecosystem caused by acidic conditions may effect the nutrition of some stages of the brown trout.

The major chemical components to be considered are the exchangeable cations A13+ and Mg2+ in the soils of the catchments. The aqueous

chemistry of aluminium is very complex, but it is deduced that it is the low molecular weight (monomeric) aluminium hydroxides that are the most toxic species to fish. Calcium and magnesium compounds provide the chief acid neutralising capacity (base saturation) of the soils but, in addition, the calcium content of the surface water must be maintained, >1.0 mgl-1 if fish are to survive in the presence of aluminium levels ~ 50µgl-1. The aluminium originates from minerals in the soil, especially from the clay fractions, and is released by H+ions copartnered by SOh2- or other mobile anions, e.g. NO3-. In this respect, soils derived from acidic rocks such as granite with their high aluminosilicate levels and low alkaline earth levels, are particularly prone to the release of aluminium and provide only low cation exchange capacity. Soils derived from intermediate or basic/ultrabasic rocks will be less troublesome, as will soils derived from sedimentary rocks, particularly limestones.

The hydrogeological characteristics that are most important, apart from the provenance of the soil mentioned above, are those that control water pathways through the various materials that make up the soil profile. Dramatic increases in stream water acidity are commonly associated with peak flow occasions (episodes) and the frequency of these events is thus of importance. Water leaving the soil may have a variety of histories depending particularly on whether the soil is saturated with water or not. It has been established that even when the soil is saturated, e.g. at snowmelt, most of the discharge is generally water that has been stored in the upper layers of the catchment since before the event. Irrespective of where the water has been stored, it is likely to have been affected by contact with upper acidic soils before emerging. Acid water may, under some conditions, release monomeric inorganic aluminium species from the stream or lake bed. Where surface flow occurs over bare rock, there is a relatively

large contribution of direct acidic precipitation on the surface of the lake itself.

In the statistical analysis described under Objective 2, there is a negative correlation between the fisheries status of a lake and its altitude.

OBJECTIVE 3

In Norway and Sweden, to what extent are the biological, chemical and hydrogeological characteristics of catchments, which determine whether the water quality is acceptable to fish, being adversely affected by the acid deposition itself?

Distinctive chemical and hydrogeological changes have been documented for catchments associated with acidic waters. The palaeoecological studies demonstrate that water acidification to the recent extent and with the present geographical distribution, has occurred only since the industrial revolution, especially since 1850. There is a strong correlation between this geographical distribution and the present distribution of sulphur deposition.

A number of soil studies have shown that the underlying increase in soil acidity can most reasonably be explained by increased sulphur deposition. There may be an additional contribution from increased forest cover.

Studies, using strontium isotope and other techniques, have assessed natural weathering rates appropriate to soils sensitive to acidification. These rates, often in the range 20-50m eq.m-2 yr-1, are often less than the corresponding rates of deposition of acidity.

Aluminium, which has been deposited in large amounts in various chemical forms as a weathering product in the soil, may become soluble in the monomeric inorganic form under acidic conditions. In the presence of anions of strong acids, these and other aluminium species start to move in water out of the soil. Sulphate ions now constitute an important part of the anion content in the soil water in southern Scandinavia and in parts of the UK, and thus play a major role in the transport of aluminium toxic to fish from soils to freshwater systems. Such efflux has been conspicuous in natural episodes of greatly increased waterflow and has been generated experimentally by acidifying catchments. Organic anions produced in high concentrations in some catchments can form molecular complexes with aluminium, and thereby reduce the toxicity.

It is established that atmospheric deposition of nitrogen compounds has increased in recent decades. Until recently, this has not been shown to be an important factor in water acidification, probably because the vegetation retained the main part of the incoming nitrogen. However, the Norwegian 1000 lakes survey showed a definite increase in nitrate concentrations in lake water over the period 1974-1986.

OBJECTIVE 4

What changes would be brought about in water chemistry and fishery status in Norway and Sweden by given levels of reduction of man-made sulphur deposition?

The positive relationship between deposition of sulphur compounds and water acidification is now firmly established, though other factors play a role in some areas. Reduced deposition is therefore necessary if water quality is not to deteriorate further. Although the extent and rate of potential recovery cannot yet be accurately predicted, progress has been made through several projects.

Regional surveys have shown that water acidification is generally confined to areas receiving acid deposition. Examination of diatom remains in lake sediments laid down over centuries has also established that many lakes in southern Scandinavia and the UK have undergone progressive acidification from about 1850. Soil acidification to a considerable depth, has also been observed in southern Scandinavia. By comparing ionic input-output budgets with estimated weathering rates, it is found that present deposition of acid is likely to cause continued soil acidification in southern Scandinavia.

Although sulphur processes in catchments are complex, it has been clearly shown that reduced sulphur deposition over a period of months or a few years leads to reduced sulphate concentrations. in runoff in acid sensitive catchments in Scandinavia and UK.

Changes in other ions following reduced sulphur deposition, are more difficult to predict. Several types of evidence may be used to infer reductions in hydrogen ions and inorganic aluminium.

A simple charge balance argument and two more sophisticated models give consistent estimates of reductions needed for recovery. The MAGIC model, designed for long-term predictions, has been validated against palaeolimnological data, although the strength of the validation has been questioned. The Birkenes model (BIM), developed primarily for short-term predictions, reproduces present day chemistry fairly well. Although long-term predictions are highly uncertain, particularly because of the lack of long-term field data records for calibration and validation, these models have aided our understanding of acidification processes.

The results of the modelling exercises may be compared to other evidence of recovery. Application of deacidified precipitation to covered catchments (~600 m²) at Risdalsheia in S.Norway, has resulted in a considerable reduction of nitrate and sulphate in runoff, compared with that from adjacent control plots. The increase in pH compared with the control is, however, small. On the other hand, addition of acid at Sogndal in Norway and at Gardsjøn in Sweden, has caused considerable increases in concentrations of H+ and inorganic aluminium in streamwater. Evidence of recent recovery has been obtained by palaeolimnological studies of a few lakes and by data from Sudbury in Canada, where considerable increases in pH have been observed in acidified lakes after reductions in sulphur deposition.

Results from MAGIC were fed into the Birkenes model to predict effects of reduced sulphur deposition on concentrations of cations during episodic events. The results indicate that a 30% reduction in

current deposition of excess sulphur would not be sufficient to halt acidification at a site like Birkenes. A 60% reduction would produce significant improvements in streamwater chemistry, but even a 90% reduction would not guarantee successful restocking with trout. At less affected sites, lower reductions will be beneficial.

GAPS IN KNOWLEDGE AND SUGGESTIONS FOR FUTURE RESEARCH.

1. Long-term monitoring at key sites

Continued monitoring of lake, stream and soil acidification will be essential in order to assess the effects of reduced emissions of acidifying substances. It is very important that the measurement of both inputs and outputs should continue on a long-term basis at key sites in both southern Scandinavia and Scotland. As far as the UK is concerned, this should be done in the highly acidified Loch Ard catchment and at the transitional Allt a'Mharcaidh catchment. The cost will be very small compared with that involved in achieving major reductions in SO₂ emissions. The work should be funded with a minimum delay to avoid gaps in the data.

Long-term monitoring should, wherever possible, form an integral part of continuing research programmes.

2. 2. Studies of long-term acidification of catchments ,

Investigations on the long-term acidification of catchments and of their response to periodic treatment with acidifying agents, such as those being undertaken in the Lake Gårdsjøn catchment, should be continued in order to gain further information on the rate of response of catchments to changing inputs of acid deposition.

3. Importance of nitrogen compounds

The effects of inputs, both atmospheric and terrestrial, of nitrogen compounds will assume increasing importance in catements where the uptake of nitrates by vegetation may no longer be able to compensate for increasing inputs, thereby leading to increased acidification of the soil and surface waters. The effects of nitrates on the whole catchment ecosystem should be studied in greater detail.

4. Aluminium chemistry

Many aspects of aqueous aluminium chemistry are still poorly understood. In particular, the bioavailability of the various species of monomeric aluminium, the manner in which they become bonded to biological material (e.g. gill membranes), the nature of the mechanisms which determine their toxicity to fish, and the mitigating effects of calcium (and silicic acid?) all require further study.

5. Periodic surveys of lake chemistry and biology

Surveys of the water chemistry and of the fish and invertebrate populations of a large sample of lakes should be repeated at regular intervals in order to relate changes in the structure and dynamics of fish populations to changes in water chemistry and food supply. These data will be required in order to assess the effects of reduced acidic deposition and the prospects of successful restocking of lakes! with fish.

Additional research effort should be directed towards the importance of phosphorus and other nutrients, and also of the internal circulation (turn-over time), in the ecology of lakes.

Sulphur from the oceans

Increased attention should be paid to the importance of the release of natural sulphur compounds from the oceans, its seasonal changes related to biological activity (e.g. phytoplankton blooms), and its overall congribution to acid deposition relative to that of anthropogenic origin.



10 DOWNING STREET

LONDON SW1A 2AA

From the Private Secretary

15 August 1990

Dear Kata

MARINE ARCHAEOLOGY

Thank you for your letter of 15 August. You will have seen from Caroline Slocock's letter to Tricia Rennie of 13 August that the Prime Minister is content that the transfer should take place. In terms of presentation of the White Paper, your Secretary of State will want to bear in mind the Prime Minister's concern that the transfer should not mean a net addition in taxpayers' money for archaeology in this country.

I am copying this letter to Moira Wallace (HM Treasury), Len Wright (Scottish Office), Anna Coleman (Welsh Office), Stephen Pope (Northern Ireland Office), Martin Le Jeune (Office of Arts and Libraries) and Sonia Phippard (Cabinet Office).

7 mm eve

DOMINIC MORRIS

Ms Kate Bush Department of the Environment

FT

SCRETARY OF STATE

OR THE ENVIRONMENT



2 MARSHAM STREET LONDON SWIP 3EB 071-276 3000

My ref:

Your ref:

Private Secretary to The Prime Minister 10 Downing Street LONDON SWIA 2AA

1 TAugust 1990

MARINE ARCHAEOLOGY

I have seen a copy of the Secretary of State for Transport's minute to the Prime Minister of 8 August. I referred the proposed transfer of responsibilities to my Secretary of State before he went on leave. He indicated then that he would be content to accept an arrangement along the lines now described in the Secretary of State for Transport's minute. He also indicated he would like to announce the transfer in the forthcoming Environment White Paper (the drafts considered by MISC 141 have referred to this) and that he would be content to respond more fully to the "Heritage at Sea" report in the Autumn.

I am copying this letter to Moira Wallace (Treasury), Len Wright (Scottish Office), Anna Coleman (Welsh Office), Mike Maxwell (Northern Ireland Office), Martin le Jeune (OAL) and Sonia Phippard (PS/Sir Robin Butler).

KATE BUSH

Private Secretary

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THE KW

be P.U.

10 DOWNING STREET LONDON SWIA 2AA

From the Private Secretary

13 August 1990

Dea Tricia,

The Prime Minister has seen a copy of your Secretary of State's minute of 8 August. Subject to the views of colleagues, she is content that the changes outlined there should go ahead. However she has stressed that the transfer of responsibilities should not mean a net addition in taxpayers' money for archaeology in this country. Each project should have to compete on its merits for the funds available but she hopes that the change will enable a better informed and more coherent policy for marine archaeology as a whole.

I am copying this letter to Moira Wallace (HM Treasury), Alan Ring (Department of the Environment), Uriel Jamieson (Scottish Office), Lawrence Conway (Welsh Office), Stephen Pope (Northern Ireland Office), Martin Le Jeune (Office of Arts and Libraries) and Sonia Phippard (Cabinet Office).

Tous viced,

Cordi

CAROLINE SLOCOCK

Ms Tricia Rennie Department of Transport

of



NBPM

2 MARSHAM STREET LONDON SWIP 3EB 071-276 3000

My ref:

Your ref

John Gieve Esq PS/Chancellor of the Exchequer HM Treasury Parliament Street LONDON SW1P 3AG

13 August 1990

- JBush

Thank you for your letter of 26 July.

We are very happy with We are very happy with the sentence offered by the Chancellor and have included it in the latest draft of the White Paper which we aim to circulate this week.

I am copying this letter to Barry Potter and Sonia Phippard, and to Simon Whiteley at DTp, together with your original letter.

Private Secretary

KATE BUSH



ENU APPAIRS: Acid Rain pt 17

PRIME MINISTER

MARINE ARCHAEOLOGY

Robin buttes has their evening sent is a with (Gray B) supporting the evening of responsibility 5 DOE + the aniforal apartments

You commented on the attached minute from Cecil Parkinson that it records only the proposals for the changes, not the reasons.

Two reasons for transferring responsibility for marine archaeology from Department of Transport to Department of the Environment (and its territorial counterparts in Scotland, Wales and Northern Ireland) are:

- expertise within the Department of Transport on marine archaeology (Department of Transport accepts this: they have no archaeological expertise, and rely exclusively on a Advisory Committee for which the Department then act as little more than a rubber stamp. Department of Environment, on the other hand, are already responsible for land archaeology and the heritage, and therefore have considerable in-house expertise and the ability to ask informed questions of outside advisers. (The same holds true in the territorial departments.)
- Transport there is always a competition for resources between archaeology and other marine concerns, particularly marine safety; and when those two compete for resources, marine archaeology inevitably (and probably rightly) loses out. By locating with Department of Environment Chris Patten will be able to take an informed judgment within the overall heritage budget as to much is to be devoted to marine archaeology as against land archaeology.

Both the Department of Transport and Department of Environment expect the change to be welcomed by the Heritage Lobby. In my view the arguments for the re-organisation are plausible if not wholly compelling. But it will be important for Chris Patten to make clear the transfer does not mean a net addition in taxpayers' money for archaeology in this country; each project

will have to compete on its merits for the funds available, but the change will enable a better informed and more coherent policy for archaeology as a whole.

On that basis agree the proposals in Mr Parkinson's minute?

DOMINIC MORRIS

10 August 1990

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les - especially

no rel- addition to

Ref. A090/1974 MR TURNBULL Marine Archaeology The Secretary of State for Transport's minute of 8 August seeks the Prime Minister's consent to a transfer of responsibility for protecting historic wrecks to the Secretary of State for Environment, and to the territorial Secretaries of State in respect of wrecks off Scotland, Wales and Northern Ireland. The transfer would enable responsibilities for marine archaeology to be exercised alongside the wider responsibilities of those departments for the heritage and historic monuments. particular the Royal Commission on Historical Monuments would take on the task of identifying and recording wrecks of historic significance. The proposals will form the Government response to a report by a group of archaeologists last year on "Heritage at Sea". The Prime Minister wrote to Mr Cranley Onslow last August about the Government response to the report. DTp wish to clear the proposal in time to include a short reference to the change in the Environment White Paper, which goes to press on 17 August. DOE's formal response to "Heritage at Sea" will follow in the autumn. The resources to be transferred from DTp to DOE are modest, and no Transfer of Functions Order is needed. The recommendations in Mr Parkinson's letter are agreed by the receiving Secretaries of State, and I recommend that the Prime Minister accepts them. 10 August 1990 ROBIN BUTLER

CONFIDENTIAL



he call

10 DOWNING STREET

LONDON SWIA 2AA

From the Private Secretary

10 August 1990

ENVIRONMENT WHITE PAPER: TREATMENT OF TAXATION

The Chancellor wrote to the Prime Minister on 24 July about the treatment of taxation in the Environment White Paper and proposing a line for the Government to take on taxation issues when the White Paper is published. Much of this was taken into account in the discussion at the meeting of MiSC 141 held at the end of July. However, the Prime Minister would like to comment now on the point raised by the Chancellor on VAT on domestic fuels.

The Chancellor suggested that, if questioned on this point, the Government should say that it has no present plans to extend VAT to domestic fuels but that this could not be absolutely ruled out in due course if necessary to meet the targets on CO₂ emissions. The Prime Minister is content with this line, but she has stressed that it should be clear that the targets concerned are <u>international</u> targets.

I am copying this letter to Sonia Phippard (Cabinet Office).

CAROLINE SLOCOCK

Miss Kate Gaseltine HM Treasury

2

You saw Mr Major's minte a

your papers for the Case meeting CONFIDENTIAL your page 141 but made no specific

comment on it. It is attached.

Prime Minster D

Ju Wes 5

9 August 1990 On Off bromeship fuel, are you happy with the Circ

CO2 EMISSIONS AND VAT ON DOMESTIC FUELS

CAS 9/8

John Major minuted to you just before the MISC 141 meeting which finalised the text of the Environment White Paper. He endorsed the view, set out in the White Paper, that increases in the relative prices of fuel and energy will be necessary in the long term to achieve the 2005 target for stabilising CO2 emissions.

There is one specific, political point on which he would welcome your views.

There is agreement as to what the White Paper should say about tax generally. John Major's minute set out a line to take in response to questions after the White Paper is published.

One question which is likely to arise is the future of the pledge not to extend VAT to domestic fuel. John Major suggests that the line should be:

"we have no present plans to extend VAT to domestic fuel but this cannot be absolutely ruled out in due course if necessary to meet the targets on CO2 emissions.

He would like to know if you are content with this.

Tos - with andral - done

It is sensible not to rule out the option of extending VAT to domestic fuel in the longer term:

unless other factors drive the price up, necessary for the government to push up the price of coal, oil and gas to produce the energy savings needed to deliver the 2005 target;

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- this <u>could</u> be done without touching VAT. Coal and gas might be taxed at some future date, and the present low rate of excise duty on central heating oil (around 1p a litre) could be increased;
- but extending VAT could be a simpler way of encouraging energy efficiency in the home. This particular exemption strikes an odd note when people are concerned about the rate of energy use;
- help to the poorest section of the community could then be targeted. A blanket exemption goes to everyone regardless of need.

CONCLUSION

John Major is right to suggest that we should be prepared, if asked, to say that extending VAT to domestic fuel cannot be absolutely ruled out in the longer term.

CAROLYN SINCLAIR

CONFIDENTIAL



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10 DOWNING STREET LONDON SWIA 2AA

From the Private Secretary

9 August 1990

Dear John,

FRAMEWORK FOR ENVIRONMENTAL DECISIONS

The Prime Minister has seen the Chancellor's minute of 1 August attaching the report of John Odling-Smee's group on developing a framework for environmental decisions. She has also seen Mr Patten's minute of 8 August.

The Prime Minister regards this as a useful first step in addressing the concerns about the basis for environmental decision-taking which were expressed in MISC 141. She agrees with the general principles set out in the report, but notes that further work will be needed in Departments on the means of applying these principles if improved decisions are to result in practice. She would accordingly be grateful for a progress report in six months' time covering both the Department of Environment guidelines for policy appraisal and the work by Departments on the analysis and valuation of environmental effects in their policy areas, on which they will have reached preliminary conclusions by the end of this year. It would be useful if the Treasury could take the lead in drawing this progress report together.

I am copying this letter to the Private Secretaries to Members of MISC 141 and to Sonia Phippard (Cabinet Office).

CAROLINE SLOCOCK

Yours ricacly,

John Gieve Esq HM Treasury

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Prive Minister

Gartert to approve
these changes?

This records the proposels CAS Prime Minister When we the masons? MARINE ARCHAEOLOGY who we did to Dane with the Contyille Cominsi there ser a lente son Last year a report "Heritage at Sea" was presented to the Government by a group of archaeologists and divers. It recommended changes in the way historic wrecks and other archaeological sites in tidal waters are protected. You recently assured Cranley Onslow that decisions would be taken during the course of this summer. I understand that the relevant Departments have agreed on the 2. following recommendations: (a) transfer from the Secretary of State for Transport to the Secretary of State for the Environment of responsibility for historic wrecks in English waters, along with the lead responsibility for marine archaeology; transfer of responsibility in waters off Scotland and (b) Wales to the relevant territorial Secretaries of State; (c) transfer of responsibility in waters off Northern Ireland to the Secretary of State for the Environment, with DOE Northern Ireland acting as his agents. The transfers should take place on 1 April 1991, or (d) earlier if that proves practicable and sensible, with the resources now available going to the Department of the Environment. (e) There is no need at this stage for a new agency to deal with marine archaeology or for new legislation.

with y pupe interest? This change in responsibilities should go some way towards satisfying the authors of "Heritage at Sea". I understand that Chris Patten will be ready to respond more fully to the report in the autumn, although without raising expectations that he will have the resources to do much more, at least in the short term. If you agree to this change of responsibility, Chris Patten 4. would very much like to include mention ot it in the Environment White References are included in the current draft, on understanding that they will be deleted if you do not agree. The final deadline for that is 17 August. I am sorry that the deadlines for the Environment White Paper 5. have left so little time to decide on this proposed change, but in my view it is a useful tidying up which we can accept. I am sending copies of this minute to John Major, Chris Patten, 6. Malcolm Rifkind, David Hunt, Peter Brooke and David Mellor, and to Sir Robin Butler. CECIL PARKINSON 8 August 1990



FRAMEWORK FOR ENVIRONMENTAL DECISIONS

You may recall that Misc 141, in the context of its decision on sewage sludge, commissioned a study to try to find a systematic way of ensuring that all environmental benefits and disbenefits are taken into account when policy decisions are taken. Mr Ridley had it in mind that some formula might be devised which gave appropriate weights to, for example, both the control of CO2 emissions and of acid rain emissions, according to their relative environmental costs.

Mr Major has written (Flag A) with the results of this work. His minute gives a good summary of the conclusions; and I do not think you need to dip into the report itself. It does not come up with any magic formula. Instead, arguably it does little more than state the obvious and suggest a formal mechanism for ensuring that Departments take this into account. Given the dangers of short-sightedness in this area this seems worth doing; and the report is welcomed by Mr Patten (Flag B) who congratulates the officials involved on their work.

Cabinet Office (Flag C) point out that Departments will need to be encouraged to follow up the report's rather general recommendations with energy and imagination. These are:

- that Departments should prepare reports on what they already do and what they need to do in order to improve the way they appraise environmental policies. Preliminary reports should be available by the end of the year; and a full report by the end of next year;
- and that DOE should prepare detailed guidelines for such appraisal by February 1991.

Content to welcome the report and to endorse its recommendations?

Do you want to ask for a progress report in six months time to encourage Departments to implement the report effectively?

Caroline Slocock 8 August 1990 To please

Reference No: E0883

MR TURNBULL

cc Sir Robin Butler
Mr Owen o.r.
Mr Wells

FRAMEWORK FOR ENVIRONMENTAL DECISIONS

Since the Chancellor of the Exchequer's minute of 1 August on this subject was prepared in response to a MISC 141 remit, you may find it helpful to have advice from the Secretariat.

- 2. The Chancellor's minute correctly records the concern expressed at the meeting of MISC 141 on 6 March which led to this exercise. Several decisions had been taken in pursuit of environmental benefits (flue gas desulphurisation, catalytic convertors, and ending of sewage sludge dumping in the North Sea) which would however all exacerbate the problem of carbon emissions. The Treasury was accordingly asked to take the lead in setting up a group of officials and outside experts to develop a methodology for ensuring that the full range of environmental effects, and trade-offs between them, could be taken into account when decisions were made.
- 3. The results of the group's work are contained in the report attached to the Chancellor's minute. The conclusions are that Departments should be more systematic in identifying the environmental costs and benefits of policy proposals, and should put more effort into quantifying them, though without ignoring those which cannot be quantified. To give effect to these principles, it is proposed that DOE should prepare detailed guidelines on the appraisal of policies affecting the environment, and that Departments should equip themselves with the means of analysing and valuing environmental effects.

- 4. The proposed principles seem unexceptionable. In essence, they simply articulate the concerns expressed in MISC 141, and indeed the Chancellor does not claim that they are particularly novel. Some of the more detailed recommendations, for example for listing all available options, setting clear objectives, and monitoring results, are important to good decision-taking in any area. But the report makes the point that environmental issues tend to be distinguished by the uncertainty of the available evidence and the absence of direct market values for environmental impacts, and that policy analysis needs to recognise these factors.
- The effect of these recommendations will depend on the extent to which Departments are able to apply them in their policy work. The report was informed by case studies of the way in which the three decisions that prompted the MISC 141 concern had been made. But it might also have been helpful to include a few examples showing how the recommendations could be applied to improve decision-taking in practical situations. However the report recommends that Departments themselves should now identify what is required for analysis of environmental effects in their policy areas, and should prepare a preliminary report by the end of the year and a full report by the middle of next year. At the same time, DOE are invited to prepare detailed guidelines for policy appraisal, in consultation with other Departments, to be completed by the end of February 1991. Taken together, these proposals should lead over the next year to the development both of a method of appraisal and of the means to apply it in Departments.
- 6. The report therefore seems to point in the right direction, but Departments will need to pursue its somewhat general recommendations with vigour and imagination if improved decision-taking is to result in practice. In responding to the Chancellor's minute, therefore, you might endorse what has been

done, but note that further work will be needed in Departments, and ask for a progress report in 6 months' time when the proposed DOE guidelines should be substantially complete. I attach a draft letter for this purpose.

T J BURR

Cabinet Office August 7, 1990 SCANNED

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DRAFT LETTER TO THE PRIVATE SECRETARY TO THE CHANCELLOR OF THE EXCHEQUER

FRAMEWORK FOR ENVIRONMENTAL DECISIONS

The Prime Minister has seen the Chancellor's minute of 1 August attaching the report of John Odling-Smee's group on developing a framework for environmental decisions. The has also seen Mr Patters make of 8 Aprends.

The Prime Minister regards this as a useful first step in addressing the concerns about the basis for environmental decision-taking which were expressed in MISC 141. She agrees with the general principles enunciated in the report, but notes that further work will be needed in Departments on the means of applying these principles if improved decisions are to result in practice. She would accordingly be grateful for a progress report in months' time covering both the proposed DOF guidelines for policy appraisal (which should be more or less completed by then) and the proposed work by Departments on the analysis and valuation of environmental effects in their policy areas on which they will have reached preliminary conclusions by the end of this year. It would be useful if the Treasury could take the lead in drawing this progress report together.

I am copying this letter to the Private Secretaries to Members of MISC 141 and to Sonia Phippard (Cabinet Office).

A TURNBULL

CAROLING SLOCOCY

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PRIME MINISTER

FRAMEWORK FOR ENVIRONMENTAL DECISIONS

I have seen the Chancellor's minute of 1 August covering the report of the group under Mr Odling-Smee's chairmanship.

I agree with the Chancellor that we should accept the recommendations of the group's support, and I should like to congratulate Mr Odling-Smee and the members of his group on reaching these agreed conclusions within such a constrained timetable. The draft of the Environment White Paper which MISC 141 discussed included 18.6 an agreed passage summarising the group's conclusions. Provided you and others are content, that text can now stand and my Department will proceed to draw up detailed guidelines for environmental policy appraisal as recommended.

I am copying this minute to members of MISC 141 and to Sir Robin Butler.

CP

& August 1990

Approved by the Secretary of States and Egged in his absence



PRIVY COUNCIL OFFICE

WHITEHALL, LONDON SWIA 2AT

3 August 1990

De Minister

with CAS? ENVIRONMENTAL PROTECTION BILL : PENALTIES

Thank you for your letter of 27 July seeking L Committee's agreement to an amendment at Lords Report Stage of the Environmental Protection Bill to make the penalty provisions in the Water Act 1989 consistent with those created by the Bill.

I can entirely understand your wish to ensure that penalties for the pollution of water are consistent with the pollution control penalties in the Environmental Protection Bill. It is worrying, however, that this lack of consistency has only just come to light. It would not, as you know, have been possible to bring forward this amendment if the Bill had completed its Report Stage before the Summer recess, as we earlier hoped would be possible. Neither can I readily accept your view that there has been sufficient control exercised over additions to the Bill during its Parliamentary passage. In addition to the large numbers of amendments made during the Commons stages, I understand that some 255 Government amendments were agreed to at the Lords Committee Stage.

We have now confirmed the date of the State Opening of Parliament for the 1990/91 Session as 7 November, which means that the time available for Commons Consideration of Lords Amendments to the Environmental Protection Bill in the spillover will be severely limited. The business managers would, therefore, prefer that no Government amendments were brought forward at Lords Report Stage. This may strike you as unrealistic, but we are determined to ensure that the list of amendments does not grow to anything like unmanageable proportions over the Summer Recess. We were told that the European Communities Bill 1971 required (I think) fourteen "essential" amendments in the Lords. On business management grounds we rejected them all - and not one of them has subsequently been missed. That is the yardstick from which we must start!

ENV. AFF. Acid Rain CONFIDENTIAL

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You can thus see why I am reluctant to agree to the inclusion of your penalties proposals in the Bill unless I can be satisfied that the necessary amendments will be relatively short, and that there will not be a raft of other amendments to the Bill. I note that Chris Patten wrote on 26 July to Malcolm Rifkind indicating that you propose to bring forward amendments to take account of the impact of the new litter duty on local authorities which have let contracts to the private sector or assigned services to the DSOs following competition. You may also have other amendments in mind of which I am not aware. I therefore suggest that we meet in mid-September to discuss your plans for the Report Stage, before L Committee endorse any further additions to the Bill and before any amendments are tabled.

I would be grateful if you could arrange for your officials to prepare a note listing all the proposed amendments for Lords Report Stage, as a basis for our discussion. My office will be in touch with yours about the arrangements for the meeting which will need to take place before 19 September, the date identified by the Lords business managers as the last for tabling Government amendments. I am content for you to instruct Counsel on both the penalties amendments and the litter amendments, but without prejudice to the business managers' consideration of the merits of including them in the Bill.

I am copying this letter to the Prime Minister, Peter Lilley, David Hunt, Norman Lamont, Cecil Parkinson, John Gummer, and other members of L Committee, and to Sir Robin Butler and First Parliamentary Counsel.

manda.

STATE (NEW 200)

PR. GEOFFREY HOWE

(Approved by the land Perstell and vigil i his along)

David A Tripper RD JP MP Minister for the Environment and Countryside





Treasury Chambers, Parliament Street, SWIP 3AG 071-270 3000

PRIME MINISTER

FRAMEWORK FOR ENVIRONMENTAL DECISIONS WAS ALLA CARA At its meeting on 6 March, MISC 141 questioned whether past decisions in the environmental field had always been taken in the round. For example, there was a feeling that insufficient emphasis had been given to the fact that fitting further flue gas desulphurisation equipment to power stations and catalytic converters to cars, while reducing emissions of some gases (eg SOX and NOX), would reduce fuel efficiency and exacerbate the problem of carbon dioxide emissions. It was concluded that there was a need for a comprehensive framework to ensure that such decisions considered all the implications of a policy proposal. This could well involve pricing the various gas emissions to allow sensible decisions about trade-offs between them and about the proper level of investment in abatement.

As a result a group of government officials and outside experts was set up under Mr Odling-Smee's chairmanship. It comprised representatives of the Treasury, Department of the Environment, DTI, MAFF, Department of Energy, Department of Transport and No 10 Policy Unit, Professors Helm, Hoskins and Pearce, and Mr Brech The government departments represented agree with the conclusions and recommendations of the group.

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The report of the Group

I attach the report of the group. The summary, conclusions and recommendations are set out on pages 1-4. The key conclusions are:

- departments should undertake more systematic appraisal (in the broad sense of the development, design and analysis of policies) of the environmental costs and benefits of policy proposals;
- domestic costs and benefits should be given adequate weight even if external pressures are an important factor (in the cases mentioned at MISC 141 the main pressure for action came from the EC);
- departments should put greater effort into the quantification of environmental costs and benefits where this would improve decision making;
- policy appraisals should expose all the environmental advantages and disadvantages of a proposal even if some of the costs and benefits cannot be quantified.

The report recommends that departments should adopt a system of policy appraisal based on the conclusions of the report. To give practical effect to this, departments should be asked to prepare reports on what they already do and on what they would need to do in order to improve their policy appraisals. On the basis of this and other considerations, DOE are recommended to draw up detailed guidelines for policy appraisal in the environmental area. Finally, it is recommended that the intention to improve policy appraisal in this way and to publish guidelines should be announced in the White Paper on the Environment.

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Conclusion

None of this is very controversial. It should be generally helpful to be more systematic about appraising environmental costs and benefits. We should not, however, expect major improvements to be made in a short time: in particular valuation techniques are not in widespread use and may not always be acceptable to decision makers. Some additional effort will be required in departments but the resources involved are likely to be extremely small, and the gains in terms of better decisions could be considerable.

I therefore propose that we should accept the recommendations of the report.

I am copying this letter and report to members of MISC 141 and Sir Robin Butler.

Moinz Wallace

1 Angust 1990

PP [J.M.]

(Approved by the Chancellar and signed in his absence.)

REPORT OF GROUP ON ENVIRONMENTAL COSTS AND BENEFITS

INTRODUCTION

1. The terms of reference established for the group on environmental costs and benefits were:

to develop a framework for presenting the costs and benefits of environmental issues to Ministers. In doing so it will review existing work and draw on ongoing analysis and research. The framework should be capable of being applied in particular to the environmental effects of gas emissions and to investment appraisal.

- 2. This report sets out the group's response to the terms of reference under the following headings:
 - summary and conclusions;
 - recommendations;
 - case studies;
 - features of environmental policy;
 - existing guidelines for policy appraisal and environmental assessment;
 - possible guidelines for policy appraisal¹.
- 3. The group's membership included both officials and experts from universities and business (Annex 1).

SUMMARY AND CONCLUSIONS

4. The group's main observations about the appraisal of environmental policies and other

In this report, terms are used in the following way:

policy appraisal refers to the whole process of policy development from problem identification through to decision;

policy analysis is the component of appraisal involving detailed consideration of costs and benefits, and may include quantification (measurement in defined units) and valuation (measurement in monetary units);

policy evaluation refers to the process of checking afterwards how far policy objectives have been achieved and how efficiently and economically.

policies with major environmental implications are as follows:

- (a) Current decisions cannot be isolated from those in the past. Policy is often developed continuously, with one set of decisions leading on to the next (for example as pollution standards are tightened).
- (b) As policy debates proceed, it is easy to lose sight of final objectives, and in these circumstances options tend to be narrowed down too quickly.
- (c) Policies designed to have specific environmental impacts may be accompanied by other environmental effects, good or bad.
- (d) Targets have often been agreed without detailed consideration of how they could best be achieved.
- (e) Policy is often developed in response to external pressures. In such cases the gains may be measured in part in terms of the contribution to wider international objectives. It can be difficult to compare these gains with domestic costs and benefits.
- (f) Decisions often have to be taken on the basis of partial and uncertain scientific evidence.
- (g) Despite considerable efforts in some areas, there have been few successful attempts within Government to value environmental costs and benefits, reflecting the uncertainty of the relationships. The incorporation of valuations in decision making has been limited by their acceptability.
- 5. In the light of these observations, the group has reached the following general conclusions about the analysis of environmental policies or other policies with major environmental implications:
 - (a) Departments should undertake more systematic appraisal of the environmental costs and benefits.
 - (b) Departments should include a wide range of options in appraising projects and policies, and should review these options as new information arises. Market-based instruments should be included in the options wherever relevant.

- (c) Appraisals should recognise the international dimensions of a proposed policy. These can only be put in context if both domestic costs and benefits and implications for other countries are well understood. It is important to ensure that domestic costs and benefits, including the implications for industry's costs compared with those in other countries, are given adequate weight and that external pressures are not allowed to dominate decision making.
- (d) Appraisals should seek to anticipate EC and other international initiatives. International discussions aimed at promoting international agreement about the range and distribution of costs and benefits are desirable.
- (e) Appraisals should consider both the basis for any targets and the means by which they are to be attained.
- (f) Policy appraisals should expose all the environmental advantages and disadvantages of a proposal even if some of the costs and benefits cannot be quantified.
- (g) Departments generally should put greater effort into the quantification of environmental costs and benefits where this would improve decision-making. Expertise in applying methods for the valuation of environmental benefits and costs needs to be developed and the reliability of the valuations improved. This will require more resources to be devoted to this sort of analysis.
- (h) Reports to Ministers should indicate the degree of uncertainty about the environmental consequences of the policy options considered, including the possibility of unforeseen consequences.
- (i) Given scientific and economic uncertainty, consideration should be given to flexible policy responses, though not at the expense of cost and efficiency considerations.
- (j) Decisions should provide for subsequent monitoring of effects, and should direct future research to those areas where the policy might be sensitive to new evidence and the scope for improved decisions might justify the extra research.
- (k) The development of suitable guidelines would promote a more thorough and consistent approach to appraisal of policies with significant environmental effects.

RECOMMENDATIONS

- 6. The group recommends that:
 - (a) For environmental policies and other policies with major environmental implications, departments should adopt a system of policy appraisal based on the conclusions of this report. This system would involve a more systematic and consistent approach, and generally a greater emphasis on quantification and where possible valuation of environmental costs and benefits.
 - (b) The following steps should be taken to give practical effect to improved policy appraisal:
 - (i) Departments should identify what is required for analysis of the environmental consequences associated with their policy areas; consider the range of expert skills available for this analysis; and identify the means by which these skills can be combined. Departments should prepare a preliminary report on this by 31 December 1990 and a full report by 30 June 1991.
 - (ii) Departments should appraise their requirements for measures of environmental costs and benefits and potential applications of valuation techniques. They should as appropriate promote research into appropriate valuation techniques. Departments should prepare a preliminary report on their plans for improving valuation approaches by 31 December 1990 and a full report by 30 June 1991.
 - (iii) DOE should assemble information on existing valuation techniques and practice, and make this available to assist other Departments.
 - (iv) DOE in consultation with other departments should work up detailed guidelines for policy appraisal, based on the conclusions of this report. The Department should report on these guidelines, and the means of promulgating them, by 28 February 1991.
 - (c) The objective of generally improved policy appraisal, and the intention to publish guidelines, should be announced in the Government's White Paper on the Environment.

THE CASE STUDIES

- 7. The group approached its task by first commissioning a set of three case studies of recent environmental policy decisions. These examined the range of analysis which had been conducted in departments and presented to Ministers. The policies considered were:
 - proposals for termination of sea dumping of sewage sludge;
 - the Large Combustion Plants Directive and related proposals for emissions control;
 - proposals for EC regulations on motor vehicle emissions controls.
- 8. Each case study considered the history of the policy proposal, the associated analysis, and how decision makers used the information. The aim was to review the process of policy appraisal rather than the substance of the decision. The case studies were based on a quick review of available information, and are not definitive.
- 9. All three looked at emissions and pollution issues. Yet environmental policies cover a much wider field: including, for example, heritage conservation, and urban environment management. Consideration has been given to the extent to which analysis of other environmental issues might have different features, and of the application of the findings to project as opposed to policy appraisal.
- 10. Key conclusions from the case studies are that:
 - analysis should include clear statements of objectives, and a full listing of options;
 - there should be comprehensive recognition of all effects, and quantification where possible;
 - flexibility, monitoring and reviews are an important part of policy making;
 - analysis should clearly recognise "good neighbour" (international relations)
 gains.

11. Examples drawn from the case studies are included in the rest of this report.

FEATURES OF ENVIRONMENTAL POLICY

- 12. The case studies show that policy appraisal and project appraisal share many common features. However, projects are usually discrete while policy is often developed continuously with one set of decisions leading on to the next (most notably as pollution standards are tightened). An example is the sequential development and review of vehicle emissions targets. The first European targets were set in the late 1960s. In 1984, the Commission proposed an amending Directive which would have seen a modest tightening of standards for hydrocarbons (HC) and nitrogen oxides (NOx) by 1989 and achievement of US standards by 1995. The "Luxembourg package" was developed as a compromise in June 1985: it set an interim (Stage I) target for small cars of 15g/test NOx+HC (about twice the US standard), to be achieved in 1990/91. In 1988/89 the UK took part in discussions on the second stage small car targets, with an initial UK preference for a 12g/test standard (later in the negotiations the UK preference was for a 8g/test standard). The agreements reached in 1989 for adoption of US regulation levels are still subject to further rounds of negotiation.
- 13. Another difference relates to the timing of decisions: in policy appraisal, the advantages of deciding early need to be weighed against the likelihood that a later decision will be better informed. Policy decisions can generally be revised and reordered more flexibly than project decisions.

Are environmental policies different?

- 14. One issue is whether environmental policy appraisal presents special problems, making it more difficult than other areas of public policy. Potential difficulties include:-
- great uncertainty concerning the scientific and economic evidence (eg about the effect
 of changing one element in a complicated ecosystem whose workings we do not
 wholly understand);
- policies designed to have specific environmental impacts may be accompanied by other environmental effects, good or bad;
- there are impacts whose value is not directly measured in the marketplace;
- many of the costs and benefits accrue to later generations;

- there may be irreversible effects such as the loss of unique habitats or species;
- there is often an international context.
- 15. None of these features is unique to environmental decisions; but arguably no other class of decisions suffers from them to such a great extent. Any guidelines for analysis need to recognise this.
- 16. The three case studies exhibit these difficulties. Air quality modelling shows how difficult it is to gauge the full effects of motor vehicle emissions. Alternatives to dumping sludge at sea have implications for land and water quality. The benefits of fitting flue gas desulphurisation (FGD) units at power stations could be described (eg reducing damage to buildings and lakes) but they were difficult to quantify. In all three case studies new information was constantly emerging, particularly concerning potential greenhouse gas effects.
- 17. Because of these difficulties and the many different solutions to them, consistency in approach is important. This requires attention to the ways in which underlying policy principles (such as avoidance of irreversible environmental effects) should be taken into account.

International issues

- 18. Policies behind all three case studies were heavily influenced by EC directives or other international pressures. Development of FGD policy was influenced both by domestic emissions targets (the UK's 30% SO₂ reduction goal) and the negotiations over EC targets for emissions from existing plant. Vehicle emissions policies were largely, if not solely, related to EC pressures. In all three case studies, analyses helped to support the UK position in international negotiations, or to determine follow up action.
- 19. A lesson is that it is important for domestic costs and benefits to be given adequate weight, and for international factors to be accounted for in an explicit way, with full recognition of costs and benefits (including implications for the competitiveness of UK industry).
- 20. Another lesson is that as international factors become increasingly important for UK environmental policy, the UK should ideally be able to take a less reactive stance in international negotiations. This is especially true of EC initiatives which UK policy analysis should seek to anticipate. This has implications for research and for policy development. For

example, in drawing up a broad list of options for analysis attention should be paid to the targets and policies that might in future be sought by other governments and international agencies. Another principle is that international consideration of environmental problems should also apply rigorous appraisal procedures.

EXISTING GUIDELINES FOR POLICY APPRAISAL AND ENVIRONMENTAL ASSESSMENT

- 21. There are many existing guidelines on policy appraisal and environmental assessment, both in the UK and elsewhere.
- 22. In the USA the Environmental Protection Agency prepares analyses of environmental regulations. The content of these analyses has become more detailed and more comprehensive over the last 20 years. Since 1981 executive agencies have been required to prepare "regulatory impact assessments" (RIA) that in principle include a complete analysis of the benefits and costs of new regulatory initiatives, although in practice this objective has not been fully achieved because of methodological difficulties. A brief summary of guidelines for Regulatory Impact Assessment is attached as Annex 2.
- 23. In the UK, similar procedures exist (see Annex 3) but they are neither as formalised nor as comprehensive as in the USA. Departments are expected to appraise their policies ex ante as well as evaluate them ex post. Compliance cost assessments are required for regulatory initiatives that add to the burdens on businesses but generally these focus on cost impacts on business and do not deal with environmental costs and benefits. Environmental impact assessments are required under an EC directive for individual major capital projects but not for major policy interventions. Regulations and DOE guidelines contain explanations of how environmental assessment should be carried out.
- 24. These and other overseas examples show that guidance on policy appraisal and impact assessment can take a number of forms. It can be formal (a required procedure) or simply advice on good practice. It can be comprehensive (such as the US RIA) or look at particular aspects (UK compliance cost assessment).

POSSIBLE GUIDELINES FOR POLICY APPRAISAL

Basic framework for policy appraisal

- 25. This section sets out a comprehensive approach to the appraisal of major policies with significant environmental implications. It could form the basis for a required procedure, or remain as a set of guidelines. Much of the approach is simply good analytical practice which should be applied to any policy appraisal, whether or not it has environment aspects.
- 26. No amount of analysis can guarantee that a decision is always right. Our current understanding of climate change could not reasonably have been anticipated five years ago, although it might have been anticipated in more recent policy on combustion plant emissions. A good decision is one that makes full use of all available information, and also takes into account potential changes that might affect the policy.
- 27. Both project and policy appraisals are best when made in the context of a clear framework. This reduces the risk that significant items or links will be missed. Guidelines should include the following ingredients:
 - clear specification of the problem in context;
 - identification of relevant policy objectives, and criteria for testing proposals;
 - recognition of constraints on policy;
 - identification of policy options;
 - sound analysis, including recognition and quantification where feasible of environmental effects;
 - selection of favoured option;
 - reporting results and recommendations to decision makers;
 - monitoring of policy effect and policy review.

These are now explained in turn.

I. Specify problem

28. This requires a description of the background to the proposed policy and of the history of its development.

- 29. For example, a 1988 report on vehicle emissions set out the background summarised earlier in this report. The complex issues relating to sludge disposal were outlined to Ministers in a report presented prior to the North Sea conference. The problem was not just specified as a technical or scientific issue. Its international context was clearly recognised.
- 30. The Large Combustion Plants Directive was negotiated in 1988 against a background of the existing UK policy on SO₂ emissions (reduction of total UK SO₂ emissions by 30% from 1980 levels by the end of the 1990s). This policy was already under review within the UK because of two conflicting trends. The results of scientific research had hardened the case for making significant reductions in acidic emissions. At the same time, rising electricity demand threatened to make reductions more difficult to achieve.

II. Define objectives

- 31. Policy objectives should be spelled out clearly and reviewed as the analysis proceeds. Policy objectives which are obvious to the experts, both technical and administrative, who developed the policy proposals may not be so obvious to decision makers who come to it later. Reports on the Large Combustion Plants Directive were clear about the proposed UK SO₂ reductions targets, but were less explicit about the relative significance of local versus international impacts.
- 32. The initial specification of objectives should be general, and a tendency to define intermediate objectives and so to narrow down the range of options should be resisted. An objective set in terms of a specific reduction in emissions already prejudges the optimum load of emissions. The optimum should ideally be derived from balancing the objective of less pollution with the objective of minimum cost to the economy. This is the approach which is being applied to current appraisal of policies on CO₂ reductions. The timescale over which results are sought is an important consideration: some results may involve strict deadlines while others are more flexible.
- 33. Starting from the general objectives, advisers can develop detailed criteria to assess policy proposals. Criteria might build on basic measures such as:
 - efficiency (benefits should be greater than costs);
 - distributional effects (gains and losses to different groups in society, and between present and future generations);

- other environment measures not reflected in efficiency terms (ie irreversible effects, species preservation, recognition of uniqueness);
- achievement of good international relationships (including effects on other policies);
- practicability the likelihood that a measure will work in practice, as well as theory.

III. Indicate constraints on action

- 34. Constraints and prior commitments should be spelled out. For example, in the case of motor vehicle emission negotiations (stage II small car targets) the UK was bound by earlier commitment to the Luxembourg package (the 1985 agreement on Stage I targets). The emission performance limits of lean burn technology were seen as a constraint on the UK negotiating position. In the case of sewage sludge, the constraints included previous general commitments to moving away from marine waste disposal once alternatives became practicable. Identifying constraints and commitments helps to avoid later complaints that options were discarded without good reason (although care needs to be taken not to exaggerate the constraints). It also helps decision makers to explain how and why decisions were made.
- 35. Constraints can change over time, and may ease: for example, technology for incineration of sewage sludge improved significantly during the 1980s. Analysts should not forget that options which are ruled out in the short term may become feasible in the longer term.

IV. Identify policy options

- 36. Policy assessment is more likely to arrive at a good solution if:
 - policy options are defined broadly; and
 - analysis is flexible so that new options can be included and assessed.
- 37. Where policy is being developed continuously, the monitoring and evaluation of existing policies is an essential input into developing new policy options. All three case

- studies looked at a range of options, but in varying depth, and never in one single report. One reason for this was that new information continued to emerge. For example, the policy on reduction of SO₂ emissions developed over at least 5 years, with new information emerging both on environmental damage, and the potential for use of alternative fuels to contribute to achieving SO₂ targets.
- 38. In the case studies more attention was given to regulatory options than to market-based instruments. For example, the focus on FGD as the means of achieving SO₂ reductions may at times have obscured the other solutions. Market based instruments should be considered wherever relevant because they are usually more efficient than direct command and control regulatory options, partly because they provide a continuous incentive for technological improvements. Guidelines should include information on the ways in which market based instrument and other options can be identified and compared with regulatory options.
- 39. Some of the papers reviewed in the case studies mixed discussion on ends (targets) and means (instruments). Often decisions about the detailed means of implementing new targets are taken after the targets have been agreed. Options for disposal of sewage sludge were not looked at in detail, once it was agreed in principle that there were practicable alternatives. A full technical and economic analysis of all options, including disposal in the North Sea, was subsequently commissioned. There has been a continuing discussion about the means of implementing the SO₂ targets already agreed under the terms of the Large Combustion Plant Directive and the respective role to be played by FGD, low sulphur coal, combined cycle power stations etc.
- 40. If means alone are under consideration, then the appropriate form of analysis is a cost-effectiveness appraisal, taking account of other environmental spin-offs, and not a full cost-benefit assessment. Cost effectiveness appraisal involves finding the most efficient way of achieving a given target (rather than debating the merits of the target itself). The same principles apply: for example, all the effects of the proposal should be taken into account. Nevertheless, it is easy to lose sight of final objectives, and a clear initial separation of ends and means helps to avoid this.

V. Develop analysis

41. None of the case studies referred to existing guidance on environmental assessment or to other required procedures. Use of guidelines and checklists can be worthwhile since in complex assessments it is easy either to overlook relevant effects or to give them insufficient

- weight. A plan is needed to ensure that each step in an analysis is treated in a thorough way, that experts have enough time to prepare their advice, and that this is delivered at the right moment.
 - 42. Analysis can be particularly difficult where fixing one problem (for example, SO₂ by FGD) can have other effects (in this case implications for energy efficiency and greenhouse gas emissions). Analysis should always consider secondary or indirect effects. However, all the case studies faced the difficulty of "moving goals", and changing information and concerns. It is partly because of this that analyses of greenhouse gas effects were included only at a late stage in advice on motor vehicle emissions and sludge disposal.
 - 43. The need for scientific research to back-up environmental choices is well recognised. What may be less well recognised is the need for prior economic input and research effort to ensure that proper economic assessment is available to decision makers. It is important to involve both economic and scientific expertise all the way through the policy process, and to look ahead to the possible development of new policy options. Departments will need to consider the deployment of existing departmental resources, and their use of outside consultants and advisers. Departments should also consider how a multi-disciplinary approach, combining the skills of scientists, technical advisers and economists, can be promoted.
 - 44. Some elements in a cost benefit analysis can be produced more reliably and quickly than others. For example, estimates of technical costs, such as installing new emission control equipment, can often be derived quite easily. But the case studies have shown that the analysis of environmental benefits and costs which are not valued in the market place has been much weaker. For example, the costs of FGD were quantified, but the benefits described only in general terms such as improvements to water quality. Where direct measurement is not possible, implicit values can sometimes be illuminating. For example, the minimum implicit value of total environmental and other (e.g. international) benefits from reducing SO₂ emissions from power plants was the cost of installing and running FGD.
- 45. A cost-benefit framework covering both environmental and other issues notionally provides a good way of weighing up all the relevant factors. This is true even where they cannot all be valued. Techniques have advanced to the point where they can produce useful results in some areas even though valuation of unpriced costs and benefits has been difficult in the past and remains subject to ranges of uncertainty.
- 46. A variety of methods of valuation have been suggested in the literature. Some

- techniques build on the evidence of market transactions and these should be used wherever possible. Where market values are not available, it may be possible to infer appropriate valuations from transactions in related, but different, markets. For example, differences in house prices can be used to estimate the value of different environmental benefits ("hedonic pricing"), or observations of the costs that people incur in travelling to recreation sites can be used to infer the values of those sites. Another technique is to survey the values people place on environmental resources ("contingent valuation"). This technique has been used to place values on things such as water quality, wildlife protection, and scenic amenity. These methods are described more fully in Annex 4.
- 47. Where new research is necessary, the costs and difficulties of carrying it out may be considerable. Decisions may need to be taken about whether the extra knowledge and the expected improvement in the quality of decisions it yields justify the costs.
- 48. Although valuation techniques are fairly well established in theory, there is only limited experience of applying them in practice in the UK. Some are still in the developmental stage, and are not yet fully accepted or widely used in government. However, the techniques are more widely used in policy appraisal in the USA and some other countries. The group considers that there is scope for Departments to make greater use of valuation techniques, gradually placing greater weight on them as experience increases and their reliability and acceptability improves. In the initial stages, this may require considerable background research with inputs from departments and specialist researchers.
- 49. Given the need to use as wide a range of techniques as possible and the need for consistency in techniques and other aspects of policy appraisal, it is important that officials discuss applications both within departments and between departments. A machinery of inter-departmental consultation already exists for this purpose between departmental economists.
- 50. Annex 4 gives an indication of some of the methods and factors that should be considered in identifying costs and benefits. More comprehensive checklists are contained in documents such as the DOE guidelines on environmental assessment. Further work needs to be done to develop advice on valuation methods and a checklist suitable for inclusion in guidelines on policy appraisal.
- 51. Another important aspect of analysis in some cases is the distribution of costs and benefits, particularly where there are international consequences. For example, one of the principal benefits to the UK claimed for the Large Combustion Plants Directive was that it

- would take the heat out of the long running dispute over acid rain with other European countries, particularly in Scandinavia, which are down wind of the UK. The implication is that a proportion of the environmental benefits from emission abatement in the UK would accrue to other European countries. The implications of the Directive for UK electricity consumers were also assessed, on the assumption that the Polluter Pays Principle should be the basis for determining how the Directive's implementation should be financed. Reports on motor vehicle emissions commented on the impacts that alternative standards would have on vehicle and parts manufacturers, and vehicle purchasers. These international consequences need to be assessed alongside domestic costs and benefits.
- 52. A particular problem for environmental policy arises when there is scientific and economic uncertainty about effects. In the case studies on motor vehicle emissions and the large combustion plants directive, effects of greenhouse gas emissions were not as well established as the effects of other pollutants, and were given greater weight as understanding grew. Similarly, there were some uncertainties about the effects of disposing of sewage sludge at sea. Methods of analysis should be flexible enough to incorporate new information, especially where the state of knowledge is developing rapidly. Techniques of risk assessment may be relevant in dealing with uncertainty.

VI. Select favoured option

- 53. The favoured option will generally be the one that maximises the net benefit to the UK, taking account of the value to the UK of any international consequences. Selection of the favoured option obviously is based on the objectives and criteria defined earlier. Some of the objectives and criteria may be related to qualitative rather than quantitative measures.
- 54. Given scientific uncertainty, proposed policy responses should aim to incorporate some flexibility. It could be argued that the revision of the FGD programme allowed greater flexibility in meeting 2003 targets. There may, however be disadvantages in too much flexibility: costs may be higher and investment may be inhibited if industry is uncertain about future policy. An appropriate balance must therefore be struck.

VII. Report results to Ministers

55. Reports to Ministers should refer to all the environmental effects, even if they cannot

- be quantified. Reports on motor vehicles emissions went some way towards listing all known effects, and a narrative account was given of the effects of alternative methods of disposal of sludge (in both cases, with greenhouse gas effect considerations added at a later stage.)
- 56. The case studies generally presented cost-benefit figures as single figures. Quoting single figures is simple and clear, but can give a misleading impression of the reliability of the information. An alternative is to acknowledge uncertainty for example by providing estimates of ranges for costs and benefits. Ranges were sometimes indicated (sewage sludge disposal reports gave a lower limit of £150m and an upward range.) This could have been done in reports on motor vehicle emissions. A 1989 report on vehicle emission estimated the national annual cost of strict (EPA) standards as £1bn. However, estimates on the costs of stricter emission controls varied by a factor of over 100%. This was not because of disagreement on representative costs, but because of uncertainties over how many of the technical changes would have occurred even without the stricter controls. Guidelines should encourage a consistent approach to dealing with uncertainty.

VIII. Monitoring and evaluation

- 57. Monitoring and evaluation of policy at regular intervals are important elements of good practice. Where policy involves a series of targets over an extended time period, review of target dates can be an important element of evaluation. Further work can be commissioned if evidence suggests that information on policy effectiveness is inadequate. Monitoring programmes and the collection of data also need to be cost effective.
- 58. Environmental policy is often affected by rapidly changing knowledge about environmental effects and technologies, and monitoring assumes a special role. Monitoring was an implicit element of the decisions on motor vehicle emissions and large scale combustion plants. Both required information to form the basis for future negotiations on further emissions reductions.
- 59. More scientific and economic evidence is often required. Decisions about the areas where research should be concentrated should be made in the light of an analysis of the likely sensitivity of the policy decisions to new evidence. This requires that a cost benefit approach be applied to the collection of information, and to monitoring programmes.

July 1990

ANNEX 1:

MEMBERSHIP OF GROUP ON ENVIRONMENTAL COSTS AND BENEFITS

Mr J Odling-Smee (chair) HM Treasury

Mr M Brech

Mr N Hartley Department of the Environment

Dr D Helm Oxford Economics Research Associates

Professor B Hoskins University of Reading

Mr A J Nichols Department of Transport

Professor D Pearce University College London

Dr A Power MAFF

Mr E H M Price Department of Energy

Ms C Sinclair Policy Unit, No 10 Downing Street

Mr R van Slooten DTI

Mr R Weeden HM Treasury

Mr R U Young Department of the Environment

Ms D Church (Secretary)
Department of the Environment

Annex 2:

Excerpt from USEPA Publication

GUIDELINES FOR POLICY ASSESSMENT

Legislative and Executive Requirements for Benefits Analysis

Benefits analysis is required for a variety of Federal actions. First, the National Environmental Policy Act of 1969 as amended (NEPA), and the regulations implementing NEPA, require analysis of environmental impacts fr major Federal actions, including rule–makings, program decisions, and specific projects. Agencies must either prepare an Environmental Assessment supporting a "funding of no significant impact" or must prepare an Environmental Impact Statement (EIS). The EIS must describe significant impacts on the human environment and identify alternative actions that would minimize adverse environmental impacts. Thus, analysis of adverse environmental impacts is required for a wide range of Federal actions.

Second, Federal agencies are required by Presidential Executive Order to assess the costs and benefits of major regulations. For environmental regulations, the analysis of benefits requires evaluation of environmental improvements resulting from the regulation. As described below, the cost-benefit decision criteria established by the Executive Order sometimes conflict with the decision criteria for regulations established by the relevant legislation authorizing particular environmental regulations.

Third, environmental legislation sometimes requires that EPA prepare studies of particular environmental problems, which may involve environmental benefit or damage estimates. For example, Congress has required EPA to prepare studies of risks from disposal of mining and other specific wastes, and of risks from the discharge of hazardous wastes to public wastewater treatment facilities, under the provisions of the Resource Conservation and Recovery Act. Beyond these occasional requests for studies by Congress, there are no formal Federal requirements for benefits assessments to set overall policy direction or to guide the allocation of Federal expenditures among environmental and other programs.

This paper focuses on the use of environmental benefits estimates in the second application listed above – the design and justification of specific Federal environmental regulations. The U.S. EPA issues regulations to implement the provisions of a large number of statutes enacted by the Congress. The decision criteria to be used by the Agency in designing regulations, and hence the emphasis placed by the Agency on benefits estimates and other factors, vary depending on the statute involved. In addition, EPA and other Federal regulatory agencies must comply with Executive Orders issued by the President that require certain analyses and specify decision criteria. These two influences on EPA's decision—making are described below.

Presidential Executive Order

Formal requirements for cost, economic impact and benefits analyses to support

regulation have steadily increased as a result of a series of Presidential Executive Orders. The most recent was Executive Order 12291, issued by President Reagan in 1981. This order requires that a "Regulatory Impact Analysis" (RIA) be prepared for every major rule, and directs agencies to select a regulatory approach that maximizes "net benefits to society" to the extent permitted by law. This was the first Executive Order to make explicit a "net benefits" criterion for regulation.

A major rule is defined as any regulation that is likely to result in (1) an annual effect on the economy of \$100 million or more; (2) a major increase in costs or prices; or (3) significant adverse effects on competition, employment, investment, productivity, innovation, or the international competitive position of U.S. firms. Therefore, the Order requires formal analysis of costs and benefits for rules that are expected to impose significant costs or economic impacts.

Each RIA must include:

- "A description of the potential benefits of the rule, including any beneficial effects that cannot be quantified in monetary terms, and the identification of those likely to receive the benefits;
- A description of the potential costs of the rule, including any adverse effects that cannot be quantified in monetary terms, and the identification of those likely to bear the costs;
- A determination of the potential net benefits of the rule, including an evaluation of effects that cannot be quantified in monetary terms;
- A description of alternative approaches that could achieve substantially the same regulatory goal at lower cost, together with an analysis of the potential benefits and costs and a brief explanation of the legal reasons why such alternatives, if proposed, could not be adopted; and
- O Unless covered by the description required [in the previous provision], an explanation of any reason why the rule cannot be based on the requirements set forth in Section 2 of this Order."

Section 2 of the Order provides that "Regulatory objectives shall be chosen to maximize the net benefits to society" and that "Regulatory action shall not be undertaken unless the potential benefits to society for the regulation outweigh the potential costs to society". The Order recognizes that a "maximize net benefits" decision criterion may conflict with the provisions of certain environmental statutes, and therefore provides that regulations be crafted to maximize net benefits "to the extent permitted by law". Where regulatory approaches that do not provide the highest net benefits are selected, the RIA must describe the legal constraints that influenced the Agency's choice of the selected approach.

Executive Order 12291 therefore places a heavy emphasis on measuring and comparing costs and benefits in developing regulations. It establishes maximum net benefits as the major decision criterion unless specific statutes impose different decision criteria. It requires that all potential benefits and costs of a rule be considered, whether or not they can be quantified in monetary terms. Because the alternative with the greatest net benefits must be identified, the Executive Order implicitly requires that a range of regulatory alternatives be considered and that benefits and costs be estimated for each alternative.

Both the Office of Management and Budget (OMB), which oversees compliance with the Executive Order, and EPA have issued guidelines for compliance with the Order. Both sets of guidelines contain an explicit call for estimating the benefits, costs and net benefits of a range of regulatory alternatives. EPA's guidelines provide explicit direction on how to value benefits of reduced mortality and morbidity, choice of discount rates, and on other methodological issues, as well as describing what the RIA must contain.

Annex 3 Existing central government guidance

This Annex reviews existing central government guidance that is broadly relevant to the issue of how the costs and benefits of environmental issues should be handled.

Available guidance includes the following items:

Policy evaluation: a guide for managers (HMSO 1988)

A guide prepared by the Treasury which, as the title indicates, is a guide to how policy should be evaluated when it has been in operation for some time, or has come to an end. The implications for policy appraisal or development are stated in the document – it is difficult to evaluate a policy which was not thoroughly appraised in the first instance, or where the objectives are unclear. Ministers have instructed that policy evaluation should be built into all new policy initiatives and all proposals arising from policy reviews.

Investment appraisal in the pubic sector:
a technical guide for government departments. (HM Treasury 1984)

The "Green Book" provides general guidance on investment appraisal. It is currently being revised as the current edition dates from 1984. As the principles underlying policy development and evaluation, and project appraisal are broadly similar, the new draft will cover a number of wider issues including the evaluation of environmental benefits. In practice Departments normally supplement this guide with their own detailed guidance relating to their policies and programmes.

Compliance cost assessments

Government policy is to only regulate business activity where it has to, and to do so in the lease burdensome way where regulation is necessary. There is a commitment to prepare compliance cost assessment (CCAs) for all regulatory proposals affecting business.

The DTI's Enterprise and Deregulation Unit issue guidelines on how CCAs should be prepared. These guidelines have been revised recently by an inter-departmental group. CCA does not include detailed consideration of environmental costs and benefits.

Environmental assessment: a guide to the procedures (HMSO 1989)

An EC directive on "The assessment of the effects of certain public and private projects on the environment" (85/337/EEC) was adopted in June 1985 and came into effect in July 1988.

This document, published by DOE and Welsh Office, explains the procedures which fall within the scope of the Directive and require planning permission in England and Wales.

It provides a checklist identifying matters to be considered in the course of preparing an environmental statement, and indicates what information such a statement should contain. The statement is intended to provide full and detailed information but it does not provide a cost-benefit assessment.

Forestry Commission have produced a document entitled "Environmental assessment of afforestation projects" (1988), which covers similar issues for forestry projects.

Departmental guidance

Two departments have produced manuals of environmental appraisal (ODA and DTp).



Foreign and Commonwealth Office

London SW1A 2AH

1 August 1990

1

Den Charles,

The Foreign Secretary has asked me to send you Mrs Chalker's latest report on the ODA's forestry initiative, which I enclose.

(J S Wall)

Private Secretary

C D Powell Esq 10 Downing Street

FROM: LYNDA CHALKER DATE: 30 JULY 1990 cc PS/Mr Lennox-Boyd Mr Lankester Mr Ainscow Mr Bayne Mr Bennett Mr Manning Mr Hudson Mr Faint Mr Ireton Mr Turner Mr Machin Mr Howard Mr Brenton ESED/DW Lecetary of State Secretary of State ODA FORESTRY INITIATIVE 1. In October 1988 the Prime Minister undertook in Parliament that we would direct more of our aid to forestry activities. Last November she announced at the UN General Assembly that we would aim to commit a further £100 million to forestry over the next three years. We have been reporting on progress in implementing this initiative. There has been a good deal of activity since I last reported in December, and I should like now to summarise where we now stand after a particularly busy period. Aims 2. The main aims of our initiative are to help developing countries: a) maximise the economic and social benefits they may receive from their forests in a sustainable way; /b)



- b) limit deforestation by tackling its causes and supporting Forest Departments charged with conservation and sustainable management;
- c) promote reforestation of degraded lands and agroforestry;
- d) increase the productivity of forests through research;
- e) conserve the bank of plant and animal species, most of which are contained in forest habitats.

The Scale of the Challenge we face

3. There can be no doubt about the scale of the problem. Recent figures from the FAO suggest that the rate of global deforestation has risen by about 50 per cent in the last decade, with a current annual loss roughly equal to one and a half times the area of England. The main underlying causes are poverty, rapid population growth, increased agricultural production and, in some countries, bad policy (eg fiscal and tax incentives for land clearance).

ODA Projects

4. The following table summarises progress on the number of ODA projects underway since October 1988:

Date			Projects	Total Value
				(£m)
	October	1988	80	45
	November	1989	115	57
	July	1990	150	62

In addition the ODA is currently considering a further 60 projects at a potential cost to the aid programme of £100 million. So, in total, the ODA now has 200 projects either underway or in preparation at a total cost to the aid programme of about £160 million.

- 5. By the end of this year I expect to have committed up to £40 million of the £100 million which the Prime Minister announced in November 1989. These funds will be allocated to projects in Belize, Brazil, Cameroon, Honduras, Kenya, Indonesia, Malaysia, Nepal and Sri Lanka (always subject to the conditions in individual countries being conducive to such commitments). Examples include a £11 million forest management and reforestation project in Sri Lanka; a new £5 million phase of our successful forestry research project in Nepal which focuses specially on the needs of poor people for forest products; and a £1 million link between the Forestry Research Institute of Malaysia and the Oxford Forestry Institute.
- 6. We place particular importance on assistance for projects run by British charities. In October 1988 we were funding 18 such projects. Now there are 56.
- 7. Forestry <u>research</u> continues to be a key component of our strategy. Earlier this year I increased ODA's annual research grant by 50 per cent to over £2 million. The forestry research funds are managed by the Oxford Forestry Institute, which is the foremost European centre of expertise on tropical forestry. They conduct some research themselves and commission other British institutions to pursue the research that is their own specialism.

International Activities

8. Forestry continues to figure on the international agenda, including, of course, at the Houston Summit. We have been considering how to take forward the Summit commitment to pursue a Forestry Convention or Agreement. This is best handled by the United Nations Environment Programme. Dr Tolba, UNEP's Executive Director, could be relied on to get a practical agreement by 1992, and make sure that it ties in properly with existing work on Conventions on Biodiversity and Climate Change. The UNEP Governing Council from 1-3 August provides an opportunity to sound out others on this and possibly make progress.

- 9. We continue to work to reform the <u>Tropical Forestry Action Plan</u>. You met the independent review team when they visited London in March. They produced a sensible report, and we are working to get its recommendations implemented. We need more models like the TFAP in Papua New Guinea where the Government has a moratorium on new logging concessions until sustainable management techniques are introduced.
- 10. The <u>International Tropical Timber Organisation</u> gives some grounds for optimism. At its meeting in May, the ITTO Council agreed Guidelines for sustainable forest management (work which ODA had financed). Building on this, the timber producer nations set themselves the target of ensuring that all trade was on a sustainable basis by the year 2000. That represented a sea change in attitude for the producers, who now seem to realise that good management is in their own interest.
- 11. Within the European Community, the Development Council agreed a sensible Resolution on forestry in May. At my insistence this included an undertaking to look again (at the next Development Council Meeting in November) at the TFAP in the light of the conclusions of the independent review. The Community will also have a key role to play in carrying forward the initiative for tropical forests in Brazil announced at the Dublin Summit and endorsed at the Houston Summit with the World Bank as co-ordinator.
- 12. The ODA will take a close interest in the <u>Brazil</u> initiative, to ensure that there is a good story to tell for next year's Summit in London. We are collaborating with ICI on a major conference in Brazil on forestry in the autumn; forestry will also be discussed during the Prince of Wales' visit there in October, for part of which I hope to accompany him. This interest, together with our Memorandum of Understanding, has given us a most necessary voice to which the Government of Brazil seem prepared to listen. The first

project under our Memorandum of Understanding was signed in Brazilia at the beginning of this month. I hope we may have other projects to sign up to when I visit later in the year. 13. I am copying this to the Secretary of State for the Environment. Overseas Development Administration 30 July 1990





N. b. P. M.

BHP
2617

Treasury Chambers, Parliament Street, SW1P 3AG 071-270 3000

26 July 1990

Philip Ward Esq PS/Secretary of State for the Environment Department of the Environment 2 Marsham Street LONDON SW1P 3EB

De- Pl.I;

ENVIRONMENT WHITE PAPER

I understand that the Chancellor agreed this morning to send a suggested amendment on the passage in the White Paper dealing with taxation of fuel and vehicles. The change is to the final sentence of paragraph 5.48 which he suggests should read:

"The Government will consider whether these measures need to be supplemented by any further changes in the taxation of fuel and vehicles which might encourage people to seek greater fuel economy in their motoring."

Copies of this letter go to Barry Potter at No.10 and to Sonia Phippard.

Y ...

Ja.

JOHN GIEVE

HBPM CCBM

TONY BALDRY MP



Department of Energy 1 Palace Street London SW1E 5HE 071 238 3169

Caroline Slocock 10 Downing Street LONDON SW1A 2AA

2CJuly 1990

Dear Caroline

PUBLIC SECTOR ENERGY EFFICIENCY CAMPAIGN

You enquired about the timing of the first annual report on the present campaign to improve the efficiency of energy use on the Government estate. As responsibility for energy efficiency has now passed to Mr Baldry I am writing to let you know the present situation.

At the meeting of Ministers with special responsibility for energy use within Departments chaired by Peter Morrison on 2 May it was agreed that a report should be drawn up in two parts, the first giving an overview of progress in the first year plus certain aggregated data for each Department, with part two giving further data and details of each Department's strategy for improving energy efficiency. Agreement was also reached on a methodology for constructing a league table of Departmental energy use based on energy use in office buildings, to be included in part one.

The Committee considered a draft of part one of the report on 18 July. However, detailed work on drawing up the draft and league table has cast serious doubt on the reliability of base data supplied to some Departments. Much of this data and the resulting league table was considered too unreliable to be useful or suitable for publication. It was therefore agreed that the report should be revised and the league table omitted prior to submission to the Prime Minister. A league table using the



agreed methodology will then be produced based on energy use in the first six months following the introduction of direct billing to Departments at the start of the current financial year. We would hope that this should be available before the Christmas Recess.

We are now aiming to get the initial report, without the league table, to you by the end of August.

Yours sincerely Kirth Parker

KEITH PARKER Private Secretary





UNCLASSIFIED



Treasury Chambers, Parliament Street, SW1P 3AG

The Rt Hon Chris Patten MP
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
LONDON SWIP 3EB

25 July 1990

Jear Chis,

REVIEW OF COASTAL POLICY

MILIT DUS | MIN YEONEZI K-YEON W

I have seen a copy of your letter of 17 July to Malcolm Rifkind (received in the Treasury late yesterday).

I understand that the reference in the draft White Paper to a proposed review of coastal policy was not discussed at MISC 145 on 9 July. The need for such a far-reaching review remains unproven, and the terms of reference would require detailed consideration. There are major national interests involved, notably in mineral extraction and oil exploration, in defence and military training, and significant public expenditure in for example coastal defences.

Against that background, your proposal of a new committee instead of the inter-departmental review might present difficulties in reconciling the eventual report with public expenditure control and our policies on the use of relevant resources. For this reason I would find such a proposal difficult to accept. As for an inter-departmental review, I would be prepared to consider this, but it would require more time to discuss the terms of reference and the membership. In the circumstances, it seems to me to be wrong to refer to the review in the White Paper: the relevant paragraph has been spliced into the drafts at a late stage, and can surely not be important to its overall impact. We can consider whether the fact of a review should be announced in due course, if and when agreement has been reached on the terms of reference and composition of the review team. Your officials should write to others involved in order to prepare the ground for decisions.

I am copying this letter to the Prime Minister and the other members of MISC 141, to Tom King, Reter Brooke and Sir Robin Butler.

RICHARD RYDER





PRIME MINISTER

ENVIRONMENT WHITE PAPER

When we spoke about other things on Sunday morning, you mentioned that one of the passages in the draft White Paper that had caught your eye was the piece at para 5.16-17. This says that measures to stabilise CO2 emissions will - in the long term - inevitably have to include increases in the relative prices of energy and fuel. I am sending you this personal note to explain why I think this passage is essential for the credibility of the White Paper.

One of the criticisms that the paper will run into is that it is light on detail about how we will get to our CO2 target. The specific energy and transport measures spelt out in the draft, together with the beneficial effects of the switch from coal to gas for power generation following the Electricity Act, will probably get us less than half way there. Anyone who knows the issues at all will see that there is a gap to be closed and will understand already that only price or other market-based instruments - on which the paper is generally rather light - can close it. We would, of course, be pressed on this point whatever we said in the draft of the White Paper, and it may therefore be useful to have a solid and defensible position from the outset.

So I think that acknowledging the obvious, in the restrained terms which 5.16-17 uses, is about the least that we can say. Eliding this issue would damage us by leaving us without a convincing story to tell on CO2, and there will be many who will also argue (with the experience of the 1970s to point to) that it is really only price rises which will drive efficiency gains. Politically, it is reasonably safe ground because the Opposition are already publicly committed to action to meet our CO2 target faster than us, and hence to earlier price rises. John Wakeham is content. I believe that committed to action to meet our CO2 target faster than us, and hence to earlier price rises. John Wakeham is content, I believe, that what we say poses no problem for privatisation. The last sentence of 5.18, while preserving necessary freedom of fiscal manoeuvre for



John Major on transport taxation, clearly rules out tax or other measures to raise relative energy prices before the next election. And 5.16 makes it clear that we shall be acting only as part of a concerted international effort, with others pulling their full weight.

I very much hope, therefore, that you will agree with me that we should keep these references. I know that John Major, whose drafting appears in 5.16-17, has thought long and hard and come to this conclusion himself.

I should of course be happy to have a word about all this before MISC 141 if you wish.

Another issue that I should like to raise on Thursday is the possibility that we considered briefly earlier in the year that the foreword to the White Paper might be signed by you. I think, provided you agree, that this would be a good idea. I am not giving this minute any wider circulation.

CP

15July 1990



apr

2 MARSHAM STREET LONDON SW1P 3EB 071-276 3000

My ref:

Your ref

25 July 1990

The Rt Hon Norman Lamont MP Chief Secretary HM Treasury Parliament Street LONDON SW1P 3AG

In Mone

ENVIRONMENT WHITE PAPER: PES IMPLICATIONS

WITH DM?

In paragraph 10 of my paper MISC 141(90)14 I undertook to report to MISC 141 our conclusions on the passages in Chapters 7 and 9 of the draft White Paper which suggest increased public expenditure. I have now received your letter of 23 July.

For the benefit of MISC 141 colleagues, there are seven broad subjects, six of which are in the Chapter 7 and one in Chapter 9, where the White Paper as drafted promises extra spending commitments. There could of course have been a great many more such passages, but we have deliberately kept such commitments to the absolute minimum I find necessary for the success of the White Paper. The sums of money required are therefore relatively very small.

The relevant passages within my own Department's responsibilities promise additional expenditure by the Countryside Commission, Nature Conservancy Council, and on a Cathedrals initiative. The passages at issue which are the responsibility of the Agriculture Departments promise additional spending on the Countryside Premium Scheme, Hill Livestock Compensatory Allowances, Environmentally Sensitive Areas, and a new Urban Fringe Scheme. The PES bids relating to these subjects are as follows:

Department	White Paper Paragraphs	PES 1991-92	bid (£m) 1992-93	1993-94
DOE	7.24, 7.38	17	23.5	30.5
	7.64, 9.27/8			
Ag Depts	7.13, 7.14,	15.8	45	46.7
	7.54, 7.55-6			
Total		32.8	68.5	77.2



My view, which is shared by John Gummer, is that the Countryside chapter in the White Paper would simply not be credible unless we include passages along the lines of those in the draft. Indeed it is because I recognise the particular difficulty of this year's PES round that I am not proposing other things which would help the White Paper succeed but which cost public money. We have of course always faced the difficulty - which has been reduced to the minimum by sensible compromise and restraint-that publishing an Environment White Paper in September would raise some problems since the PES round would not have been completed. John Gummer and I are proposing passages which only require spending of £33m, £69m and £77m in the next 3 years.

Your starting point in your letter, which I completely understand, is that you are reluctant to discuss these particular parts of the DOE and MAFF PES bids separately from the others. So unless John and I are able separately to settle our PES bids with you across the board in the next week, you understandably argue that all the passages in the draft which promise extra spending must be omitted altogether or so diluted as to contain no new promises.

I am anxious to help; and I realise that MISC 141 is not the right place for bilateral PES discussions. For my part I am prepared to undertake to provide sufficient PES cover from whatever we agree for this Department in PES bilaterals to allow the DOE square bracketed passages in the draft to stand. (The cost next year would be £17 million.) It is obviously not clear what level we will settle at, but whatever it is, I will undertake to fund the necessary amounts to the relevant programmes. I would ask you to allow the relevant DOE passages to stand, with this firm and clear undertaking.

John Gummer's PES position is, however, rather different from mine and I know he is unable to make a similar undertaking. But unless we can say something positive in the White Paper about some new steps we propose to take to integrate environmental and agricultural policies, we shall in my view quickly lose credibility in the all-important area of countryside policy. It is clear from all the many representations that John and I have had that one critical test of our environmental credibility is the degree to which we tie environmental strings to agricultural grants. John Gummer's proposals for improving the Hill Livestock Compensatory Allowance (HLCA) scheme are particularly important, and will help protect most of the uplands, or about 50% of the British countryside. The scheme involves payments to farmers in the less favoured areas, based on numbers of breeding cattle and sheep. John proposes to make HLCAs much more environmentally friendly, by limiting the number of stock grazing moorland which attract payment; by introducing a heather management scheme, and by introducing a code of good upland management for farmers receiving HLCA payments.

But unless we can offer the relatively small PES amounts involved we have nothing new to say at all here. In my judgement the absence of such initiatives would make Chapter 7 so weak that there would be a strong case for postponing publication of the White Paper until



these matters had been resolved in the PES round. So whilst I realise how difficult it is for you, my view is that we must find some way of drafting positive passages under these headings.

In summary, I hope that you can agree to the DOE passages in the draft White Paper on the basis on my undertaking above. And my judgement is that, unless we can find some agreed reasonably positive approach on all, or most, of the Agriculture Departments initiatives now in the draft, our stance on countryside issues will be greatly weakened.

I am copying this letter to the Prime Minister and other members of MISC 141 and to Sir Robin Butler.

Jones.

CHRIS PATTEN



PRIME MINISTER

MISC 141: ENVIRONMENT WHITE PAPER

MISC 141 meets tomorrow to consider the draft Environment White Paper. There are three main issues but only two are for substantive discussion.

The three issues are:

- (i) the drafting and presentation of the White Paper
- (ii) public expenditure issues
- (iii) taxation (not for discussion)

Papers

There is a complex set of papers. These are flagged as follows:

- (A) the draft Environment White Paper
- (B) the "popular" version
- (C) Cabinet Office brief
- (D) Policy Unit brief

A second set of papers refer to more detailed issues:

- (E) letters on public expenditure
- (F) letters on review of coastal policy
- (G) Policy Unit note on coastal policy
- (H) minutes on taxation
- (I) letters on cathedrals

Drafting and Presentation of the White Paper

The main issues are as follows.

(i) Is the overall shape and tone of the main White Paper now appropriate? The Policy Unit advise that it is much better. But there are still some doubts about

one or two paragraphs, eg. 4.8 and 5.4.

- (ii) Is the abridged "popular" version acceptable? Again Policy Unit advice is that it is in good shape: there is a specific issue on whether it should be expanded to cover Wales, Scotland and Northern Ireland.
- (iii) Is the drafting of the "action chapter" (22) what individuals and companies can do - satisfactory?
- (iv) Is chapter 18 on institutions acceptable? Should it contain a reference to the continuing of MISC 141? Should departmental annual reports be required to include sections on environmental issues? And what should be said about the future status of HMIP?

Public Expenditure Issues C.C. Access to Cht Tops / Coltitude,
Midlands France Russide

There is a stand-off between Chris Patten and John Gummer on the one hand and the Chief Secretary on the other. Chris Patten, and John Gummer, wish to include specific references to additional public spending on environmental matters in the White Paper. The Chief Secretary will not accept this, unless they form part of a firmly agreed overall public expenditure settlement for the DOE and MAFF programmes.

I think you must support the Chief Secretary. It would be a most unfortunate signal to announce promises of extra money on the environment before the survey negotiations were completed. That would simply raise colleagues spending targets. Any undertakings of higher public spending would betray the whole discipline of the public expenditure process.

One option might appear to be delay in publication of the White Paper until after the PES settlements. Chris Patten may hold out for this: but this should be rejected. Publication of the White Paper before privatisation of the electricity companies is thought to be important; and delay will raise, not lower, expectations.

There is also specific new public expenditure proposed on cathedrals. Chris Patten wants to include reference to new grant assistance for cathedrals - funded again by new public money. The Chief Secretary is resisting. Again I suggest he needs to be supported. No reference can be made to new grant aid for cathedrals, unless Mr. Patten is prepared to identify savings in existing PES programmes now to cover the cost.

Finally, Chris Patten proposes a review of coastal policy, again to be referred to in the White Paper. Understandably, the Treasury resist. Any announcement of a review is bound to generate expectations of further expenditure and support.

Taxation

The Chancellor and Chris Patten's minutes at Flag H draw attention to an important point of presentation in the Environment White Paper. The Chancellor and Chris Patten are anxious for you to be aware of the implications of what is said in the White Paper. But they do not wish (or need) to discuss this with colleagues - because they are all in broad agreement.

The main point is that there are at present no practical alternatives to higher fuel taxation at some point in order to deliver the CO2 emissions target for the year 2005. This is www.discussed in very general terms in the White Paper - but it will almost certainly be necessary to say more on further questioning.

The proposed response is:

- any increases in energy taxes need not increase the (1) overall tax burden;
- (2) any increase need not add to the rpi, if other taxes which score in the rpi are reduced;

- (3) no tax increases are planned for at least two years;
- (4) the need for, and extent of, any tax increases will depend on the response to other measures taken to help meet the CO₂ target.

Conclusion

Content to accept this Treasury/DoE defensive briefing line if questions raised on meeting the CO2 commitment?

BHP

B. H. POTTER

25 July 1990

c:\wpdocs\economic\misc - eam
(slh)



2 MARSHAM STREET LONDON SW1P 3EB 071-276 3000

My ref:

Your ref:

Caroline Slocock
Private Secretary to
The Prime Minister
10 Downing Street
LONDON
SWIA 2AA

24 July 1990

Dear cardine,

ENVIRONMENT WHITE PAPER: MISC 141 MEETING

My Secretary of State has circulated with MISC 141(90)14 drafts of the Environment White Paper and of an abridged version.

I now enclose a colour mock up of the abridged version, to show how the text would appear in the type of document my Secretary of State has in mind. The text is the same as in the MISC 141 paper but my Secretary of State hopes that this version will help discussion of the document, although obviously more work will be needed in the detail of the presentation.

I am copying this letter and the enclosure to the private secretaries of members of MISC 141, and of Sir Robin Butler.

, ,

PHILLIP WARD Private Secretary





Treasury Chambers, Parliament Street, SW1P 3AG 071-270 3000

PRIME MINISTER

ENVIRONMENT WHITE PAPER: TREATMENT OF TAXATION

MISC 141 meets on 26 July to consider the Environment White Paper. I thought I should draw to your attention some difficulties about the treatment of taxation in the Environment White Paper and our general policy on this. The issue arises in the context of the discussion of the Government's intentions for meeting the target of stabilising CO₂ emissions at 1990 levels by 2005.

Tax increases (which would probably have to include new taxes on energy) are not essential to achieve the 2005 target - a target which is conditional on other countries doing their bit. But the alternatives would either:

- look very similar to tax increases. Marketable permits, for example, would lead to similar price rises in the energy and electricity sectors (they may not be feasible on an adequate scale in transport);
- be far more costly to the economy and/or consumer choice (eg blanket regulation of the amount of CO₂ emissions, hence energy production, by electricity suppliers and industry; restrictions on the average size of cars sold in the UK).



Though not essential, tax increases are overwhelmingly likely to be necessary over the next 10 years if the targets are to be achieved. Our latest (very uncertain) estimates suggest that the average price of (non-transport) energy might have to double, but that fuel prices in the transport sector would rise by a lesser amount as fuel is already heavily taxed. (The general levels of taxation and prices as distinct from energy prices and taxes need not be affected. This is a key point in presenting the medium term prospect.) In practice, the energy efficiency measures proposed in the White Paper will make a contribution, so that taxes will not have to do quite so much.

In transport the means of raising taxation are readily available: it is simply a matter of increasing the duties on petrol and derv. In non-transport energy there are no comparable duties covering all fuels. There are two broad options:

- VAT could be extended to domestic fuel, but 15 per cent VAT would not be enough to achieve the targets, and we are pledged not to do this;
- new taxes on coal and natural gas could be imposed, and the duty on heavy fuel oil increased.

The latter package is likely to be required whether or not VAT is extended to achieve the targets. It has the significant advantage that it allows the tax rate to be differentiated between fuels according to their carbon content (ie a carbon tax can be proxied).

None of this needs to be spelt out in the White Paper (nor should it be). The current draft (attached) merely refers to the inevitability of increases in the relative prices of energy and fuel in the long term (though not the next few years, for electricity privatisation and other reasons). This is the minimum which we can say and preserve the credibility of the 2005 target.



But when the White Paper is published, we are likely to be faced with a number of questions about what lies behind these generalisations. The key questions are:

- will the pledge not to increase VAT on domestic fuel be dropped?
- will there be new taxes on coal and natural gas?
- how much will energy taxes have to go up and when? and whether there would be any significant effect on the general price level.

As I have said, the credibility of the policy of hitting the 2005 target for CO₂ emissions depends on significant tax increases after the next few years not being absolutely ruled out. On the other hand, the privatisation of electricity requires no significant tax increases on electricity or energy used in producing electricity for at least the next two years or so. The broad outlines of the presentation might therefore be along the following lines:

- significant increases in taxation at some future stage cannot be excluded, though they will not be required in the years immediately ahead (except possibly for petrol and derv). The timing will depend on action in other countries, the effects of the energy efficiency measures in the White Paper, further work on alternative policy instruments (eg marketable permits), etc;
- we have no present plans to extend VAT to domestic fuel (which would mean changing the policy on VAT extensions) or to introduce new taxation on coal and natural gas but this cannot be absolutely ruled out in due course if necessary to meet the targets on CO₂ emissions;



- it is not possible at this stage to say what might be the effects on the price of energy and fuel or on energy-intensive and energy-producing sectors of the economy;
- any extra revenue from higher energy taxation could be used to reduce taxation elsewhere, so that the general level of taxation and prices need not be affected.

None of this will be easy. But I believe that without something along these lines it will not be possible to establish the credibility of the 2005 target. If you agree with this broad approach, my officials will fill out the details of the presentation of tax issues over the period up to publication of the White Paper.

Jst. Gien

J. [J.M.]

Approved i doit & the Chinellis

24 July 1990



Draft White Paper paragraphs

(The words in square brackets are not included in the version circulated to MISC 141.)

It will be necessary to take a number of measures over a period of years to achieve the objective of stabilising CO, emissions at 1990 levels by 2005. In the long term these will inevitably have to include increases in the relative prices of energy and fuel. This could be achieved by taxation or other means, such as tradable permits. If achieved by taxation the general level of taxation need not be [significantly] affected; higher taxation of energy and fuel could be offset by lower taxation elsewhere that in the medium term there need be little net effect on the general price level]. Measures to restrain CO2 emissions will to take account of the possibility that market-based instruments will often be more efficient and less expensive than regulation in reducing emissions because they allow producers and consumers, rather than regulators, to decide how energy can best and most economically be used. Over the next few years the Government intends to introduce a number of regulatory measures such as those which save energy and are worthwhile in their own right. They are described in detail in paragraphs [] below.

Long term measures affecting the relative price of energy will be taken when competitor countries are prepared to take similar action. Unilateral action by the UK would do little to influence global warming. It would have a damaging impact on activity and employment in the energy-intensive sectors, relative to our competitors, to little purpose. In the immediate future the reduction of inflation is of overriding importance. Given this and the time some other countries will take to act, tax or other measures directly raising the relative price of energy outside transport will not be introduced in the next few years.



CABINET OFFICE

70 Whitehall London SWIA 2AS Telephone 071-270 0259

From Sir John Fairclough FEng Chief Scientific Adviser

W0551

Dr R F Coleman
Department of Trade and Industry
1-19 Victoria Street
London SW1H OET

24 July 1990

www.cas?

Dear Ron

THE ENVIRONMENT: CLEANER TECHNOLOGIES

I was pleased to see your letter of 17 July to David Fisk, to learn of the progress you are making and to learn that the National Engineering Laboratory and Warren Spring Laboratory will be undertaking a review of Government work on cleaner technology.

I am concerned that the report you are preparing should be available by the beginning of October (and not later in that month) to match the expected delivery of the companion report from the ABRC. Together these reports will provide a starting point for the ACOST Environment Committee Economic Working Group.

The DTI report will need to include a commentary on the overall scope of work on cleaner technology and the underpinning objectives for it, and to point up those areas of particular promise or where more needs to be done. I am sure that ACOST will wish to explore these and related matters with representatives from NEL and WSL when they present the report at the next meeting of the Economic Working Group.

Copies go to recipents of your letter.

Yours sincerely

JOHN FATRCLOUGH

Management-in-confidence.

PRIME MINISTER

24 July 1990

MEETING OF MISC 141, 26 JULY: REVIEW OF COASTAL POLICY

Chris Patten has written to Malcolm Rifkind attaching terms of reference for a major review of coastal policy - including sea defences. He asks for agreement to announce this in the Environment White Paper (Paragraph 7.60).

This is a bounce which should be resisted. Colleagues need more time to think about what is involved in such a review.

BACKGROUND

Chris Patten's proposal comes out of the blue. He is responding to pressure from environmental interests who believe that there is little effective co-ordination of the Government's coastal policy.

He suggests setting up "a rather high-powered" committee with an externally appointed chairman and several independent members as well as civil servants and members of conservation groups. The terms of reference would include:

- a strategic approach to sea defences in the light of likely rising sea levels;
- a strategic approach to the wise use of estuaries and other coastal wetlands;
- a framework for the control of in-shore developments so that planning of the sea goes hand in hand with that on land.

COMMENT

Sea defences cost money. So, possibly, does wise use of estuaries and coastal wetlands. Anything involving planning and conservationists needs to be watched. Richard Ryder may well write before MISC 141 arguing that such a proposal cannot be agreed without prior discussion at official level.

CONCLUSION

Support the Treasury argument that this proposal needs proper consideration. It would be premature to announce it in the White Paper.

CAROLYN SINCLAIR

PRIME MINISTER P 03708

ENVIRONMENT WHITE PAPER

[MISC 141(90)14]

DECISIONS

- 1. The group need to consider the drafts of the full White Paper and the abridged version, and agree any major changes which are needed before they go for printing at the beginning of August. The drafts reflect comments made at MISC 145 on 9 July (MISC 145(90)3rd Meeting Minutes).
- 2. You might structure the meeting around the issues listed in Mr Patten's covering Memorandum, and one or two others raised in recent correspondence. They are:
 - i. The overall shape and tone of the White Paper.
 - ii. The abridged version. In particular, you need to decide whether it should be expanded to cover Wales, Scotland and Northern Ireland, or whether there should be separate versions for this purpose.
 - iii. Carbon dioxide target (Chapter 5). There are two main issues: the terms in which the UK's commitment should be expressed; and the treatment in the text of measures to achieve the target, particularly possible fiscal measures.
 - iv. Public expenditure implications (mainly Chapters 7 and 9). A number of the proposals in the draft White Paper (those in square brackets) would involve additional public expenditure. Mr Patten will outline at the meeting the outcome of discussions with the Chief Secretary about these points.
 - v. The proposed statistical report on the UK environment (Chapter 17). You will want to ensure that you are content

with the way this is presented.

- vi. Environmental protection institutions (Chapter 18).

 Again, you will want to ensure that you are content.
- vii. Action for all (Chapter 22). You will wish to consider the tone of this chapter.
- viii. The treatment of research.
- 3. Finally, you will want to consider Mr Patten's proposals for the timing and presentation of publication.

MAIN ISSUES

Overall shape and tone of the White Paper

- 4. The White Paper will have little to say that is new about policies or expenditure programmes. Its impact will therefore depend heavily on the quality of the narrative, and its success in convincing the reader that the Government has comprehensive policies on environmental issues. The accessibility of the documents to the lay reader will be very important.
- 5. The White Paper covers the ground agreed when MISC 141 discussed an outline in May, although the organisation of the material is different. The group may wish to discuss:
 - i. The overall tone and consistency of the draft. You may feel that some editorial work is still required, eg to bring the rather formal style of later chapters into line with the tone of chapter 1 (which was largely drafted by Mr Patten himself).
 - ii. The need for a summary at or near the beginning of Chapter 1 (as suggested in Ms Slocock's letter of 16 July to Mr Patten's Private Secretary).
 - iii. The order of the later chapters, particularly those

concerned with land use, the countryside and heritage issues. In previous discussions, Ministers felt that these chapters should form a separate section of the White Paper, to emphasise that they were different from "pollution" issues. That was the structure adopted in the synopsis which MISC 141 discussed in May. But the chapters are now sandwiched between global warming and air quality. You may want to consider whether the earlier structure is preferable.

The abridged version

- 6. The new abridged version of the White Paper is of about the right length and pace to give a simple account of the main issues, but there are still some rough edges in the drafting that need attention. It is not just a summary of the White Paper: the structure is slightly different (for example the first three chapters of the White Paper are run together into a single introductory section) and some of the more technical material is omitted. You will again want to consider whether the general tone is right, and to provide any guidance for final redrafting. It would help DOE if MISC 141 stressed the need to keep the text as simple and straightforward as possible.
- 7. A specific issue is whether the abridged version should be expanded by 2-3 pages to cover Wales, Scotland and Northern Ireland, or whether there should be separate versions for this purpose, as Mr Patten would prefer. You will want to seek the views of the territorial Secretaries of State. I understand that all three are likely to be briefed to support a single UK document.

Carbon dioxide target

- 8. Chapter 5 sets out the target, and the action to which the Government are willing to commit themselves as part of an international agreement to combat global warming. There are two main issues:
 - i. How the proposed target should be expressed. Paragraph

- 5.16 of the draft has been agreed after correspondence between Departments. It says that the UK would be prepared to commit itself to returning carbon dioxide emissions to 1990 levels by 2005. It does not repeat earlier statements (including your own) that this would involve a cut of up to 30% compared to projected emissions by 2005, a calculation which Mr Wakeham believes is hypothetical and unhelpful to electricity privatisation. But it does say that Britain's total contribution to global warming (from all greenhouse gases) would fall by about 20% between 1990 and 2005. You will probably want to endorse the agreed formulation.
- ii. What should be said about the measures to be adopted to meet the target. Mr Patten says that the specific (nonfiscal) measures set out in the text (eg in paragraphs 5.24-62) are likely to achieve about one third of the required savings. By implication the main part of the remainder will need to be achieved by the fiscal and other market-related options discussed in paragraphs 5.16-19 and 5.48. These paragraphs clearly envisage increases in fuel prices, although not in the next few years. You will want to consider whether the proposed text is acceptable.

Public expenditure implications (mainly Chapters 7 and 9)

9. A number of proposals in the White Paper, mainly relating to agriculture, the countryside and the heritage, are in square brackets because they would have public expenditure implications. Mr Patten believes that these proposals are essential if the White Paper is to look convincing. At an earlier stage he suggested that if they could not be agreed now, publication should be deferred until after the Survey. He is therefore seeking the Chief Secretary's agreement to the additional expenditure involved in advance of the main Survey decisions. The sums involved are:

1991-92 1992-93 1993-94

Addition to DOE and MAFF PES

£32.8m £68.5m £77.2m

10. The Chief Secretary's letter to Mr Patten of 23 July says that he is not prepared to agree these sums except in the context of an agreement about the totality of Mr Patten's and Mr Gummer's relevant bids. However Mr Patten hopes to speak further to the Chief Secretary before MISC 141 meets. You will want to ask him to make an oral report at the meeting. If the matter remains unresolved, MISC 141 may wish to express a view about the importance of these items in relation to the timing of the publication of the White Paper (see paragraph 15 below).

Proposed statistical report on the UK environment

11. The proposal for a new statistical report on the UK environment is set out in paragraphs 17.20-24 of the draft White Paper. Annex B lists the statistics to be included. MISC 141 agreed that there should be a new publication at their last meeting, but were concerned that there should be no rigid timetable which might turn the report into an audit of the Government's record. Paragraph 17.22 says "...the Government hopes that the first such report will be published within 2 years, and that successive reports should follow at roughly three year intervals". This seems acceptable. The abridged version refers to "regular" statistics (at the end of the second paragraph on the second page); it might be better for this to be aligned with the main text.

Environmental protection institutions

- 12. Chapter 18 sets out proposals for continuing arrangements within Government to follow up the White Paper, and for changes in environmental protection institutions. You may wish to discuss three issues:
 - i. The continuing role of MISC 141. You have agreed that

MISC 141 should remain in being, and that this should be made known on publication. But it is now mentioned on the face of the White Paper (the second sentence of paragraph 18.3). This appears to breach the normal convention that Cabinet Committees are not referred to in published documents, and you may feel that the specific reference to a Committee should be deleted.

- ii. Inclusion of environmental issues in Departments' Annual Reports (paragraph 18.5). This proposal appears to be acceptable to Departments, although the previous Paymaster General expressed doubts about adding a further requirement to the formal core elements of the Reports. You will want to ensure that colleagues are content with the way this is presented.
- iii. Future status of HMIP. When this was discussed in correspondence, you said that the question of HMIP's ultimate future status should be kept open, because you were not convinced of the case for making it an NDPB if it operated successfully as a Next Steps Agency. You will want to ensure that you are content with the way this possibility is raised (last sentence of paragraph 18.15).

Action for all

13. Chapter 22 sets out action which individuals and businesses can take to improve the environment. Mr Patten believes that it is important to include such a chapter, but previous drafts have been criticised for adopting a different tone from the White Paper norm. You may want to seek colleagues' views on whether the new draft overcomes these criticisms.

The treatment of research

14. The Chief Scientific Adviser has suggested that the text of the White Paper should include boxes (like those in "New Scientist") with appropriate examples of good research activity. You will probably want to endorse this.

PUBLICATION DATE AND PRESENTATION

- 15. Mr Patten proposes publication in late September. This is in line with the strong views expressed at previous meetings. In particular, the Chancellor of the Duchy of Lancaster and other Ministers are likely to resist any suggestion that publication should be delayed, for example to resolve the public expenditure points.
- 16. Mr Patten also proposes extensive publicity arrangements, and seeks the involvement of other Ministers, including MISC 141 members and nominated Ministers in Departments. You may wish to stress the need for careful coordination, to achieve maximum effect and ensure that Ministers speak with one voice.

HANDLING

17. You will want to ask the <u>Secretary of State for the Environment</u> to introduce his Memorandum. You might then work through the issues identified above, bringing in other Ministers as appropriate. In particular the <u>Chancellor of the Exchequer</u> and the <u>Secretaries of State for Energy</u>, and <u>Transport may wish to speak about the presentation of action to achieve carbon dioxide targets; and the <u>Chief Secretary</u>, <u>Treasury will wish to comment on public expenditure</u>.</u>

6

P F OWEN Cabinet Office 24 July 1990



Treasury Chambers, Parliament Street, SWIP 3AG

The Rt Hon Chris Patten MP
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
London
SW1P 3EB

23 July 1990

wto BP?

econ

Dear Secretary of State

ENVIRONMENT WHITE PAPER

Thank you for your letter of 16 July, in which you propose that the White Paper should include a number of promises which would add to planned expenditure on wildlife and the countryside (and on support for cathedrals, on which we are in separate correspondence).

- 2. As you know the outlook for the coming public expenditure survey has been difficult from the start. And, again as you have acknowledged, we have made it more difficult by the decisions taken on AEF which, as colleagues recognised in Cabinet on Thursday mean that less can be afforded for other programmes.
- 3. Your own bids for the coming survey, covering Housing, Other Environmental Services, Property Holdings and the sums which my officials say be you are likely to bid for PSA Services, total some £2 billion in 1991-92 and sums of the same order of magnitude in the later years. I am afraid that, against that background, it is simply not possible for me to agree to a small part of your bids without prejudice to the rest of them: any agreement would have to be in the much broader context of your bids for the Other Environmental Services programme as a whole.
- 4. I am afraid that the same goes for John Gummer's 'green' bids, where I gather that the schemes are still being worked up. That in itself is a major obstacle to any agreement, but in any case I see no prospect of a decision on them except in the context of John's bids for domestic agriculture as a whole.

CONFIDENTIAL

- It follows from the above that I do not think that a trilateral meeting would be the right route. I would, however, be very happy to meet you separately to discuss the whole of your and John's relevant bids (involving territorial colleagues in John's case) in the hope of reaching an agreement.
- 6. You expressed the view in your letter that, without some promises of extra public spending in chapter 7, it would not be possible to publish the White Paper in September. In the last resort I would accept your judgement of the best date for publication. But I am surprised that you should attach such importance to the passages in question. There is, in my view, scope for a much more positive presentation of some of the areas in dispute than the note by officials suggests.
- On HLCAs, for example, it would be possible to stress that these payments are made to farmers in the LFAs covering 43 per cent of the total UK land mass. By supporting sheep and cattle farming, they help to prevent depopulation and to conserve the rural environment. A new provision in the relevant EC Regulation allows Members States to include measures in the HLCA scheme to take account of environmental requirements. The White Paper could point up our policy whereby, where practicable and cost-effective, those benefiting from EC subsidy schemes will be required to protect and enhance the environment on their holdings. And for the countryside bodies, whose funding has doubled in real terms under this Government, you have a good story to tell about the achievements and plans of these bodies at current levels of funding. In any case, the intention behind the White Paper has from the beginning been to set out a measured and balanced statement of our approach to environmental policy: it will fulfil that role admirably and does not need to promise extra public expenditure.
- I am copying this letter to the Prime Minister, to John Gummer and to Sir Robin Butler.

Sleen Campbell

Plan NORMAN LAMONT

Plapproved by the Chief Secretary

and signed in his absence

PRIME MINISTER

20 July 1990

MEETING OF MISC 141, 26 JULY: ENVIRONMENT WHITE PAPER

This meeting is likely to concentrate on the presentation of the White Paper. Most of the disputes on substance have now been ironed out between Departments. (Agreement has been reached on what we say about the reduction in gases implied by the 2005 target. The reference to "up to 30%" for CO₂ has been dropped in favour of "perhaps 20%" reduction in present levels of <u>all</u> gases).

Chris Patten has produced an abridged version of the White Paper designed for popular consumption (it will come round in full colour before the MISC 141 meeting). The abridged version will be on sale separately. But full versions of the White Paper will have the abridged version attached. Chris Patten hopes that this will meet your wish for an effective and pithy summary at or near the beginning.

COMMENT

There are three changes to the version of the White Paper which you have seen:

- we now have a companion piece in the shape of the abridged version;
- Chapter 2 is cast as an a bridge between the generality of Chapter 1 and the contents of the White Paper;
- there is an excellent summary of the White Paper

The first and last of these do give the meat of the White Paper.

The summary is particularly punchy. There is a case for moving it up to the front of the White Paper and putting it between Chapters 1 and 2. It is a pity to leave it at the end where only the assiduous and exhausted will find it.

Paragraph 4.8

By and large the White Paper is now in reasonable shape. But there is one bit of drafting worth questioning. Paragraph 4.8 states:

"The Government recognises that ... the developed countries are responsible for a large share of the world's environmental problems. We consume a lot of resources, some of which are non-renewable; and we create waste and pollution which can affect the whole world".

The paragraph goes on to point out that per capita emissions of CO₂ are much higher in the USA and Great Britain than in India or China. This is true. But you may feel that this paragraph is unhelpful insofar as it might encourage industrial developing countries to argue for special dispensation from efforts to combat global warming. They will do this anyway, and to some extent will get it, but do we need to encourage them in the White Paper?

Outstanding issues

Two points on which Departments are still not agreed are:

- the inclusion of various MAFF and DOE measures in Chapter 7 and elsewhere involving extra money;
- what is said in paragraph 5.44 about changes in the taxation of vehicles and fuels.

Spending proposals

You will not want to get drawn into the debate between the Treasury on the one hand, and John Gummer and Chris Patten on the other. The dispute is part of the PES round.

Certainly the inclusion of the proposals in square brackets in Chapter 7 would brighten the White Paper. But they are not crucial to its success. If John Gummer and Chris Patten take a different view, it is always open to them to find the money for these projects and drop something else.

If this issue remains unresolved beyond early August, the White Paper will have to be printed without the new spending proposals. Chris Patten may argue that this would be so unfortunate that it would be better to postpone the appearance of the White Paper until November, when the PES round will be settled.

COMMENT

This argument should be resisted:

postponement would simply fuel expectations about the size of the proposals over which the Treasury are battling;

- September was chosen for publication to fit in both with the Party Conference and electricity privatisation. Delaying would not be helpful to either;
- postponement only makes sense if the Treasury is expected to give in. There is no guarantee (or even any sign) of this.

Taxation of vehicles and fuels

In the section on transport in Chapter 5 Cecil Parkinson and Chris Patten want to say that:

"The Government is now actively considering what further changes in the taxation of vehicles and fuels might be desirable to encourage people to seek greater fuel economy in their motoring" (para 5.44)

The Treasury hate other Departments getting involved in the Budget process, especially in public. John Major will ask for this sentence to be watered down.

COMMENT

It is perfectly reasonable to say that the Government is considering what changes in the taxation of vehicles might be desirable to encourage fuel economy. You have already agreed that John Major and Cecil Parkinson should talk about this.

It would, however, be better to omit the reference to 'fuels'. What Cecil Parkinson has in mind is differential taxation of fuels such as diesel to reflect their impact on global warming.

paragraph 5.44 as drafted, and paragraphs 5.17 and 5.18 which conclude that;

"tax or other measures directly raising the relative price of energy will not be introduced in the next few years".

CONCLUSION

Given the subject matter, the White Paper has come out quite well:

- it is largely well-written;
- it will be an immensely useful source book for schools and other organisations;
- the discussion of market mechanisms and the need for price measures in the longer term is sufficiently serious for "The Economist" (who thought that the White Paper would duck this altogether);
- the exercise has pulled Whitehall together on the environment to a surprising degree. The economic Departments are now fully engaged and are injecting some rigour into the debate on the environment. But there are none of the sharp divisions which have been paralysing the White House;
- The Foreign Office need to be watched. They hanker for us to adopt whatever position sounds good abroad.

 Chris Patten and some of his senior officials show disturbing signs of going along with this. The Patten-Waldegrave axis has dominated MISC 145.

Recommendation

- Agree that the abridged version is an adequate summary of the whole. Chapter 23 which lists the measures proposed is particularly effective. It should come at the beginning of the White Paper.
- Accept that different countries will adopt different policies on global warming depending on the stage reached in their economic development. But there is no need to encourage special pleading by India and China (paragraph 4.8).
- Spending proposals must be sorted out with the Treasury. There is no case for postponing publication on their account. That would simply fuel wild speculation.
- The reference to taxation of fuels in paragraph 5.44 Could confuse the important message in paragraphs 5.17 ch and 5.18. It would be better dropped from the transport paragraph. But there is no reason why that paragraph should not say that the Government is considering what further changes in vehicle taxation might help to secure greater fuel economy.

CAROLYN SINCLAIR

Barry

PRIME MINISTER

MISC 141: ENVIRONMENT WHITE PAPER

You are chairing a meeting of Misc 141 on Thursday to consider the draft White Paper. I do not yet have the Cabinet Office steering brief but you may like to take a look at the papers we have over the weekend. After the rather disappointing draft which you saw earlier, it seems to be shaping up rather well although the main White Paper is still extremely long.

I enclose:

Flag A A covering paper from <u>Chris Patten</u> which highlights the questions he wishes to cover at the meeting.

Flag B

A letter from Chris Patten on <u>a review of coastal</u>

<u>policy.</u> He wishes to establish a committee with an

externally appointed Chairman to look at the

conservation of the marine and coastal environment.

This would be announced in the White Paper and he would

like to discuss this at Misc 141.

- Flag C An <u>abridged version of the White Paper</u>. This is rather good, easy to read and well worth reading. A full colour version will arrive in time for the meeting.
- The draft White Paper, including a revised chapter 7 at the back. This is very long and I has only just arrived so I have not had an opportunity to read it in full. I have glanced at the first chapter, which seems broadly the same as the draft you have seen. Rather than providing a summary at the beginning as you suggested, Mr Patten has opted for a summary at the end (flagged) and for issuing the abridged version with all copies of the full White Paper. Carolyn suggests the summary might be better brought forward to the beginning.
- Flag E A note from <u>Carolyn Sinclair</u>. After some concern at the initial drafts, Carolyn now seems pretty happy with the

White Paper. She raises a number of points, the most important of which are how to handle <u>spending proposals</u> and how to present <u>taxation of vehicles and fuels</u>. She suggests that Mr Patten may argue that the White Paper will need to be delayed until November if the spending proposals cannot be agreed before September. But I doubt whether he will do that, given that he will want to have issued the White Paper before his Conference speech.

Carolyn mentions that a compromise has been reached on the dispute she mentioned to you over the reference to cutting CO2 emissions by up to 30% to achieve the target of stabilising them at 1990 levels by 2005. References to this have now been dropped in favour of a "perhaps 20%" reduction in present levels of all greenhouse gases.

You may like to note the proposal in chapter 9 on providing money to restore cathedrals, which you have discussed with Mr Patten and on which he minuted you recently. You said you would wait until you saw the Treasury response before replying to Mr Patten. But no Treasury comments have yet been received. You will want to consider whether to give any explicit support to this idea in Thursday Misc 141. It seems likely that the extra expenditure involved will have to be considered in the Survey and cannot therefore be announced in the White Paper. But you might in any case want to save this for an announcement in the context of the Millenium.

I do not myself like the proposed title of the White Paper, "This Common Heritage" which seems too sub-Shakespearian for my taste.

US

Caroline Slocock 20 July 1990



SW1A 2AU

The Rt Hon Malcolm Rifkind QC MP Secretary of State Scottish Office Dover House Whitehall LONDON

2 MARSHAM STREET LONDON SWIP 3EB 071-276 3000

My ref:

Your ref:

/ 7 July 1990

I Malwa

REVIEW OF COASTAL POLICY

The draft of the Environment White Paper which went to MISC 145 on 9 July contains an announcement of our intention to mount a major review of coastal policy with the objective of producing a co-ordinated framework for its future management. I have been considering how best to take this forward.

The calls for such a review, coming from a wide variety of environmental interests, reflect a widespread belief that there is a lack of effective co-ordination between the different Government Departments and agencies responsible for various aspects of the planning and management of the coast. The attached list illustrates the range of responsibilities which interact and can overlap with each other. The subject is so wide-ranging that I think we need more than a purely inter-departmental review. I propose therefore that we should set up a rather higher powered committee, with an externally appointed Chairman and with membership drawn both from departments and the relevant conservation agencies as well as one or two independents. I would of course consult colleagues about membership. The Committee would be serviced by my Department.

I attach draft terms of reference. The focus of the review would be on the conservation of the marine and coastal environment. Certain issues would be outside its scope: for example, water quality where we are aware of the problems and have moved on to implementing solutions or stand-alone issues such as sea outfalls. I would expect the committee to cover wider conservation and development issues, looking for mechanisms and prescriptions which will be seen to protect and enhance the inter-tidal and coastal environment. Committee would complement the marine environment review which we have already announced in taking forward the Environmental Protection Bill. We could expect a report 12 or so months after the committee began work.



We will have an opportunity to discuss this at the 26 July meeting of MISC 141. I would of course welcome any views from colleagues in the meantime.

I am copying this letter to the Prime Minister and the other members of MISC 141, to Tom King, Peter Brooke and Sir Robin Butler.

2

CHRIS PATTEN





10 DOWNING STREET LONDON SWIA 2AA

From the Private Secretary

16 July 1990

Dear Phillip,

ENVIRONMENT WHITE PAPER

The Prime Minister has had an opportunity to look at the draft of the environment White Paper circulated to members of MISC 145. Her only comment at this stage is that the opening chapter will need an effective and pithy summary at or near the beginning. You may like to bear this in mind as drafting proceeds.

I am copying this letter to the Private Secretaries to members of MISC 141 and to Sonia Phippard (Cabinet Office).

Your sicely,

CAROLINE SLOCOCK

Phillip Ward, Esq., Department of the Environment.

Docen 2 MARSHAM STREET LONDON SWIP 3EB 071-276 3000 The Rt Hon Margaret Thatcher MP Your ref: 10 Downing Street LONDON SW1A 2AA / July 1990 slatust of flach In Chuckingto. As you will have seen from the Press, the Second Meeting of the Parties Montreal Protocol on Substances that Deplete the Ozone Layer was a great success. The agreement reached is a major step forward in the international effort to deal with the problem of ozone depletion. I am convinced that this would not have happened but for your intervention with President Bush. It was crucial in gaining the US commitment to additional funds, without which an agreement on developing countries participation in the Protocol could not have been reached. The fact that you opened the Meeting was very important. It showed both your concern, and the Government's, for the subject and helped galvanise the delegates into action. Many of them signalled their appreciation for your presence in their statements. Your announcement of our financial contribution was also helpful and timely. The Parties met the ambitious environmental goal you set them. agreed a substantial tightening of the Protocol controls. Chlorofluorocarbons are to be phased out by 2000 with two intermediate cuts on 1986 levels of 50% in 1995 and 85% in 1997. The Parties also agreed to return to this issue in 1992 with the aim of accelerating the phase out schedule. Halons are to be phased out by 2000 except for agreed essential uses, with a 50% cut by 1995. Controls on two other ozone depleting chemicals - carbon tetrachloride and methyl chloroform - were also agreed. carbon tetrachloride will be phased out by 2000, with an intermediate cut on 1989 levels of 85% by 1995. Use of methyl chloroform will be reduced by 30% of current levels by 1995 and 70% by 2000. It will be phased out by 2005. Neither of these chemicals were controlled under the Protocol previously. We had to go slightly further on controls on methyl chloroform than originally intended, but this was unavoidable given the strong pressures from other countries and the need to reach an agreement that all parties would accept. I believe that this has put us in a very good position environmentally. I am confident UK industry will be able to meet the challenge.

One slightly disappointing aspect of the Conference was the fact that several countries including ourselves would have liked to have gone further and faster on CFC's. In particular a number of countries argued that we should phase out CFCs by 1997. This would be a wholly acceptable target provided essential medical uses are exempt. We will be pressing the European Commission to bring forward an amending Regulation to provide for this within the Community as soon as possible.

I view as a particularly significant achievement the agreements on a financial mechanism and technology transfer. Under the financial mechanism developed countries will meet the agreed incremental costs that developing countries incur in complying with the Protocol; the World Bank is assured a major role.

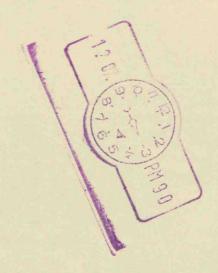
Nearly 60 countries from the developed and developing world succeeded in reaching an agreement that includes controls on chemicals previously vital to economic development, financial support for developing countries, and a commitment to helping those countries obtain and change to the new technologies for producing and using substitute chemicals. Both the Indian and the Chinese delegations said they would recommend to their Governments that they join the Protocol. A number of other delegations, Argentina and Turkey for example, announced they would be joining.

The meeting marks a new phase in international cooperation on major environmental issues. We can build on this to try to solve the other - more difficult - environmental problems that we face, such as biodiversity and global warming.

I am copying this to all Cabinet colleagues, and to Sir Robin Butler.

CHRIS PATTEN

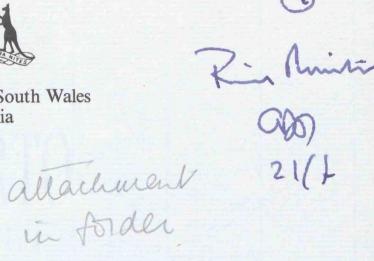
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Premier of New South Wales Australia



The Rt. Hon. Margaret Thatcher, M.P., Prime Minister, 10 Downing Street London SW1

16th July 1990

Dear Mrs Thatcher,

I am writing to thank you for the hospitality and time you extended during my recent visit to London.

I was most appreciative of the opportunity to once again enjoy some very interesting and informative discussions about some of the important issues affecting our countries.

I am enclosing three papers recently released by my Government - A Greenhouse Strategy Discussion Paper, our Earth Day Statement and a summary of the Government's achievements in micro-economic reform which I am sure will be of interest.

I look forward to meeting you again soon, and may I send my best wishes for the continuing progress and success of your government.

Thank you once again.

Yours sincerely,

Nick Greiner, M.P.

Enc.

Prine Minister ass 27582 CABOFF G ZCZC GVK0549 1BN0902 LAS4726 NBRA0677 RR GVKUK .NAIROBI (UNEP) 160 190933 TLX NO. 05127582 27582 CABOFF G ETAT - THE RIGHT HONOURABLE MARGARET THATCHER - PRIME MINISTER OF THE UNITED KINGDOM - OF GREAT BRITAIN AND NORTHERN IRELAND - 10 DOWNING STREET - LONDON SE 1 - UNITED KINGDOM BT MISC 5452-07 I AM EXTREMELY GRATEFUL FOR YOUR FORTHCOMING POSITION ADT THE OPENING OF THE OZONE CONFERENCE AND DEEPLY APPRECIATE YOUR KINDNESS AND THOUGHTFUL APPROACH TO THE ISSUES OF THE ENVIRONMENT THAT CAME CLEARLY ACROSS WHEN I HAD THE PLEASURE OF MEETING YOU AT 10 DOWNING STREET. I SINCERELY LOOK FORWARD TO MAJOR SUPPORT ON YOUR PART IN THE BIGGER ISSUES AHEAD OF US ''CLIMATE CHANGE'' AND ''BILOGICAL DIVERSITY''. THIS IS A BELATED APPRECIATION BECAUSE OF A VERY BAD COLD THAT I WRESTLED WITH IN LONDON AND WHICH LAID ME LOW AFTER THE MEETING. KINEST REGADRDS. (MOSTAFA K. TOLBA, EXECUTIVE DIRECTOR, UNITED NATIONS ENVIRONMENT PROGRAMME UNITERRA NAIROBI) COL CKD =07191135 NNNN 27582 CABOFF G



Your reference

Our reference

File

R1317

Royal Commission on Environmental Pollution

Church House Great Smith Street London SW1P 3BI

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DIRECT LINE 071 276 2128

SWITCHBOARD 071 276 3000 FAX NUMBER 071 276 2098

12 July 1990

PRESS RELEASE

A NEW SERIES OF STUDIES

The Royal Commission has decided to make an increased contribution to discussion of environmental matters. This will be done partly by maintaining a closer continuing interest in the subjects of its recent reports and partly by undertaking a new series of studies. The Commission hopes that this will enable it to cover a wider range of environmental issues at any one time than is currently possible and to respond more quickly as issues arise.

The reports on the new series of studies will be in addition to the major reports that the Commission publishes. The new series will concentrate on more tightly focused topics enabling reports to be produced more frequently. The Commission will continue in parallel to carry out studies on major, wide-ranging issues, such as the present study on fresh water quality.

The topic chosen for the first study in the new series is emissions from heavy duty diesel vehicles including lorries and buses. Details of the scope of the study and arrangements for the submission of evidence are below. The Commission's aim is to complete the study early in 1991 and to publish its Report during the first half of that year.

The Government has welcomed the Commission's proposals for additional activity and has agreed to increase the resources available to it.

Study on emissions from heavy duty diesel vehicles

The study on environmental pollution arising from emissions from heavy duty diesel vehicles will be concerned with the emission of gases and particulates (including smoke), focusing on:

future emission standards, with particular reference to the proposed EC Directive;

means of abatement of emissions, including the scope for retrofitting vehicles in service;

the development and enforcement of standards to be met by vehicles in service;

quality standards for diesel fuel.

It will take account of the environmental impact of exhaust and other emissions, the scope for their abatement, the pattern of vehicle use and the financial implications of any measures proposed.

The Commission has invited evidence from a number of organisations but would welcome evidence from other organisations and from individuals, in two parts:

available papers, to be received by the end of this month if possible;

views on some or all of the above aspects of the topic, by 14 September.

It should be sent to Church House, Great Smith Street, London SW1P 3BL.

NOTE TO EDITORS

The Royal Commission on Environmental Pollution is an independent standing body, established in 1970, with terms of reference "to advise on matters, both national and international, concerning the pollution of the environment; on the adequacy of research in this field; and the future possibilities of danger to the environment." Its Chairman, Lord Lewis of Newnham, and Members serve part time.

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CONFIDENTIAL

PRIME MINISTER

9 JULY 1990

ENVIRONMENT WHITE PAPER

MISC 145 considered the Environment White Paper today. Discussion focussed on three points:

- whether we quantify the reduction in projected CO₂ emissions which will be necessary to achieve stabilisation by 2005 (the "up to 30%" figure);
- what we say about tax and energy prices in the longer term;
- whether we can include the paragraphs currently in square brackets in Chapter 7 (Countryside and Wildlife). These cost money.

Quantifying Projected CO2 Reductions

The background is set out in my earlier note of 5 July.

The Department of Energy argued hard for the "up to 30"" figure to be dropped. The White Paper should focus on the fact that we are proposing to cut <u>current</u> emissions of <u>all</u> greenhouse gases by about 20%.

The Treasury and the Department of Trade and Industry supported the Department of Energy. Douglas Hogg argued forcibly that it was wrong to use an expression such as "up to" in a White Paper. It could mean anything from 0% to 30%.

But Chris Patten and the Foreign Office remained firmly attached to the "up to 30" figure, which they believe makes it easier to argue that the 2005 target is a really demanding one.

MISC 145 could not resolve this issue. It is likely that John Wakeham and Norman Lamont will write before the next meeting of MISC 141 setting out their views.

Energy Prices and Taxation

Everyone in MISC 145 agreed that the White Paper could not say <u>less</u> about energy prices and taxation than is currently proposed in paragraphs 5.17 and 5.18.

The Treasury said that they would like to tone down what is said in paragraph 5.43 about transport and tax. No-one supported them. The present wording is consistent with your recent agreement to Cecil Parkinson's suggestion that he should discuss options with John Major.

Public expenditure measures for Countryside and Wildlife

You have said in MISC 141 that proposals involving new spending must be agreed with the Treasury. Chapter 7 currently has a number of proposals in square brackets. These would involve extensions of current MAFF or Environment programmes such as:

- the Countryside Premium Scheme (which gives incentives to farmers to manage set-aside land in an environmentally friendly way);
- the Hill Livestock Compensatory Allowance (the proposal is to modify the arrangements to <u>discourage</u> over-grazing);
- advice (from DOE and MAFF) on conservation, wildlife and landscape.

The extension of these programmes is currently being discussed in the PES round. This will not be finished by the time the White Paper goes to the printers. So the options are:

- to publish chapter 7 without the passage; in square brackets (Chris Patten and others think that this would make the White paper look very thin);
- to reach agreement with the Treasury on these points in advance of settling the rest of the PES packages for MAFF and Environment.

The total at stake is about £25 million in 1991-92 (more in later years).

- The argument <u>for</u> including the new spending proposals is that they will appeal to wide numbers of people-wildlife enthusiasts, walkers and other countryside lovers who read the publications which dwell at length on subjects such as the use made of set-aside land.
- The argument <u>against</u> is that special treatment for these programmes will encourage other colleagues to twist Norman Lamont's arm. This is a very difficult public expenditure round, and the Treasury will be very nervous if it seems that special pleading wins the day.

This issue cannot be settled in MISC 141. Without your intervention it is likely to remain unresolved by the time the White Paper goes to press. In that case Chapter 7 would have to appear without the passages in square brackets.

Conclusion and Recommendations

- There are good arguments for dropping the reference to

a reduction of "up to 30%" in <u>projected</u> CO₂ emissions by 2005, We should instead emphasise a 20% cut in <u>present</u> emissions of all greenhouse gases. John Major, John Wakeham and Nicholas Ridley can all be expected to argue for this.

- We should <u>not</u> weaken what is said in paragraphs 5.17 and 5.18 about the longer term need to increase energy prices to achieve the 2005 target on CO₂. Colleagues are agreed on this.
- It will need a steer from you to resolve the public expenditure logjam on Chapter 7. The arguments are finely balanced. An extra £25 million will brighten the White Paper, but will send the wrong signal in the PES round.

CAROLYN SINCLAIR

CONFIDENTIAL

Prie Minister

You may who to read the fish chapter are he arechard.

PRIME MINISTER

PRIME MINI

I gave you some papers over the weekend about the Environment White Paper and enclosing a draft of some of the key chapters which Misc 145, Chris Patten's subcommittee of Misc 141, was to consider today.

You may find it helpful to know the conclusions of today's discussions, particularly as these are relevant to the points on which Carolyn Sinclair was seeking a steer from you in the papers you received over the weekend. A note from Carolyn is attached. There are three points:

- whether the White Paper should include references to cutting CO2 emissions by up to 30%. Views within Misc 145 seem polarised. Rather than expressing a view now, you might wait until the draft White Paper is considered later this month at Misc 141, so that you can hear colleagues' views;
- the wording of the White Paper on taxation and energy prices in Chapter 5. There seems to have been general agreement on this, with the Treasury only questioning what is said about transport and tax in paragraph 5.43;
- how to deal with a number of proposals in chapter 7 (a copy attached) which involve £25m extra expenditure and which run the risk of being excluded from the White Paper because they must be discussed in the PES. Carolyn suggests that this issue is likely to be unresolved unless you intervene one way or another. She says the arguments are finely balanced.

I am not sure you need express a view on these questions before the draft White Paper is discussed at Misc 141 later this month. But unless you do, Carolyn suggests that Chapter 7 will include very few new announcements and will look thin. It seems to me that the only intervention you could make to free the logjam would

be to ask the Chief Secretary to consider these proposals independently of PES. But if you were to ask this it would to my mind send the wrong signals about the PES negotiations.

One issue on which it would be very helpful to those drafting the White Paper if they had your views now is on the style and content of Chapter 1. This is covered by the papers sent to you over the weekend.

Agree not to intervene on the three points above?

Agree to ask Mr Patten to include a <u>summary</u> in Chapter 1 of the new proposals in the White Paper?

085

Caroline Slocock 9 July 1990



Prio Minister @

9/7

The Rt. Hon. Nicholas Ridley MP Secretary of State for Trade and Industry

The Rt Hon Chris Patten MP
Department of the Environment
2 Marsham Street
LONDON
SW1

Department of Trade and Industry

1-19 Victoria Street London SW1H 0ET Enquiries

071-215 5000 Telex 8811074/5 DTHQ G Fax 071-222 2629

Our ref Your ref

Date

071-215 5623 PE3AQO

July 1990

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Dear Chris

ENVIRONMENT WHITE PAPER : FOLLOW UP WITHIN GOVERNMENT

I agree with the proposals in your 26 June minute to the Prime Minister and note from No 10's letter of 29 June to your office that the Prime Minister accepts them too subject to discussion in MISC 145 of the practicalities of the annual reporting requirement. When we have that discussion I think it will also be important to consider the presentation of your proposals in the White Paper so that we do our best to avoid the potential criticism to which you refer that Government itself will not be doing enough following publication.

I have agreed to be the DTI Minister who will be nominated to carry forward the tasks you have identified.

I am copying this letter to all other members of MISC 141.

Aralha



ENV AFF: and Ren P717

RG 7254p Prime Minister ENVIRONMENTAL PROTECTION INSTITUTIONS (L) I have seen Chris Patten's minute to you of 22 June and the attached proposals on environmental protection institutions. I am broadly content with the proposals in the paper, and with the suggestion that they should be aired in the forthcoming White Paper. In particular, I agree that making HMIP into a 'next steps' agency would be a sensible move, and tht we should invite views on possible longer-term changes in the structures of environmental protection agencies. I have, however, two slight reservations. Firstly, it is important that a more independent HMIP should continue to have access to expert toxicological advice, and I hope that officials can look into this further. Secondly, I hope that further discussion within Whitehall of the possibilities for change would not be limited to the two options canvassed in the paper. I am copying this minute to other members of MISC141 and to Sir Robin Butler. 9 July 1990 KC Department of Health

MR POWELL

GREEN NEWS OVER THE WEEKEND

CCMr Turnbull 6/7

I am told by Phillip Ward that he has intelligence that the American Green movement will be holding a press conference at noon Houston time on Sunday to give the results of a survey they have done of the performance of countries against the communique of the last Economic Summit. He understands the results to be (in order of merit):

lst	Germany
2nd	France
3rd	UK
	USA
4th	Canada
	Japan
5th	Italy

Also Phillip has heard that the Sunday Times is likely to have reports of an EC Commission comparative study which shows that the UK is doing very well on its bathing beaches.

US

Caroline Slocock 6 July 1990



CABINET OFFICE

70 Whitehall London SWIA 2AS Telephone 01-270 0259

From Sir John Fairclough FEng Chief Scientific Adviser

W0533

Dr R F Coleman Department of Trade and Industry 1-19 Victoria Street London SW1H OET

6 July 1990

Dear Ron,

THE ENVIRONMENT: CLEANER TECHNOLOGIES

larings ti tagges live Thank you for your helpful letter of 29 June reporting on how DTI proposes to take forward the work on cleaner technologies.

Like you I see cleaner technologies as encompassing a spectrum of activities from novel research, (which may be twenty or more years from application) to incremental improvement geared to more immediate regulatory and commercial pressures, often referrred to as environmental technology. While it is desirable to have a working definition of clean technology, I would hope that this is drawn widely as your letter suggests and recognises that resolution of many of the problems we face will depend on radical change. Clearly, in consultation, you will wish to define the lead role of DTI and the responsibilities of other departments in this area. But I would hope that these tasks can be done quickly and that you will be able to provide a report on progress very shortly with a schedule for further action.

A better understanding of current activity on cleaner technologies across Whitehall will be valuable in establishing the roles of industry, the science base and departments. However

I did not detect how you propose to set about this, whether through bilateral discussions or a meeting of relevant departments. I accept that we need to identify the main areas of industry-led work in alternative technologies and that with the report from the ABRC this should inform departments on priority areas for government funded research. ACOST clearly has a role to play in commenting on the scope for encouraging business to play a more active role in responding to the clean technology challenge and stands ready to begin that task. Though I accept

that there are difficulties, I would be concerned should the first stage of the study you propose not be available by October.

I am copying this letter to Peter Gregson and E(ST)(0) members.

Yours sincerely

JOHN FAIRCLOUGH

PRIME MINISTER

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ENVIRONMENT WHITE PAPER

The Environmental committee chaired by Mr Patten (Misc 145) will consider the first draft of the White Paper on Monday afternoon. You do not at this stage need to look at this (it is voluminous and will be subject to further work) but I am enclosing some of the key chapters in case you would like to do so while you are in Houston.

I would suggest you read the draft of the opening chapter, which has been personally drafted by Mr Patten. And it would probably help Monday's discussion if you were able to give a steer now on three points set out by Carolyn Sinclair at Flag A.

Essentially, the opening chapter, although eloquent, is long on rhetoric and short on substance. Mr Patten gets across rather well in simple, accessible language, the underlying principles of Government policy; but he is sometimes too fanciful. The opening chapter promises a great deal but says very little about concrete steps to achieve it. And concrete steps are what commentators will be looking for. Carolyn suggests Chapter 1 needs to summarise the action proposed by the White Paper as well as to explain its underlying principles. I very much agree.

Carolyn suggests that we might offer to redraft Chapter 1 accordingly. But, given Mr Patten's evident wish to leave his personal stamp on this chapter, I think he might be offended by this and it would be better to leave the redrafting to him.

Carolyn also draws your attention to a dispute between Departments on how to present the target for CO2 equivalents. The Treasury and Energy want to avoid referring to reducing CO2 by up to 30% by 2005 because the estimates for emissions now look lower and because it sends the wrong signals for privatisation of the electricity industry. They would prefer to concentrate on the cut by 20% of CO2 equivalents. This seems sensible. The current passage in the White Paper is flagged.

Finally, Carolyn underlines the careful presentation on energy prices in the draft and asks you to endorse the wording, which has been provided by John Major. It is flagged.

The White Paper needs tightening up considerably and this may well be done after the Misc 145 meeting. It certainly needs it. Also the annexes seem to contain too much key material. And Annex A on economic instruments reads more like a Ministerial policy paper than a White Paper and looks curiously indecisive in this context.

Are you content to endorse Carolyn's points above (but not to suggest that No 10 might redraft chapter 1)?

USS

Caroline Slocock 6 July 1990 PRIME MINISTER

5 July 1990

ENVIRONMENT WHITE PAPER

MISC 145 will look at a full draft of the Environmental White Paper on 9 July. This note flags up three points which you will want to begin considering before MISC 141 takes the draft on 26 July (after 26 July there will be very little time to change the draft before it goes to the printers). The points are:

- the tone and content of Chapter 1;
- whether we <u>quantify</u> the reduction in projected CO₂ emissions which will be necessary to achieve stabilisation by 2005;
- what we say about tax and energy prices for the longer term.

Chapter 1

The first chapter is almost entirely Chris Patten's own work. It is elegantly written and would make an excellent speech. But is does not read like any other first chapter in a White Paper. It is more like a preamble than a concise summary of the whole such as was produced for the NHS White Paper.

There are two ways of looking at this:

The environment is an extraordinarily diffuse subject which arouses considerable emotion. It lends itself to rhetoric, and arguably good rhetoric is the best way to introduce a White Paper which some will find thin on specific new proposals.

Against that, it could be said that there is too much rhetoric about the environment already. Although there are some good points in Chapter 1 - on the need for economic growth (para 1.5); on stewardshhip (para 1.14); and on market forces (paras 1.28-1.30) - the rhetoric weakens the impact of the message. Although the need for sound science and sound economics is there, it does not come across as clearly as it might. This could lay the Government open to the charge of publishing a long and windy paper with little real meat in it.

Attached at Annex A is the summary of the Netherlands National Environmental Policy Plan Plus. The various lobby groups will inevitably compare the Environment White Paper with such a publication. The Dutch document is much more concrete. After reading it one has a good idea of precisely what the Dutch are going to do, for example

- to reduce acidification
- cut CO2 emissions from vehicles
- improve energy efficiency in houses.

In the case of our White Paper you have to read the relevant chapter and often an annex as well, to get the same information.

There is to be a final chapter summarising all the conclusions and recommendations in the manner of a Select Committee report. But this will not have the same impact as a crisp first chapter highlighting the most important points and proposals.

Conclusion and recommendation

There is some excellent drafting in Chapter 1 which should not be lost. But it would make more impact if it was recast on the lines of Chapter 1 of the NHS White Paper.

It should have a good, crisp first paragraph explaining that the Government's approach is based on sound science and sound economies. The principles on which the Government bases its actions should be set out so that they can be seen at a glance (the present Chapter 1 is called "First Principles", but it is hard to find them in the text). Specific new proposals in the White Paper could be highlighted.

If you agree, we could try our hand at a redraft here which - if it met with approval - could be sent to Chris Patten by way of illustration.

Quantifying projected CO2 reductions

This is one of the main remaining areas of dispute between Departments.

In your speech at the Hadley Centre for Climate Prediction, you said that stabilisation by 2005 could involve cuts in presently projected levels of CO₂ emissions of up to 30%. This figure came from the Department of the Environment.

30% is the upper end of a range of possible CO₂ increases based on projected energy use between now and 2005. The lower end of the range is 10%. These figures were calculated by the Department of Energy for use in the Governments submission to the IPCC last December, so they are in the public domain. But they have been overtaken, and there are good arguments for not using them in the White Paper:

- Increased use of gas by a privatised electricity industry will reduce the emissions of CO₂ from electricity generation.

The decision to make more use of gas was taken after the figures for the IPCC were calculated;

- Other Departments have questioned the underlying assumptions about industrial growth, in particular the balance between energy intensive and less intensive industries;
- Projections of energy use have proved notoriously unreliable in the past.

There is a further electricity privatisation angle:

- Chris Patten likes the "up to 30%" figure because he thinks it helps us to argue that the 2005 target will be very demanding. But by almost certainly exaggerating the extent to which we will need to rein back energy.

consumption, it sends the wrong signal to the market.

The latter will fear that we will become hooked on cutting CO₂ emissions by 30%, rather than simply stabilizing at 1990 emission levels.

For all these reasons, both the Treasury and the Department of Energy would like to drop any reference in the White Paper to cuts in CO₂ emissions based on <u>future</u> projections of energy use. John Wakeham argues that we should focus instead on the total cut of 20% that we shall be making in emissions of <u>all</u> greenhouse gases. This can be presented as a cut compared with <u>present</u> values. It is thus more soundly based than a cut measured in terms of what might have been.

Conclusion and recommendation

The White Paper should <u>not</u> include figures for cuts in CO_2 emissions which are based on future projections of energy use. This means that the references to "up to 30%" should be dropped. We would do better to focus on the cut of 20% in all greenhouse gases compared with present values.

Any apparent discrepancy with your Hadley Centre speech can be easily explained. It is natural to give an order of magnitude in a speech. But it would be wrong for a White Paper to quote figures which are likely to be revised in the near future because of new developments.

Energy prices and taxation

The White Paper makes it clear that there are no plans in the short term to increase energy prices through taxation.

But paragraphs 5.17 and 5.18 in Chapter 5 state that such action may be necessary in the longer term. The wording has been provided by John Major and stresses that:

- the Government intends <u>over the next few years</u> to concentrate on measures which impose little cost on the economy, and are sensible in their own right;
- the timing of any move to higher energy prices will depend on the success of these initial measures. Implicit in this is the notion that the public can affect the timing through spontaneous changes in behaviour;
- an increase in the taxation of energy need <u>not</u> lead to an overall increase in the tax burden. Offsetting tax reductions could be made elsewhere. Increased energy taxation could also be made RPI-neutral;
- we will only raise energy prices if competitor countries do likewise.

Colleagues agree that the White Paper cannot say less than this. The specific measures listed in the White Paper clearly will not by themselves produce stabilisation by 2005. It is calculated that they might produce between 30%-50% of the necessary reduction in CO₂ emissions.

Conclusion and recommendation

The calculations on which MISC 141 based the decision to go for stabilisation of ${\rm CO}_2$ emissions by 2005 assumed rises in energy prices. This must be acknowledged in the White Paper, or the target will look a sham. There are two important safeguards:

- no action will be taken in the short term (which helps with electricity privatisation);
- action on energy prices will only be taken if other countries do likewise.

Summary

- The present Chapter 1 should be made sharper. It should summarise at a glance the main principles and proposals in the White Paper.
- All figures based on future energy projections should be omitted from the White Paper. This means dropping the reference to a reduction of "up to 30%" in CO₂ emissions by 2005. We should instead emphasize that we will be cutting present emissions of all greenhouse gases by 20%.
- The longer term need to increase energy prices in order to achieve the 2005 target should be described in the terms proposed by John Major in paragraphs 5.17 and 5.18 (subject to any slight refinement of drafting).

CAROLYN SINCLAIR

and Smiles

NETHERLANDS NATIONAL ENVIRONMENTAL POLICY PLAN PLUS

SUMMARY

1. <u>Introduction</u>

- 1.1. It became apparent after the publication of the National Environmental Policy Plan (NEPP) on 25 May 1989 and in the course of the forming of the Lubbers-Kok coalition government (Christian Democrats/Labour Party) that environmental policy would have to be tightened up on a number of points if the targets in the plan, which aimed at sustainable development, were to be achieved as quickly as possible. The aim of the plan, which is to ensure that environmental problems are not passed on to subsequent generations, can only be achieved if we change our current patterns of production and consumption. That means a break in the trend in the way we currently behave and which one must become manifest during the current government's period of office. It was established in the government's policy statement on 27 November 1989 that environmental policy is the third mainstay of the government's programme. In drawing up policy plans the government will be taking into account the possible effects of these on sustainable development.
- 1.2. The government policy statement listed the points on which environmental policy required tightening up:

* reducing carbon dioxide emissions;

* stepping up policy on acidification;

* stepping up policy for the conservation and development of nature;

* management of entire waste chains, also viewed in relation to product policy;

* cleaning up soil and underwater soil;

* energy conservation policy.

The tightening up on these points does not entail any strategic turn-around in relation to the National Environmental Policy Plan, but it does mean an acceleration of the introduction of measures so that the long-term objectives needed for sustainable development are likely to be achieved earlier. We are talking therefore about a change in the speed of implementation and not a change of direction. The consistency of policy is guaranteed because the points of departure of the National Environmental Policy Plan still hold true.

The government's policy statement also points to the need for better coordination of policy documents such as the National Environmental Policy Plan, the Nature Policy Plan, the Third Memorandum on Water Management and the Fourth Physical Planning Report. It is partly as a follow-up to the responses to the NEPP that the National Environmental Policy Plan Plus (NEPP Plus) is

2 looking at aspects such as the implementation of policy and the development of the set of instruments, notably the use of financial incentives, an extension of the General Environmental Provisions Act (Wet algemene bepalingen milieuhygiene, WABM)) and the set of financing instruments. The NEPP Plus indicates which aspects of policy are being highlighted and which additional measures this will require in relation to the NEPP. Considerations which come into play are not only those of effectiveness and efficiency but also the availability of additional funds. The NEPP Plus, together with the NEPP itself, constitute the main thread of environmental policy for the nineties: the strategy, the objectives and the measures to bring sustainable development in the Netherlands within reach for the period 1990-1994. 2. Stepping up policy Climate change More and more research findings are pointing to a future climate change as a result of human activity. Major risks are attached to a continuing emission of gases responsible for the greenhouse effect such as CO2. The stepping up of policy is aiming in particular at reducting CO2 emissions. The stepping up of policy will produce a stabilisation in CO2 emissions in 1994/1995 at the level of 1989/1990 (this is 182 million tonnes of CO₂ per year). The NEPP assumed stabilisation in the year 2000, An absolute reduction of 3 to 5% is anticipated for 2000. Given international developments this can be regarded as an ambitious objective. For this purpose additional measures will be taken up to and including 1994 in the field of: energy conservation (including retrofit insulation of existing buildings, increasing the efficiency of appliances, energy conservation investments); energy consumption (reduction and discouragement of coal consumption); traffic and transport (improvement in public transport, restriction on the growth of car traffic, improving driving behaviour); waste prevention. The next NEPP will indicate whether additional measures are needed to achieve the objective by the year 2000. The measures will be partly funded from the CO2 levy on fossil fuels (of which the revenue in 1994 will be NLG 150 million).

Acidification A level of protection that would result in 20% of the Netherlands forests being protected is regarded as inadequate. It was not and is not a satisfactory policy objective. Hence the fact that the stepping up of policy is partly designed to achieve additional reductions in the emissions of acidifying substances by means of international, national and object-oriented acidification measures (the latter for regions with a high peak load). The emissions coming from abroad will in fact come to have a growing influence on the percentage of woodland which must be designated as nonvital. This step will enable the national interim acidification objective of 2400 acid equivalents per hectare per year to be achieved some years earlier than 2000 and risks for woodland in general to be confined. The stepping up of policy will be achieved through additional measures: tightening up of emission requirements at electricity power plants (in conformity with the covenant with the Dutch Electricity Generating Board, SEP); the use of NO, abatement technologies for gas turbines; promotion of low NO, gas engines and NO, poor combustion installations in industry; use of a subsidy scheme for central heating boilers with low NOx emissions; higher NO, emission standards for waste incineration and energy conservation measures; stricter traffic and transport policy; promoting the use of co-generation; using the openings offered by the modernisation of refineries. Research and pilot projects are intended to show in 1990 what is the desired scope of object-oriented policy designed to reduce ammonia emissions in specific regions. Effect-oriented measures will also be taken to protect forests, nature areas and cultural heritage. Measures to abate acidification in Eastern Europe will be examine in the report on the Environment and Eastern Europe which is due to be published in 1990. NLG 100 million has been earmarked for all the additional acidification measures in 1994, NLG 55 million of which is intended for measures to restore forests and nature areas, NLG 5 million for restoration measures for the conservation of cultural heritage and documents, NLG 15 million for object-oriented policy and NLG 25 million for source-oriented measures (gas engines etc.). Funds will come from the CO2 levy, the WABM levy and public funds.

4 2.3 Waste prevention and re-use At the current growth in waste of 2% per year the amount of waste (excluding dredging sludge and manure) would increase to 50 million tonnes per year by 2000. Radical measures are therefore needed to achieve the objectives in the NEPP (among other things, 10% quantitative prevention). The stepping up of policy is designed to cut drastically the growth in waste flows and confine the load on the environment deriving from waste substances. Policy is intended to produce a fall in the amount of waste to be incinerated and dumped from 20 million tonnes to 12 million tonnes per year. This will mean a drop in the amount of waste to be dumped from 17 to 5 million tonnes per year. Prevention and re-use will be promoted by: accelerated screening of waste flows for possibilities of preventing and re-using waste; a targeted product policy; promotion of re-use through quality control of secondary raw materials and by raw materials policy; the use of instruments such as environmental care and permits; possible introduction of deposit return systems and regulatory levies after research. Waste prevention and re-use may lead to a reduction in CO₂ emissions. This is why a plan of approach will be published in late 1990 preparing for measures for prevention, re-use and the processing of synthetic, natural and energy-intensive materials. The major portion of the expense of waste prevention and re-use will be borne by the target groups by means of the legislation to be introduced. In so far as measures will have to be partly funded by the government, funds which are already available will be used. 2.4. Product policy Environmental policy which is aiming at integrated lifecycle management requires a sound product policy. This aspect is underlined in the government policy statement in relation to the management of the entire waste chain. Product policy aims at managing the entire chain from raw material up to and including waste, including the consumer phase. This is not just being done to restrict the effects at the waste stage, but also to combat emissions and diffuse dissemination of substances and to conserve energy.

5 The measures are intended to result in an optimal use of (non-renewable) raw materials, the smallest possible energy consumption, an improved quality of products (longer life, more readily repairable) and a restriction on emissions and waste flows during the entire life of a product. Instruments which are being developed for this purpose are: product standards an obligation to provide information and accountability environmental care at the drawing board stage regulatory levies an environmental seal (to be introduced in 1991) a logo for products which require treatment as minor chemical waste (to be introduced in 1991) advertising code of practice. Product policy is due to be set forth in a report on products and the environment in 1992 on the basis of initial experiences. Legislative instruments will ensure that the polluter pays for the measures to be introduced. Soil clean-up 2.5. The cabinet's position on the advisory report of the Steering group 'Ten-year scenario for soil clean-up', which will determine the lines of clean-up activities for the years 1991-1994, is based on the point of departure that the most serious problems with regard to soil clean-up will have to be solved within a single generation. For this purpose soil clean-up policy is being stepped up. Soil clean-up activities will be stepped for: environmentally urgent projects; underwater soils of national and regional waters; situations in which problems for urban renewal have arisen as a result of soil pollution. Research will be conducted into the possibility of banning the sale of polluted ground so that the cost of clean-up will be less rapidly passed on to the community. Important, too, are the activities of the Committee for the clean-up of soil on operational industrial sites (the Oele Committee); the plans for those industrial sites which present the greatest risks will be announced in late 1990. Altogether, on the basis of the government's policy statement, an additional NLG 350 million has been earmarked for the period 1991 to 1994 inclusive for soil clean-up, almost NLG 140 million of which will be spent on underwater soils. 75% of the revenue from proceedings to recover costs will be used to step up clean-up

activities. In total NLG 2 billion is available to fund environmentally urgent projects between 1991 and 1994, NLG 720 million of which it is assumed will be externally funded (by means of voluntary clean-up activities, revenue from recovery of costs and by (future) users of polluted land). 2.6. Energy conservation There is a special need to step up energy conservation policy because of the climate problem, because of acidification and because of the endeavour to achieve a sustainable use of raw materials. Energy conservation is needed because of environmental and raw materials policy and the stepping up of this policy is all the more necessary now that higher prices are failing to encourage energy conservation. The tightening up of policy is intended to produce a more economical use of fossil fuels. If no measures were to be taken energy consumption would rise sharply from 2775 PJ in 1990 to 2975 PJ in 1995. Compared with the assumed growth without the NEPP Plus measures, savings for 1995 are scheduled to run to about 40 PJ per year. In 1990 and 1991 a saving of together almost 30 PJ has to be achieved. An investment of NLG 3 to 4 billion is necessary for the period up to 1995 alongside the use of instruments aiming at influencing behaviour. The implementation of the government's policy on energy conservation and renewable energy is described in the Energy Conservation Memorandum which is being published simultaneously with the NEPP Plus. Reductions in the amount of fuel used is anticipated for one thing in connection with the reduction of CO2 emissions. The coal used in electricity power plants will be reduced (from 73% as anticipated for 2000 to 56%) and the use of coal in industry will be discouraged. The policy involves: subsidies (the support programme for energy conservation and renewable energy sources, SES, a tender programme, retrofit insulation of existing dwellings); * legislation and covenants; technology development and demonstration projects; promotion of innovation; information and transfer of knowledge. Energy conservation will also have to be part of Petajoule: measure of energy consumption: peta = 1015 (million times a billion)

environmental care systems and an inquiry made as to how energy conservation can be involved as a criterion in granting permits. Research is also being started into the possibilities of a regulatory energy levy. More than NLG 350 million has been earmarked for energy conservation in 1994 under the NEPP and the NEPP Plus (NLG 100 million of which was earmarked in the coalition agreement). The expenses for the target groups are estimated at an additional NLG 300 million in 1994. Mobility, traffic measures and physical planning If sustainable development is to be achieved other measures will be needed alongside technical measures as a result of the growth in mobility . If policy is stepped up in this way the emission reduction objectives in the NEPP for NO, hydrocarbons and CO2 can be achieved. In Part d of the Second Traffic and Transport Structure Scheme a major shift in emphasis has been introduced in relation to Part a for the benefit of environmental management. This emerges in the nature and the scope of the investments which are now geared more to public transport and can also be seen in other measures which are desirable from the angle of environmental management, such as: reduction in the use of fuel; improvement in engine technology; more economical driving behaviour; reduction in the use of cars; clean and quiet lorries. The instruments to be used for this purpose will often take the form of financial incentives such as capping the tax allowance for commuting costs, introducing tolls on a number of access roads and tunnels in the Randstad, a peak hour surcharge on motor vehicle tax and an increase in the excise duties on petrol and diesel (8 cents per litre). An incentive scheme for clean and quiet lorries and buses has also been set up. Car use will also be discouraged by physical planning instruments. This will entail a stricter policy on the siting of housing and business premises with priority being given to accessibility by public transport. The investment in public transport in relation to the NEPP has been raised by NLG 50 million in 1990 running to NLG 100 million in 1994 in relation to the funds earmarked in the coalition agreement which run to NLG 450 million in 1994.

The measures in the NEPP and the NEPP Plus will be funded from revenue from the capping of the standard tax allowance for commuting expenses (NLG 240 million annually) and from some of the revenue from the rise in excise duty on petrol of 8 cents per litre (including VAT) and funds becoming available from the CO, levy and the increase in excise duty on diesel. The integration of environmental, nature and water 2.8. policy Environmental, nature and water policy are all aiming at sustainable development. The points of departure are the same though the details may differ. Although much is being done to coordinate and integrate the various policy fields, it will remain a point of attention. This will be notably the case in the field of ecological standards, area-oriented policy, risk policy, the set of instruments and the implementary aspects of the three policy fields. The plans for stepping up policy on the development and conservation of nature are given in detail in the government's decision on the Nature Policy Plan. 3. The implementation of environmental policy 3.1. The break in the trend on paper has to be converted into a break in the trend in reality. The detailing of the main points of environmental policy given in the NEPP and in this NEPP Plus takes time: we are talking about an operational path frequently involving painful choices. Some measures can be taken fast, others need to be regulated internationally or the set of instruments needs to be improved or more insight is required into the consequences or technological adjustments. A sound planning of environmental policy is absolutely vital. Equally crucial for working out and implementing policy and for funding and expertise is good cooperation between the tiers of government and the target groups. By now, agreements on cooperation have been made with virtually all the groups involved in implementing environmental policy. Reinforcing target group management is one of the contributions of central government. It means that the target groups have a centre to which they can resort, that policy is coordinated and that environmental policy is internalised among the target groups. Provincial and local authorities will also be taking part in target group consultations. Provisions have been made within central government to assess the impact of all policy plans which may have a major effect on sustainable development.

Cooperation between the authorities in enforcing environmental policy is being enhanced by joint programming and coordinated implementation of enforcement activities at regional level. Cooperation at international level aims at optimal use of international frameworks, notably the EC, to put through measures the Netherlands considers necessary for sustainable development. Two implementary aspects for which policy needs to be stepped up urgently will be examined: waste processing and soil protection. The future structure of waste processing will be the subject of a document due to be published this year. Legislation is being prepared for the separate collection of waste and for the proper removal of chemical waste stored on industrial sites. The implementary decrees of the Soil Protection Act will come into force as soon as possible for the purpose for which they were intended. Rules for the use of manure will be tightened as part of stage two of policy on manure. The extent of the problem of soil saturated with phosphates will lead for one thing in 1991 and 1992 to the designation of land where the ground water is threatened by phosphate penetration. The phosphate added in this area covering approximately 80,000 hectares will not be allowed to exceed the potential uptake by the crops. 4. Set of instruments If environmental policy as a third mainstay of government policy is to succeed all the available instruments have to be deployed including both strict legislation and regulations and close enforcement of these and financial instruments. Such instruments have to meet certain criteria: respect for the principles of equality before the law, of legal security, of democratic checks and of efficiency and effectiveness. Nor must they result in a rise in the burden of taxes and contributions and they must be reconcilable with EC In the reactions to the NEPP one senses that people are wondering whether the government is sufficiently equipped to achieve the far-reaching environmental objectives. The set of instruments is all the means the government has at its disposal to influence the behaviour of businesses and members of the public: agreements (including covenants); legislation; financial incentives; information; setting examples; penalties.

The instruments are usually used in combination. The most effective combination is ascertained from case to case. A shift in emphasis is being made in relation to the NEPP on two points, bearing in mind the cooperation with the target groups: more attention to legislation as the base on which the instruments are used (including enhancing the implementability and enforceability of regulations) and more attention to the devising and use of financial incentives.

Covenants will involve procedural guarantees. Covenants often serve to supplement legislation but they may be an independent instrument if they are more effective and more efficient than other instruments.

In the document on instruments, enforcement and the extension to the WABM, which is being published at the same time as the NEPP Plus, the considerations underlying the strengthening of the set of instruments are given in detail. The main guise in which this is being done is in the extension to the WABM, the use of financial incentives and improvements to the funding structure.

- 4.2. The WABM (General Environmental Provisions Act) will be extended to become the Environmental Management Act with the aim of safeguarding the integral protection of the environment (also to prevent effects being passed on), to enhance transparency for members of the public, industry and authorities and to improve implementation and enforcement. The extension of legislation will take place in phases. Research will first be done on a number of points, among other things on a general determination of peoples' responsibility to take care of the environment and on coordination in the field of water quality management. After this a final decision will be taken on extending the WABM.
- 4.3. Financial incentives can be used with the aim of encouraging environmentally friendly behaviour. Rewards, subsidies, deposit return systems, regulatory levies etc. all come under this heading. Financial incentives may have advantages over direct regulation in the sense that they are more efficient, more effective and more flexible and may encourage the use of clean technology. But by the reverse token there may be disadvantages such as less effectiveness in the event of low price elasticities and uncertainty as to the effect achieved. This will have to be looked at from case to case. The use of financial instruments will be checked against the criteria of the Socio-Economic Council, an advisory body to the government and will have to fit in with EC policy and EC law and within the normal budgetary frameworks. The latter means that if a regulatory levy is imposed, the subsequent revenue will have to be returned

11 collectively and via the fiscal authorities in one way or another so that the burden of taxes and contributions is not raised. The attitude to subsidies remains cautious. In examining financial incentives to check whether they are effective and legitimate, attention will focus on: influencing dumping and incineration rates influencing the use of secondary raw materials introducing deposit return systems prior funding of energy conservation measures regulatory energy levies regulatory raw material levies deposit return systems for substances regulatory levies on mineral emissions in agriculture. The possibility of regulatory levies on certain nonrecyclable packaging, paint containing organic solvents, light bulbs and disposables etc. will be examined in the near future. After consultation with industry a decision will be taken as to whether they should be introduced on an experimental basis. Unlike the financial incentives of which the prime aim is to affect behaviour, the funding instruments are designed to generate resources. Financial incentives and the set of funding instruments must not be confused. The fact that the funding instruments may affect behaviour should be seen as a normally positive side-effect. The general point of departure in funding measures to prevent and solve environmental problems is that the expense may not be passed on to future generations. The polluter pays principle continues to apply. But strict application of this principle is not always possible in practice. This means that in situations which require public funding for reasons of fairness and efficiency specific purpose levies will have to be imposed. There are general and special purpose levies. Special purpose levies are geared to a special group of polluters. If the costs cannot be recovered from the individual polluters or from a special group of polluters they can be paid for by means of a general purpose levy or from public revenue. The present levy under the WABM is an example of a general purpose levy. 5. Cost and funding A number of changes have been introduced in relation to the NEPP (the amounts apply for 1994): In the coalition agreement additional funds were earmarked (partly to be financed from the CO2 levy) to a total amount of NLG 450 million in 1994. NLG 100 million of this amount will be spent on

Table I: Additional financial contributions in relation to 1988 (rounded off in millions of guilders in 1994)

	NEPP	NEPP-plus
Agriculture Industry Other businesses Households Government	825 1578 1324 2294 632	805 2112 1371 2288 1134
	6650	7710

Table 2: Additional expenditure on environmental management in relation to 1988 (rounded off in millions of guilders in 1994)

NEPI		NEPP-plus
Climate Acidification Eutrophication Disposal Diffusion Disturbance/Disruption Energy conservation Reduction in car mobility General instruments Support and enforcement	309 1560 598 1656 645 140 574 733 255 180	432 1605 598 2235 645 140 653 723 375 304
	6650	7710

MISS SLOCOCK

4 July 1990

THE ENVIRONMENT WHITE PAPER: SPECIFIC MEASURES TO REDUCE CO2

We spoke about the extent to which the Environment White Paper will set out specific measures for stabilising ${\rm CO}_2$ emissions by 2005.

The answer is that the White Paper will propose some specific measures in the transport and energy fields. But by themselves these will not be nearly enough to deliver the 2005 target. You will see from the attached letter that DOE calculate that the total of specific measures might produce 28% of the reduction in $\rm CO_2$ emissions necessary to meet the target. There may well be some quibbling in Whitehall over this figure. But everyone accepts that it will be necessary to go well beyond the specific measures proposed in the White Paper to achieve stabilisation of $\rm CO_2$ emissions in 2005.

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CONFIDENTIAL

3 July 1990

John Odling-Smee Esq HM Treasury Parliament Street London SW1

Dear John,

HITTING CO, TARGETS

We had a brief crat the other day about the impact which the DTp and DEn measures to be listed in the White Paper would have in contributing towards the reductions necessary for the UK to stabilise $\rm CO_2$ emissions at 1990 levels by 2005. Or put the other way round, how much of a contribution we estimate needs to be made by taxation and other MBIs to be used in the longer term, as floated in the relevant paragraphs of Chapter 5.

- 2. It seems important that in briefing Ministers for MISC 145 and subsequently for MISC 141, all Departments use broadly the same figures: if possible we do not want Ministers to be arguing at these meetings about how far they think the listed measures will take us. I thought, therefore, it would be helpful to circulate the attached note which sets out our calculations. Although they are our calculations, they are based on figures provided by DEn and DTp for MISC 141, and I would hope that all Departments could agree them.
- 3. As we discussed, the important figure is the 13.5 MTC or 28% of the necessary reduction mentioned in the final paragraph. The Government is not at this stage saying that they want to operate with equal vigour on the Transport and non-Transport energy sectors. The target which the Prime Minister announced was expressed in total CO_2 terms and it obviously makes sense for us to focus on the total reduction caused by the aggregate of the measures listed in the White Paper.

- 4. If you or others disagree with the figures in the attachment, I should be grateful if you could let me know as soon as possible so that we can seek agreement. The figures are obviously only orders of magnitude and we certainly do not want to get into an argument about whether the measures take us 28% or 31% of the way. Much more important, I think, that we should all agree on the advice we give to our Ministers.
- 5. I am copying this letter to the other members of Peter Owen's Group.

Jours sweets, Robin Jong

R U YOUNG
Director
Environmental Policy & Analysis

, EMISSIONS

- 1. This note compares the reductions in the emission levels projected for 2005 required to meet the target of stabilisation at 1990 levels with the reductions likely to be achieved by the specific measures mentioned in the current draft of the White Paper. The projections are those provided by DEn and DTp and produced in MISC 141(90)10.
- 2. Some measures would only be effective, or would be much more effective, if accompanied by fuel price increases. This note assesses the effect of the measures listed without fuel price increases.

3. Transport

	MTC
Reduction needed by 2005	15.8
Total Reduction caused by listed measures	1.0
MOT test changes]	
Traffic management]	

So without price rises, DTp measures produce about 6% of the required savings.

4. Energy	
	MTC
- 1 1 2 2005	32
Reduction needed by 2005	34
Total reduction caused by measures listed	12.5
of which	
Renewables	4.5
СНР	1
Efficiency Regs	3.5
Business Consultancies	1.5
Home Energy Efficiency Scheme	1
LA Housing	1

So without price rises DEn measures produce 39% of the required savings.

5. Taken together the measures produce 13.5 mtc of the required 47.8 mtc, or 28%.

CONFIDENTIAL THE RT HON JOHN WAKEHAM MP

Department of Energy 1 Palace Street London SW1E 5HE

071 238 3290

Ms Caroline Slocock Private Secretary to The Prime Minister 10 Downing Street LONDON SW1A 2AA

4 July 1990

Dear Caroline

GLOBAL CLIMATE CHANGE

My Secretary of State was pleased to see Mr Patten's minute of 29 June to the Prime Minister reporting on the calculations done by his Department on the reduction in our contribution to global warming from all greenhouse gases taking account of our willingness to accept a commitment to limit CO2 emissions to 1990 levels by 2005 together with action on CFCs and in other areas such as vehicle emissions. He has also seen your letter of 2 July giving the Prime Minister's endorsement of Mr Patten's suggestion for the presentation of the reduction in the White Paper.

My Secretary of State agrees we should not miss the opportunity to use the presentational advantages of a cut in effective emissions compared to present day values rather than the more hypothetical cut against projections of what might have been. He believes this could be particularly helpful for the White Paper in avoiding calls for yet further action which would be potentially damaging to electricity privatisation in the crudial run up to the sale of the companies at the end of this year and the beginning of next.

My Secretary of State very much supports therefore Mr Patten's proposal that he should look at how we can present this very welcome new result in the global warming section of the White Paper, and hopes this can provide the key element for our presentation of targets in the appropriate passage.

I am copying this to Private Secretaries to members of MISC 141 and Sir Robin Butler.

TERRY CARRINGTON Private Secretary

Your rincerely

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the department for Enterprise

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The Rt. Hon. Nicholas Ridley MP Secretary of State for Trade and Industry

The Rt Hon Chris Patten MP Secretary of State for the Environment 2 Marsham Street

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Our ref Your ref

Date

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2 July 1990

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Dear Chis

ENVIRONMENT WHITE PAPER: ENVIRONMENTAL PROTECTION INSTITUTIONS

Thank you for sending me a copy of your minute and paper of 22 June to the Prime Minister.

I agree with the broad approach you suggest. While the White Paper can include careful expression of our willingness to keep an eye on the institutional arrangements, with the possibility of further change in the future, for example as the NRA beds in and integrated pollution control (IPC) is implemented and settles down, we should avoid encouraging the grander plans which some environmentalists favour. As you say that would risk creating a burdensome and dangerous bureaucracy and jeopardise the progress we have already made, for example in setting up the NRA. I must say that, for these very reasons I oppose any suggestion of creating a new umbrella body. That risks achieving no more than adding an unnecessary and unhelpful bureaucratic tier.

I agree with your proposal to establish HMIP as a "next steps" agency. Among other things this should help its efforts to recruit people of the calibre required. It will be important to ensure that its establishment as an agency is effected speedily without distracting the Inspectorate from the vital task of implementing IPC effectively.





I can also go along with your proposal to keep the NCC and CC separate for now but, personally I favour merging them in England.

I am copying this to the Prime Minister, other members of MISC 141 and Sir Robin Butler.

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Pomie Missockly

Treasury Chambers, Parliament Street, SWIP 3AG

The Rt Hon Christopher Patten MP Secretary of State Department of the Environment 2 Marsham Street LONDON SW1P 3EB

2 July 1990

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Dear Minister

ENVIRONMENT WHITE PAPER: FOLLOW-UP WITHIN GOVERNMENT

I have a reservation about the proposals in paragraph (iii) in your minute of 26 June to the Prime Minister.

I would have no problems with the idea that Departments might include in their departmental reports passages describing White Paper follow up action and new environmental initiatives. But I should not wish there to be a formal requirement or rule.

Collectively, we have made a considerable effort to keep the mandatory core element of the new reports to the minimum, so as to allow departments as much flexibility as possible in tailoring the content of the reports to their needs. The list of core items has been published (in Cm.918) and endorsed by the Treasury and Civil Service Select Committee. Once we start adding to it, it will become hard to resist adding further to the core so that more and more of the reports' contents were being prescribed by the Treasury. And a mandatory requirement might place some departments under pressure to divert resources to finding "green-looking" initiatives to report which were in fact of very little worth.

I wondered too, whether the basic idea would help a great deal with those pressing for an annual White Paper or statistical audit. Material in Departmental Reports is unlikely to give the sort of coverage they seek, and they would have to acquire twenty separate booklets to find it.

Be that as it may, I have no problems over DOE encouraging appropriate departments to include suitable passages in their reports, if you believe that would help. My concern is purely over a new mandatory requirement adding to the published core list.

I am copying this letter to other members of MISC 141, to Tom King and to Sir Robin Butler.

Your Sucrely

THE EARL OF CAITHNESS (approved by the Paymaster General and signed in his absence)



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10 DOWNING STREET LONDON SWIA 2AA

From the Private Secretary

2 July 1990

Dear Phillip,

GLOBAL CLIMATE CHANGE

The Prime Minister was grateful for your Secretary of State's minute of 29 June setting out what your Department is already doing to establish a CO₂ equivalent target for controlling emissions; and how your Secretary of State proposes to carry this forward. The Prime Minister is content with the approach he sets out and in particular that such a target should be presented in the Environment White Paper.

I am copying this letter to the Private Secretaries to members of MISC 141 and to Sonia Phippard (Cabinet Office).

Your sicordy,

Caroline Slocock

Phillip Ward, Esq., Department of the Environment.





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Treasury Chambers, Parliament Street, SW1P 3AG

The Rt Hon Christopher Patter MP Secretary of State for the Environment Department of the Environment 2 Marsham Street LONDON SW1P 3EB

2 July 1990

Dear Minister

ENVIRONMENT WHITE PAPER: ENVIRONMENTAL PROTECTION INSTITUTIONS

I am responding to your minute of 22 June to the Prime Minister.

Subject to the views of colleagues, I am content with your proposals with respect to these institutions, with one exception. The judgements made by HMIP are of course of considerable importance in determining the costs faced by industry, and it seems right that these judgements should be subject to political control. It seems to me that it would be premature at this stage to give a commitment to move to NDPB status for HMIP. It would be preferable to see how successful Agency status was, and to consult later on more radical moves including NDPB status. Subject to that, and to the qualification that any resource implications should be contained within the provision agreed between you and Norman Lamont in the Public Expenditure Survey, I should be content for you to proceed as you propose.

I am copying this letter to the Prime Minister and to members of MISC 141.

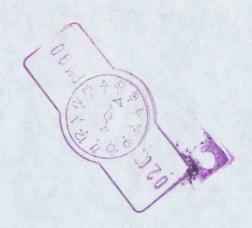
THE EARL OF CAITHNESS

Yours Jucerely

Capproved by the faymaster General and sugned in his absence

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ENV AFFAILS: ACO ROW PTIG.



LONDON OZONE CONFERENCE: STATEMENT BY RT HON CHRIS PATTEN SECRETARY OF STATE FOR THE ENVIRONMENT

With permission, Mr Speaker, I would like to make a statement about the outcome of the Second Meeting of the Parties to the Montreal Protocol on Substances that Damage the Ozone Layer, which the UK hosted and chaired in London last week under the auspices of the United Nations Environment Programme and which was opened by the Prime Minister.

I am delighted to say that the agreement reached at the meeting marks a major step forward in the global effort to deal with the ozone problem.

The Parties agreed that chlorofluorocarbons should be phased out by 2000, with intermediate cuts of 50% compared with 1986 levels by 1995, and 85% by 1997. We also agreed that halons should be phased out by 2000, except for agreed essential uses, with an intermediate cut of 50% by 1995.

These two agreements represent a substantial tightening of the controls in the Protocol. Before the London meeting the only requirements were a return to 1986 production and consumption levels by 1989/90 for CFCs and 1992 for halons, and a 50% cut for CFCs by 1998/99.

Controls on two other ozone depleting chemicals - carbon tetrachloride and methyl chloroform - were also agreed. Use of carbon tetrachloride will be phased out completely by 2000, with an intermediate cut of 85% by 1995. Use of methyl chloroform will be reduced to 30% of current levels by 1995 and 70% by 2000, and it will be phased out completely by 2005. Neither of these chemicals were controlled under the Protocol previously.

Despite this tightening, several countries including ourselves would have liked to have gone further and faster. In particular a number of countries argued that we should ban CFCs by 1997. We think that this would be a wholly acceptable target provided that there was an

exemption for essential medical uses - for example medical aerosols. We will be pressing the European Commission to bring forward an amending regulation to provide for this within the Community as soon as possible.

We will be returning to this issue on a global basis in 1992 - the parties agreed that there should be a review of the CFC controls then, with the aim of accelerating the phase-out schedule.

We also reached agreement on a financial mechanism under which developed countries will meet the incremental costs that developing countries incur in complying with the Protocol, and on the technology transfer that will be necessary to enable developing countries to do so. Governments cannot simply guarantee that technology will be transferred, because they do not own the technology. But provision was included in the Protocol so that if a developing country feels that insufficient financial support or transfer of technology threatens its ability to comply with the Protocol's provisions, it will be able to discuss this issue with the other Parties so as to find a solution.

Mr Speaker, the outcome of the London meeting is a unique achievement in environmental diplomacy. Never before has the international community reached agreement on this sort of package. It brings together tight controls on chemicals which have previously played a vital role in our economic development, financial support for developing countries, and a commitment to helping those countries adopt and adapt to the new technology that has to be employed in making and using substitute chemicals.

The fact that nearly 60 countries from the developed and developing world succeeded in reaching agreement on this issue, and that the Indian and Chinese delegations both said that they would recommend to their Governments that they join the Protocol, marks a new phase in international cooperation on major environmental issues. I believe that, having reached agreement on the ozone problem, we can now move on and try to reach agreement on the other more difficult environmental problems that we face, such as global warming.



2 MARSHAM STREET LONDON SW1P 3EB 071-276 3000

My ref:

Your ref:

Dominic Morris
PS/Prime Minister
10 Downing Street
London
SW1,

2 July 1990

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STATEMENT: CONFERENCE ON THE OZONE LAYER

I attach the text of a statement which my Secretary of State proposes to make to the House this afternoon.

I am copying this letter and the statement to Tim Sutton (Lord President's office), Murdo MacLean (Chief Whip's Office), Richard Gregory (FCO), Eamon Taylor (ODA) and Neil Thornton (DTI).

PHILIP WARD

Private Secretary

PART 16 ends:-

SS/6nv to PM 29.6.90

PART begins:-

DOE tO DM 2.7.90



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