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GLOBAL WARMING AND POLICY MAKING

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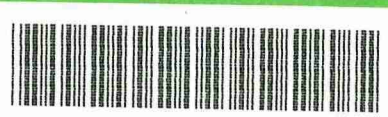

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GLOBAL WARMING AND POLICY MAKING

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Summary

This paper outlines some of the major policy issues raised by the prospect of global warming. Scientific uncertainty create political disputes concerning risks and costs, about the trade-off between short-term welfare considerations and long-term conditions. Furthermore, they involve key issues of global distribution between developing countries and developed countries. The scientific uncertainties and issues are outlined with a view to identifying the policy dilemmas involved in energy policy. The paper concludes by making a plea for a global outlook and prudent action.

GLOBAL WARMING AND POLICY MAKING

The phenomenon of global warming has attracted broad public attention.[1] The issues involved are enormously complex. The base reaction is probably rooted in human humility and awe, in the notion that human intervention into the spheric order of our planet is dangerous, deplorable and doomed, an expression of human hybris. The scientific uncertainties involved strengthen rather than weaken this attitude. How de we handle uncertainty? Who gets the benefits of doubt? How do we trade off the welfare of the present generation against the possible detoriation in the conditions shaping the lives of future generations? How do we allocate the costs of prevention among a few have - and many have-not nations? If there are winners and losers from global warming, by what right can we arrange such a gigantic game of chance? To what extent are policies determined by alternative approaches to the challenges posed by scientific uncertainty and to what extent are those approaches determined or mediated by ideological positions on the role of government and assumptions about the self-correcting propensities of the market? It is important to recognize the political issues and frames of reference involved.

I am not a physical scientist and I shall not attempt to adjudicate the many issues involved in the disputes which have emerged. However, those disputes constitute a political datum of considerable import, scientific disputes about global issues become matters of politics, generate policy issues which can only be resolved in the political market place. Political decisions are almost invariably decisions under uncertainty, propelled by the necessity for choice. Scientific investigation can reduce uncertainties, not eliminate them. In the case of global warming policy makers confront uncertainty among climatologists and geophysicists. Let me describe the dilemmas presented by facts and uncertainties as they arrive in the political arena.

In the physical world both people and natural systems transport and transform large amounts of carbon, nitrogen, and other materials, as well as energy. Nature has played the predominant role throughout history. Following the industrial revolution, however, the scale of human activity has grown rapidly and in some instances equal that of fundamental natural processes. Human generated release of carbon into the atmosphere has not reached the same proportion of the total as human induced fixation of nitrogen. However, it is growing and many would claim at an alarming rate, accounting for something in excess of 7 per cent of the total natural carbon exchange between the atmosphere and the oceans. About half of the increase caused by human activity comes from carbon dioxide (CO_2), mainly from the burning of fossil fuel and deforestation. Chlorofluorocarbons (CFC's) which are used in foams, aerosols, refrigerants and solvents account for about one quarter of the releases. Methane (CH_4) from wetlands, ricepaddies, livestock and fossil fuels is another significant contributor, as is nitrous oxide (N_2O) from fertilizers, deforestation and fossil fuel. The prevailing consensus is that the concentration of these gases will reach the equivalent to a doubling of CO_2 by the middle of the next century. The pre-industrial concentration of carbon dioxide in the atmosphere was around 280 parts per million parts of air by volume (ppm). It had reached 340-350 ppm by 1980 and is presently increasing at a rate of 2.5 ppm per year.

It is generally asserted that doubling of the CO_2 concentration in the atmosphere could lead to a rise in the global mean temperatures in the range of 1.5°C- 4.5°C. A change of this scale has not occurred in the history of human civilization. The Little Ice-Age which produced several frigid centuries from the 1400's to the 1800's and, incidentally, rendered the Nordic settlements in Greenland unsustainable, involved a mean temperature drop of around 1°C. Predictions about changes in temperature are imbued, however, with large

uncertainties.

Predictions about global warming, about the relationship between CO2 concentrations in the atmosphere and temperature, derive from extremely difficult and tentative scientific efforts at modelling complex systems. Climatic modelling on a global scale requires not only that the computer be fed a large number of variables, many of which cannot be precisely measured, but also, and equally important, that the complex and frequently nonlinear interactions among the variables be properly assessed. The policy-maker has to contend with the fact that the complexity of the atmosphere may defy adequate representation through mathematical models. Even if we should obtain a much better understanding than currently exists about the interaction between the oceans and the atmosphere, about variations in the uptake of CO2 in the oceans, about the exchange of energy between the earth and the atmosphere, etc. even the largest computers are unlikely to be able to represent the biosphere in the detail required to make precise prediction.

We know that the atmospheric lifetime of greenhouse gases varies. Gases with long atmospheric lifetimes (CO2, N2O, CFC's) will respond slowly to changes in emission. Methane will respond on a time scale of a decade. It contributes substantially less to the greenhouse effect than CO2. However, because of its short lifetime reduced CH4 emissions would produce a faster response in the atmospheric concentration than a similar reduction in CO2. [2]

Much attention is focused on the mean rise in surface atmospheric temperature as a result of CO2 concentration. However, it is the change in temperature differential between the polar and equatorial regions which will constitute the engines of climate change. Present models agree that the polar regions would undergo greater increases in temperature than the tropical regions. We do not know the scale or dynamics of

the changes, nor how the precipitation belts would be affected. Substantial uncertainties prevail concerning the relationship between global warming and sea-level rise. A point to be made here is that the prospects of possible climate change affect the economic viability of large investments based on the implicit assumption of stable climate patterns. This uncertainty is also part of the policy making conundrum.

Such risks and uncertainties are compounded by another unknown. The implicit assumption in much of the policy discussion is the idea that climate change will be gradual and orderly. That assumption may reflect the inadequacy of existing models and present knowledge about complex interactions which shape our climate. We cannot exclude, however, the possibility that change may be discontinuous, that critical thresholds will assert themselves as the composition of the atmosphere is altered as a consequence of human activity.

How should our political systems respond to the challenges inherent in the prospects for global warming and climate change? The answers are not simple and, predictably, governments, political parties, interest groups and experts have drawn differing conclusions from the uncertainties involved. Some claim that the consequences of the most dire model predictions are so alarming that immediate and decisive action is required. Others claim that it would be unwise to enter into commitments with vast social and economic consequences in the light of present uncertainties concerning both the scientific foundations and economics involved.

The heat-trapping properties of the greenhouse gases are well known and their build up in the atmosphere is well documented. It is entirely possible that climate change could be less and occur later than frequently predicated, but by the same token it could also be more and occur sooner. This argues in favour

of prudent action, even urgent action.

The design of prudent or urgent action is, however, far from simple, in view of the scale of the transformations required to produce significant reductions in CO2 concentrations, particularly in regard to patterns of energy consumption. The OECD-world and Eastern Europe account for almost 75 per cent of the global carbon dioxide emissions. The developing world can ill afford the financial investments involved in CO2 curtailment, and the priorities in Eastern Europe may well go in different directions in order to prevent an economic collapse which could undermine the legitimacy of the democratic revolutions.

Responsibility for the long term prevention of international disruptions through global warming will rest with the OECD world in the foreseeable future. Ability to meet that challenge will depend in large measure on economic priorities and the political impact of competing challenges. The last Labour government in this country proposed the establishment of a World Climate Fund and declared its willingness to contribute 0.1 % of Norway's GNP to such a fund if the majority of industrialized nations would heed the challenge. [3]

It will probably be possible to remove the contribution to the greenhouse effect from CFC's and industrial gases as called for by the Montreal Convention. The Intergovernmental Panel on Climate Change (IPCC) has been established to assess the state of knowledge about climate change, its impact and available policy responses. Furthermore, a broad consensus seems to envelop no-regret policy steps which will be beneficial in any event. They involve shifts in the fossil-fuel mix from coal and oil to natural gas which would reduce CO2 emissions per thermal unit, and to technologies for more efficient power generation. Reforestation and forest preservation also constitute policy actions which would yield climatic benefits. Such steps, however, will not solve the climate-warming

problem. That is why many governments and political parties, including the Norwegian Labour Party, favours the early completion of a framework agreement on climate change and the development of protocols which also deal with greenhouse gases (GHG) and forestation to be signed no later than at the 1992 Conference on Environment and Development. [4] Furthermore, it favours international commitments to stabilization of CO2 concentrations at least by the year 2000, a target which will require substantial reductions in CO2 emissions in view of the slow response time to past emissions of greenhouse gases and uncertainties connected with the removal of CO2 from the atmosphere.

In the world of political action it should be recognized, of course, that our scientists really do not know how large must be the reductions in carbon emissions in order to stabilize CO2 concentrations in the atmosphere. However, the scale is surely substantial and will require shifts away from coal and oil towards natural gas, hydropower, and, some would argue, nuclear energy. The latter, however, raises a host of problems concerning reactor safety and nuclear waste disposal. In addition, there is the problem of proliferation of nuclear weapons, a problem which is likely to grow in international urgency and prominence with the waning of the cold war. Shifts and substitutions will require time and investments and are likely to prove insufficient to achieve CO2 stabilization. 80 percent of the world's energy consumption is based on fossil fuels. Pricing and taxation should be tailored to the objective of reducing energy consumption and shifting it to less polluting alternatives. Hence, more efficient energy technology is also needed, both in terms of power production and end-use equipment. In addition, the power generating technology should not be as capital intensive in investment requirements as present nuclear power plants. Gas turbines could well involve comparative advantages.

The relevance of fixing quantitative targets concerning CO2

stabilization can be questioned, of course, in the light of prevailing scientific uncertainties. However, such political commitments have galvanizing and mobilizing effects highlighting priorities and stimulating adaptation and intervention. Strategies and targets should be constantly reexamined and refined, of course, in the light of experience and progression on the learning curve. Percentage targets cannot substitute for the development of cost-effective stabilization strategies. They provide indicators of political commitment rather than components of strategy. As we know from the field of development assistance policy, percentage targets have a tendency to develop independent lives largely unrelated to considerations of effectiveness in relation to over-all objectives. National targets, in addition need to be adjusted to the evolving global patterns. There is no Norwegian solution to the problem of global warming.

As a major producer of natural gas and a highly developed industrialized nation Norway should possess the incentives as well as the know-how to make significant contributions to meeting a major global challenge.

Stabilization of CO2 concentrations in the atmosphere will involve a major effort at redistribution in international society in favour of the developing countries whose development depends on increased consumption of energy. It is part of our common challenge to assist developing countries by the transfer of technology for sustainable energy production, environmentally benign and affordable technologies. [5] Since the problem of global warming constitutes a global challenge the optimum solution would be for nations to invest in stabilization in areas where the marginal productivity would be the highest independent of national borders. However, the international system is highly fragmented and in most areas based on the territorial state as the decision-making unit and primary political frame of reference. The need for a system approach collides with the rules and propensities of the

political universe. Increasingly the present structure of international society, the predominant role of the territorial state, tends to produce at best sub-optimum solutions, frequently mutually incompatible and cancelling solutions, and sometimes indulgence in beggar-thy-neighbour policies. The problems will be compounded by population growth and the growing pressures from human migration. Global warming could significantly increase the latter pressures. Effective environmental policies require a global outlook and an integrated view of the structure and tensions of spaceship earth. National views tend to confine vision and stimulate introspection. A broader community approach is needed if we are to ensure our common future.

NOTES

1. The literature on global warming is extensive. See e.g. Bert Bolin and Bo R. Doos (eds.) The Greenhouse Effect, Climatic Change, and Ecosystems, New York, John Wiley & Sons, Inc. 1986. Stephen H. Schneider, "The Greenhouse Effect: Science and Policy", Science, Vol. 243, No. 4892, February 10, 1989, pp. 771-781. Robert M. White, "The Great Climate Debate", Scientific American, Vol. 263, No.1, July 1990, pp. 36-43. Report by a Commonwealth Group of Experts, Climate Change: Meeting the Challenge, Commonwealth Secretariat, Marlborough House, Pall Mall, London, 1989. Conference Statement, The Changing Atmosphere: Implications for Global Security Toronto, Canada, June 27-30, 1988; Ottawa, Environment Canada, 1988.

2. Ivar S.A. Isaksen, "Management of Global Climate Change: The Need for Reduction in Greenhouse Gas Release", Sustainable Development, Science and Policy. The Conference Report, Bergen 8-12 May, 1990, Oslo, The Norwegian Research Council for Science and the Humanities, 1990, p. 83.

3. The policy perspective is developed in St.meld. Nr. 46 (1988-89). Miljø og utvikling: Norges Oppfølging av Verdenskommisjonens rapport, particularly pp. 57-59.

4. See Action for a Common Future, Conference Report, Bergen, Norway 8-16 May 1990, Oslo, Ministry of Environment, 1990, pp. 26-27 and 35-36.

5. This perspective on the challenges permeate The World Commission on Environment and Development, Our Common Future, Oxford, Oxford University Press, 1987.

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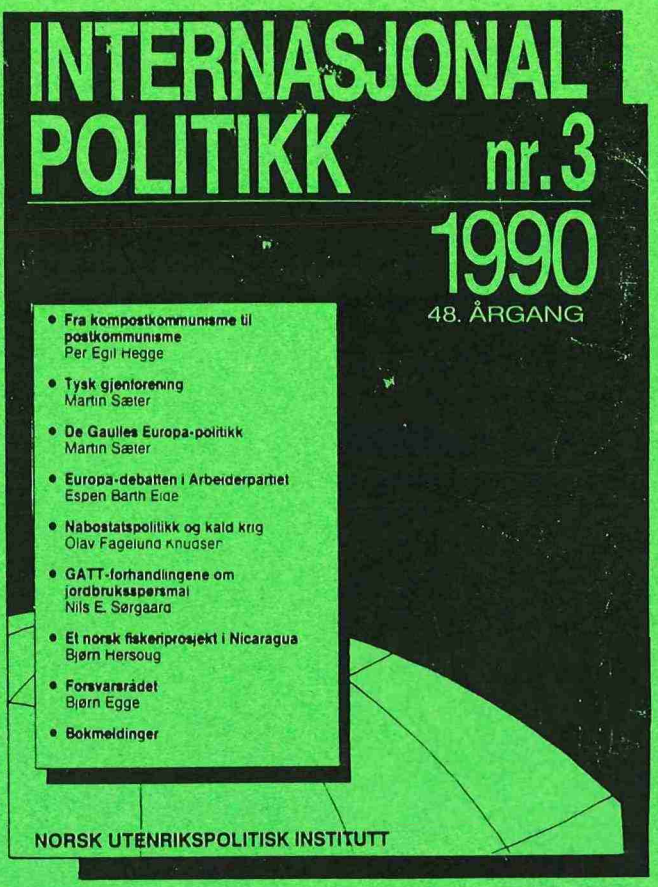

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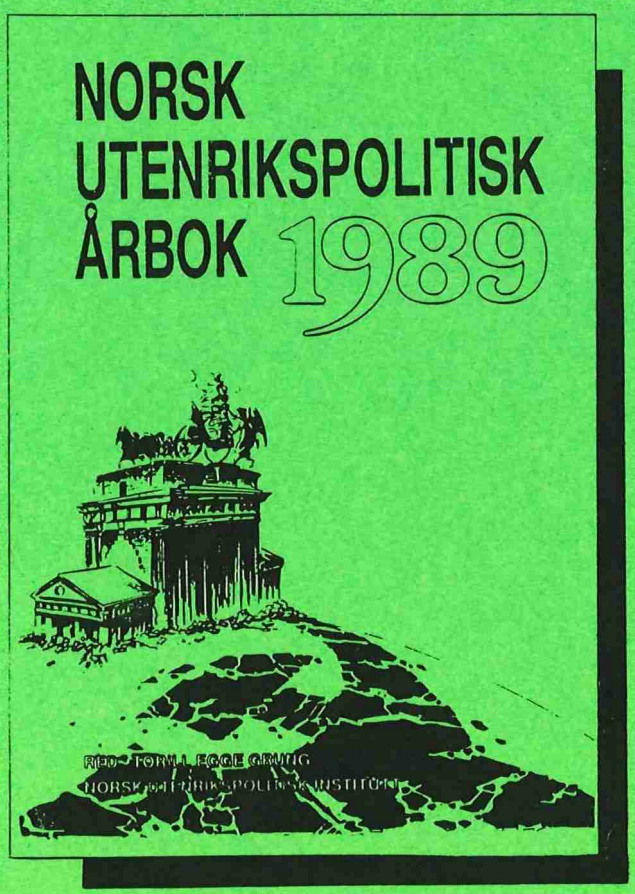

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