



CICERO

Center for
International
Climate and
Environmental
Research - Oslo

Annual report

1996



UNIVERSITY
OF OSLO

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1. CICERO

In the late 1980s, the Norwegian government expressed the desire to support international endeavors related to the world's climate. As a follow-up to the World Commission on Environment and Development, CICERO was established in April 1990.

Initially, the acronym CICERO referred to the Center for International Climate and Energy Research - Oslo. To better reflect its broader scope of research activity, the name was officially changed to the Center for International Climate and Environmental Research - Oslo, in 1995.

CICERO was established as a private non-profit organization with the University of Oslo as founder. The leader of CICERO's first Advisory Board was Gro Harlem Brundtland, then Member of Parliament. The Center's first director was Ted Hanisch (1990-93), followed by Helga Hernes (1993-96) and - starting in 1997 - Knut H. Alfsen.

In addition to establishing a multi-disciplinary approach to the research fields related to climate and environmental policies, two main goals were identified:

- To develop the research basis for initiatives in national and international climate policy

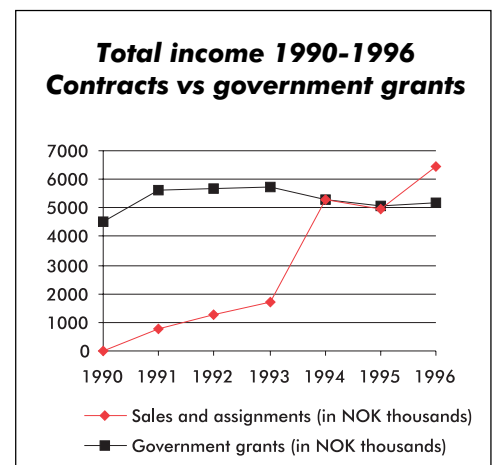
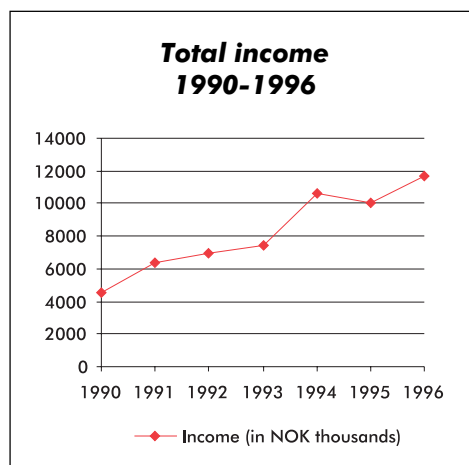
- To keep politicians, government, business, educational systems, media, the public and the international community informed about the development of international climate policy

The research activity is funded jointly by grants from the Norwegian Government, and national and international funding partners such as the World Bank, The United Nations Environment Program (UNEP), the European Union, and the Research Council of Norway.

CICERO now pursues activities in the areas of research, policy advice and information on national and international climate policy and environmentally related topics.

In order to solve the problems of pollution from emissions, there must be international cooperation. Research in the areas of the natural sciences, economics, and politics is needed to give policy-makers the best possible information on which to base decisions affecting the Earth's climate. This is the premise for the research at CICERO.

CICERO's foremost strength is its multidisciplinary approach. The Center includes personnel with competencies in the natural sciences, economics, political science and sociology.



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2. The CICERO-year 1996

CICERO's Director since the Autumn of 1993, Helga Hernes, resigned in August 1996. Assistant Director and Research Coordinator Kjell Arne Hagen was acting director until January 1997, when Knut H. Alfsen was appointed. The vacant position was announced in international scientific journals. The last position held by Alfsen was as Director of Research in the Division for Resource and Environmental Economics in *Statistics Norway* (Statistisk sentralbyrå).

Staff

During 1996, 31 people were affiliated with CICERO, 24 of whom were employees contributing a total of 18.8 man-years. At the end of 1996 CICERO had 23 employees, two people as conscientious objectors - fulfilling their national obligations, and one post-graduate student. See page 20 for a complete list.

Key economic figures

Due to increased activity in all parts of the organization, CICERO's funds were strengthened by 13.8% in 1996. The Center improved its financial position, ending the year with a degree of liquidity of 4.12, and available funds representing 76.8% of total liabilities, funds and transfers.

CICERO's earnings in 1996 were NOK 724,268. The Center's total funds at year-end were 5,944,568. The result from 1996 will be transferred to the operating fund which, after inclusion of the net result, will amount to 5,894,568. The working result of 1996 was 468,831, compared to a negative balance at the end of 1995 of 213,093.

The core government grant of total income in 1996 was 43.6%. This continues the trend in reducing the amount of government support required which in 1993, 1994 and 1995 was 73.5%, 49.2% and 49.4% respectively.

Contract revenues from international funding partners amounted to 21% of 1996 funding, 12% of which came from the

UNEP and 9% from the World Bank. Norwegian funding consisted of 15% from ministries and 9% from the Norwegian Research Council.

Research and publications

The researchers at CICERO are organized in three groups: Economics, Natural Sciences, and Political Science and Sociology. Budget and administrative responsibilities are delegated to each group. At the same time, CICERO is a multidisciplinary matrix organization. The main activities - the research projects - are most often conducted by research teams composed of members from two or three of these different groups. This model was designed to further develop CICERO as an academic research center which gives opportunities to combine the multidisciplinary approach with a strong basis in the researcher's own discipline. Researchers at CICERO must be able to combine and interpret both basic and applied research to formulate policy advice to the Norwegian government and international organizations.

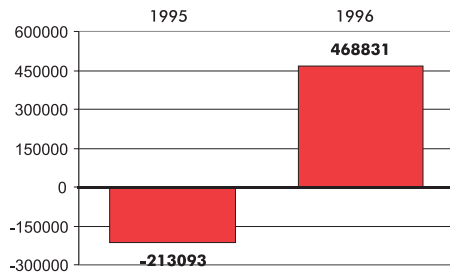
In 1996, CICERO introduced an organization model assigning research directors for six core-areas. The areas are:

- Indirect Effects and Feedbacks of Greenhouse Gas Emissions
- Burden Sharing
- Joint Implementation of Climate Measures
- Negotiations
- Integrated Assessment of Pollution Control
- Consequences of Climate Change on Natural Resources and Society

The so called strategic institute program, which is part of the basic government fund, is linked to two main areas of work: Global Environmental Problems with an Emphasis on Climate, and Regional and Local Environmental Problems and Adaptation to Climate Change. These programs are meant to secure long-term development of the center. Priority is given to development of

Staff
Key economic
figures
Research and
publications

Operating results (in NOK)



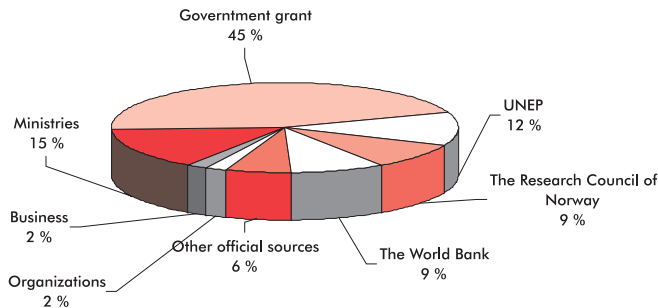
multidisciplinary methods, qualifying projects and international publications.

In 1996 CICERO published three working papers, eight reports and three policy notes in its own series. These figures are lower than in preceding years. However, the list of external publications grew significantly. The staff has an extensive list of publications in academic journals and books. There was also a significant increase in the numbers of presentations, interviews, newspaper articles, and so forth.

Research cooperation

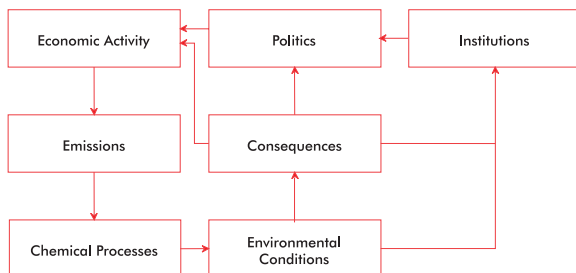
The close relationship CICERO enjoys with the University of Oslo, both through the physical location and the staff's affiliation with different departments, is of special importance in a field where applied and basic research are integrated. This affiliation is of strategic importance and gives mutual benefits. The cooperation with the University is formalized through different agreements. CICERO staff members teach and supervise post-graduate students in cooperation with the different departments. Three of the senior researchers, and one researcher, have positions at the University. The four research fellows at CICERO all participate in the organized doctoral candidate program at the University. One of the research fellows submitted her thesis in 1996.

Funding partners



Apart from the University of Oslo, CICERO cooperates with other research centers to gain mutually beneficial international contacts. Keeping in mind the intention of the Norwegian government, a special task for CICERO is to assist the national coordination of Norwegian research on climate and energy policy. The research program SAMRAM - Norwegian Energy and Environmental Policy: Constraints, Opportunities and Instruments - was started in 1996 and is coordinated by CICERO. The program is funded by the Research Council of Norway.

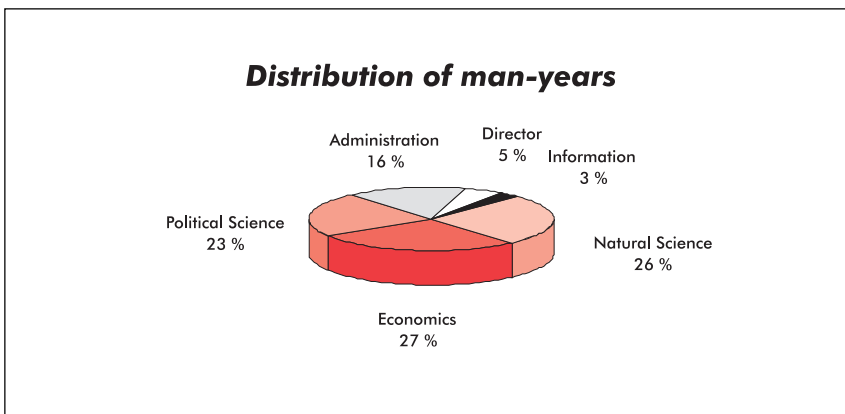
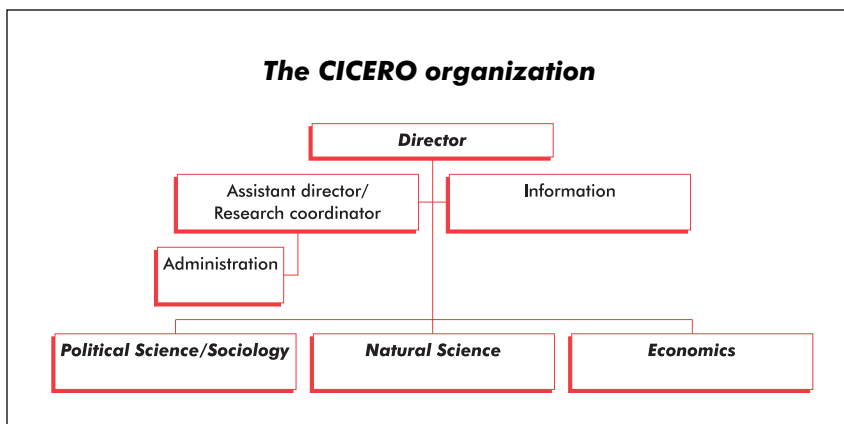
The system in which CICEROs research concentrates



A closer cooperation with the Fridtjof Nansen Institute was developed in 1996.

Continues....

This was made possible through a special fund set up by The Research Council of Norway to improve cooperation among the foreign policy oriented institutes in the Oslo region. The same fund and additional grants from the research program SAMRAM will help strengthen the cooperation in 1997.



**...Research
cooperation
Organization**

A CICERO initiative in 1993 resulted in the foundation of the Norwegian Consortium for Energy and Environment (NORCE) to better its members competitiveness in the international market. Apart from CICERO, the members of the consortium are the Center for Economic Analysis (ECON), the Fridtjof Nansen Institute (FNI), the Institute for Energy Technology (IFE), and the Norwegian Institute for Air Research (NILU). The consortium works on projects within environmental analysis and energy policies, with special emphasis on pollution, climate and energy economics, on global, regional and national levels. The board of directors was chaired by Helga Hernes until she left CICERO. The activities of the consortium have so far failed to meet expectations regarding volume, and different models for continued activity will be discussed in 1997.

International research cooperation is a necessity in the fields of work in which CICERO is engaged. The network of international partners is of considerable size. The cooperation, however, is seldom on the level of the institutions, but more often conducted on an interpersonal basis.

Organization

In 1995 the organization of CICERO was changed substantially. Among other things, leaders of each group were given greater responsibility for the economic management of the center. 1996 was the first year in which the new system was tested and the results have been very promising. The system was established as a result of external recommendations suggested by the guidelines given by the Research Council of Norway, but also as a result of an internal need for a more effective economic management system.

In 1996 CICERO became a member of the Federation of Knowledge and Contract Research, an association of the Confederation of Norwegian Business and Industry (NHO).

3. Projects

Completed Projects

The Value of Climate Measures

The study surveys the literature on the economic costs of climate policy in different countries and world wide.

Studies of costs to achieve national targets on emissions are partly based on bottom-up approaches, where the availability of new, or alternative, technologies is emphasized. These indicate that emissions of carbon dioxide (CO₂) may be reduced by up to 50% in some countries at low, sometimes negative costs.

Top-down studies tend to indicate higher costs, at least in developed countries. A 10% reduction in CO₂ emissions within the next 15 to 20 years is expected to result in a reduction ranging from 0.5% to 1.5% in GDP. Due to the impact of assumptions on the results, it is difficult to compare the costs among countries.

Most cost-benefit analyses of climate change policies prescribe only very moderate action now. This depends to some extent on the expected damage caused by climate change. The most significant factor for the assessment of benefits is, however, the choice of discount rate. There is little consensus about the proper choice of this rate.

Documentation: CICERO Report 1996:1

Project leader: H. Asbjørn Aaheim

Funding: The Norwegian State Pollution Control (SFT)

Keywords: Climate policy, climate costs

Climate Policy, Burden Sharing and the Nordic Countries: Present State of Analysis and Need for Further Analysis

This report examines the state of analysis with respect to burden sharing in the light of the ongoing negotiations among the Parties to the Climate Convention. The main focus of the report is on the energy situation in the five Nordic countries. After defining the

concept of burden sharing, the main ethical principles and most relevant burden sharing rules in the analytical literature are examined. An assessment is made of future research needs. Finally, the emission profiles, energy structure, and probable abatement costs for each Nordic country are examined.

Documentation: CICERO Report 1996:2

Project leader: Lasse Ringius

Funding: Nordic Council of Ministers' Ad Hoc Group for Energy-Related Climate Issues

Keywords: Climate policy, burden sharing, Nordic countries

Exploring Distribution of Commitments: A follow-up to the Berlin Mandate

The study reviews and analyzes some major issues that must be considered when defining principles for distributing commitments to reduce greenhouse gas emissions for countries belonging to the Organization for Economic Cooperation and Development (OECD).

The study is divided into three main parts, where the first discusses the concept and measurement of costs, the second analyzes the negotiations and burden sharing rules, and the third analyzes the handling of a mix of greenhouse gases. The study shows that removal of subsidies on fossil fuels or minimum fossil-fuel taxes have advantages in terms of cost-effectiveness and fairness compared to quantified national reduction commitments. The calculations suggest that a moderate climate policy is optimal, but a more ambitious climate policy is favorable if emissions abatement is relatively inexpensive or climate-change effects are uncertain.

The burden sharing rules examined have quite different consequences for the OECD countries depending on the choice of rule and weights of the criteria included. Due to the lack of reliable methodologies and uncertainties in the understanding of

Completed projects 1996

the mechanisms of some gases, not all climate gases should be included in the negotiations.

Documentation: CICERO Report 1996:3

Project leader: Asbjørn Torvanger

Funding: The Ministry of Finance and the Ministry of Environment

Keywords: Climate policy negotiations, burden sharing

A Comprehensive Approach to Climate Change: Options and Obstacles

The principle of comprehensiveness constitutes an important element in the climate convention, but guidelines as to how this principle is to be understood and implemented are not provided. In this analysis the meaning of this concept within the context of climate change is investigated: How should “comprehensiveness” be defined and operationalized and which scientific considerations need to be taken into account?

Understood as an approach by which all greenhouse gases are juxtaposed and parties are permitted to choose their individual reduction paths within a common framework, the comprehensive approach may constitute an important element in the development of adequate solution design models for a climate regime.

The study discusses the criteria necessary for deciding which gases to include in a comprehensive approach, and, based on these criteria, a set of gases is proposed. The study also examines the requirements a method for comparing gases with different properties must fulfill in order to be able to employ a comprehensive approach as proposed. Estimations of the relative contribution of a particular gas to the enhanced greenhouse effect are very dependent upon the chosen time horizon. Moreover, the choice of horizon is linked to the kind of effect with which one is concerned. Thus, the selection of the time horizon is a choice with significant envi-

ronmental and policy implications. Determining time horizons may prove to be difficult, and should be handled with care within the scientific, technical and political bodies of the climate convention.

There may be a lot to gain politically by adopting and developing a comprehensive approach, although it should be emphasized that a comprehensive approach may complicate, and most probably prolong, the negotiation process. There is a set of difficult questions, which have to be settled among contracting parties in order for this approach to work as intended.

Documentation: CICERO Report 1996:4

Project leader: Jan Fuglestedt

In collaboration with: Tora Skodvin

Funding: The Norwegian Ministry of Foreign Affairs

Keywords: Climate change, comprehensive approach, selection of climate gases, GWP

Feasibility Study on: Reforestation of Degraded Grasslands in Indonesia as a Climate Change Mitigation Option

Deforestation and changes in land use in the tropics contribute a significant share of the anthropogenic emissions of greenhouse gases, of which the most important is carbon dioxide (CO₂). Increasing the uptake and storage of carbon in the terrestrial biosphere through reforestation has been proposed as one strategy to counteract the atmospheric build-up of greenhouse gases.

This study investigates the feasibility of reforestation of degraded Imperata (alang-alang) grasslands in Indonesia as a climate change mitigation option. A primary objective has been to discuss reforestation in a local perspective, as previous experiences have demonstrated that proper attention to social aspects and issues relevant to the local communities is key to the success of reforestation. Man-made Imperata grasslands in Indonesia cover at least 8.6 million hectares of land of variable production potential. The grasslands have been spreading on former forest lands as a

...Completed projects

result of logging and slash-and-burn cultivation, and are sustained by regular burning.

Documentation: CICERO Report 1996:5

Project leader: Arne Dalfelt

Funding: Directorate for Nature Management, the Ministry of Environment

Keywords: Indonesia, reforestation, carbon sequestration

Climate Agreements under Limited Participation, Asymmetric Information and Market Imperfections

Marginal abatement costs differ among countries. A climate treaty that specifies fixed emissions reductions for the different countries that participate will therefore, in general, not achieve a cost-effective distribution of abatement across countries. International taxes on carbon dioxide (CO₂), tradable quotas and joint implementation (or other kinds of sidepayments) have often been suggested as policy instruments in an international climate treaty because they can reduce the total cost of achieving a certain global target for emissions relative to “fixed reduction” types of agreements.

The cost-effectiveness of taxes, tradable quotas and joint implementation or other kinds of side-payments may be reduced in the case of limited participation in the climate treaty, asymmetric information and market imperfections. The thesis points out how these factors influence the cost-effectiveness and the optimal design of the policy instruments.

Documentation: CICERO Report 1996:6

Project leader: Cathrine Hagem

Funding: The Research Council of Norway

Keywords: Climate agreements, joint implementation, asymmetric information, CO₂-taxes.

Work-sharing, Unemployment and Environmental Policy

The aim of the project is to discuss the links between technological development,

unemployment, work sharing and some environmental issues. The discussion explores whether reduced working hours in general are likely to generate reduced pollution and other environmental benefits. Although several environmental problems are mentioned, the focus is mainly on greenhouse gas emissions.

The conclusion is that there might be some environmental gains from reduced working hours in the short term, but this conclusion is not robust. In the discussion of the long-term consequences, the importance of technological development is emphasized. Especially in connection with global warming, for example the technological development within new renewable energy production is of special interest. In the literature on endogenous growth the role of the working force and “learning by doing” are emphasized. A simple model with endogenous technological development is used to illustrate that there is a risk that reduced working hours could make reductions of greenhouse gas emissions more difficult.

Documentation: CICERO Report 1996:7 and Working Paper 1996:3

Project leader: Bjart Holtmark

Funding: The Norwegian Ministry of Environment and the Norwegian Ministry of Local Government and Labour

Keywords: Climate change, work sharing

Climate Change in Africa: Issues and Challenges in Agriculture and Water for Sustainable Development

This report is primarily focused on the issue of how the World Bank can modify its projects, especially in the agriculture and water resources sectors, to prepare for future adverse effects of changes in climate. The report explicitly addresses the issue of adapting to adverse impacts of global climate change and suggests conceptual tools and methodologies that might be useful for developing the World Bank’s adaptive policies and response strategies. It

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proposes an adaptive policy framework and presents a menu of adaptive policy options. Prepared by a team of experienced analysts and policy advisors, the report examines, in particular, the practical adaptation and adaptive policy responses to climate change effects in Africa.

Two overall adaptation strategies are suggested: (1) improvement of present resource management, and (2) reduction of vulnerability to climatic hazards. In addition, where large projects and development might increase vulnerability to climate change, specific, anticipatory adaptation may be warranted.

Documentation: CICERO Report 1996:8

Project leader: Lasse Ringius

In collaboration with: Environmental Change Unit – Oxford University, Climatic Research Unit - East Anglia University, Hydrological Institute, England.

Funding: The African Technical Division, World Bank/The Norwegian Government

Keywords: Climate effects, climate damages, adaptation, Africa, water resources, agriculture, climate models, World Bank, global overlays

On-going projects

AEROCHEM

The overall objective of the AEROCHEM project is to study how past, present and future aircraft emissions affect ozone in the upper troposphere and lower stratosphere. These studies can act as a basis for decisions on emission standards for future aircraft operations.

Subsonic aircraft flying in the upper troposphere and frequently in the lowest few kilometers above the tropopause emit compounds like nitrogen oxides (NO_x), stratospheric water vapour (H₂O) and sulphur dioxide (SO₂), which could significantly affect the chemical composition of these two regions. For the upper free troposphere observations have shown an

ozone increase for the last two decades. Aircraft emissions will enhance ozone production in the upper troposphere through the NO_x chemistry. The main project tool will be global three dimensional (3-D) chemical tracer models (CTMs) where large scale ozone distribution and changes due to aircraft are calculated. CICERO will use the 3-D CTM developed at the Institute of Geophysics (University of Oslo) to study the impact of future aircraft emissions and, in particular, how this is influenced by deep convection. The results will serve as input to radiative forcing and climate models to estimate climatic effects.

To be completed: 31.12.97

Researchers: Ivar Isaksen / Terje Berntsen

Funding: EU

Keywords: Aircraft, tropospheric chemistry, global modeling

Air Pollution, Climate Change and Energy Production: Decision Analysis Tools

The project aims to contribute to the development of methodology for analyses of cost-efficient abatement of air pollution. Among other things, it examines methods for estimating risks (dose-response approach) for short- and long-term health effects, evaluation of environmental damage, and ranking of abatement measures. The methodology is tested by carrying out a case-study in Hungary.

The project is part of a larger interdisciplinary project to develop a decision support tool for ranking pollution abatement measures. The starting point is that different environmental problems should be considered in an integrated way because abatement measures usually contribute to reduce several environmental problems simultaneously (for example green house gas emissions, acidification of soil and water, and air pollution induced effects on health, vegetation and materials). Hence, an integrated approach is likely to increase the efficiency, in terms of the benefit/cost ratio, of abatement strategies.

...Completed projects

Ongoing projects

The project will mainly concentrate on the relationship between exposure and damage, monetization of damage, and how to treat the uncertainties arising in all steps in the analyses. The approach is applied to a case-study of air pollution problems from energy use in Hungary.

To be completed: Spring 1998

Doctoral thesis: Kristin Aunan

Funding: The Research Council of Norway

Keywords: Integrated assessment, air pollution, health effects, dose-response functions

Air Quality Management and Planning System for Guangzhou, China

This is a NORCE project led by the Norwegian Institute for Air Research (NILU) to help Chinese authorities plan actions against air pollution in Guangzhou, to transfer knowledge useful for estimation of pollution-related effects, and to facilitate decisions on policy measures. CICERO's contribution includes studies of effects on health and vegetation from local air pollution.

Estimates of the frequency of health effects of air pollutants in different parts of the city will be carried out using dose-response functions from the literature. The transferability of the functions will be studied by comparison with results based on available health statistics and on epidemiological studies carried out within the framework of the project. The Chinese partners are responsible for supplying health statistics.

Estimates of damage to crops (particularly by ozone) will also be based on established dose-response functions. In addition, soil acidification and contents of toxic metals in crops will be studied.

To be completed: Autumn 1999

Researcher: Kristin Aunan, Hans M. Seip

In collaboration with: Norwegian Institute for Air Research (NILU) - Steinar Larssen

Funding: Norwegian Agency for Development Cooperation (NORAD)

Keywords: China, damage assessment, cost-benefit, vegetation, health, effects, measures

China Council for International Co-operation on Environment and Development: The Working Group on Resource Accounting and Pricing Policy

The project is a feasibility study for a pollution abatement analysis for the Chongqing area. It reviews existing literature concerning environmental quality and damage effects associated with the current levels of pollution in Chongqing.

The project focus on problems related to air, water, waste, and aim to identify lack of knowledge in these fields. In the end it will propose a study of a comprehensive abatement analysis.

To be completed: Spring 97

Researchers: Kristin Aunan, Hans Martin Seip and Asbjørn Aaheim.

In collaboration with: Kjell Roland (project leader) Center for Economic Analysis (ECON)

Funding: China Council for International Co-operation on Environment and Development

Keywords: Pollution abatement, China, Chongqing

Climate Change in Africa: Issues and Regional Strategy

The objective of this project is to assist the World Bank in developing guidelines and methods for assessing climate change vulnerability and the corresponding adaptation options in Africa.

The project will evaluate the extent to which the World Bank is paying attention to possible climate change issues, and the ways in which it can improve upon this situation. Areas vulnerable to climate change in Africa will be identified and draft guidelines will be developed for World Bank activities in these areas. The

...Ongoing projects

guidelines will be tested in a small number of countries. Institutional strengthening and capacity building will be part of the program, as well as assistance to African countries in networking climate change information.

To be completed: The first phase of the project was completed by the end of 1996. A second phase is under preparation.

Project leader: Arne Dalfelt

Researcher: Lasse Ringius

In collaboration with: University of Oxford, University of East Anglia.

Funding: The World Bank (Trust fund from Norway)

Keywords: Climate change, vulnerability, World Bank guidelines

A Comprehensive Approach to the Analysis of Climate Policy

The project studies optimal policy in a comprehensive approach. A comprehensive approach means that all relevant sources, sinks and reservoirs of climate gases are subject to policy evaluation.

Two issues become central for such an analysis. One is how to aggregate emission of climate gases, and the other is how to represent all relevant measures. The question of aggregation suggests an intertemporal analysis, and the question of measures suggests that so-called “direct measures” are specified.

A numeric analysis based on an optimal control model indicates that direct measures may play an important role in the design of climate policy, particularly if the target is moderate. Moreover, in order to achieve targets for the concentrations of greenhouse gases, most of the efforts should be taken by the end of the period in question. This applies, in particular, if gases with short life-time in the atmosphere, such as methane, are subject to control.

To be completed: 15.2.97

Project leader: H. Asbjørn Aaheim

Funding: The Norwegian Ministry of Finance and Customs

Keywords: Global warming, policy measures, optimal control

Cost-effective Strategies for Reduction of Emissions: Eastern and Central European Cases

The goal of this study is to develop methods that can be used to rank measures against harmful emissions considering local, regional, and global effects. The project plans to extend and complete a case study for Hungary initiated in 1994.

The extent of damage regarding important health and environmental effects in parts of Hungary and the change to be expected from various emission reduction policies will be estimated. The case study is based on a report on Hungarian measures by György Pátzay (a previous visiting scientist at CICERO). A tentative valuation of effects will be conducted, possibly by using expert panels.

To be completed: 1.6.97

Project leader: Hans M. Seip

In collaboration with: Norwegian School of Management

Funding: The Norwegian Pollution Control Authority (SFT)

Keywords: Hungary, damage assessment, cost-benefit, health effects, measures

Environmental Policy in the European Union: Actors, Interests and Conflicts

The project will examine two research questions:

(1) The legal basis for a common environmental policy established by the Single European Act and the Treaty on Political Union provides the European Commission with strong policy instruments, and one should therefore expect a development towards a common environmental policy on the EU-level from this time onwards.

(2) The role of the EU member states in environmental policy remains strong, and

...Ongoing projects

they will use the principle of subsidiarity to curtail the Commission's attempts to develop a common environmental policy.

This study will investigate the process of EU environmental policy-making in selected cases in order to determine whether the Commission has used windows of opportunity to build a common environmental policy and with it, an increased role for itself.

To be completed: 31.12.97

Researcher Lasse Ringius

Funding: The Research Council of Norway

Keywords: EU environmental policy.

Environmental Problems, Techno-Economic Paradigms and the International Division of Labour

The history of environmental problems is studied by combining approaches drawn from technology history, development theory and environmental history. The environmental history component provides a description of the phenomena that have been tried explained. This dependent variable has determined the scope, localization, and cumulative dynamics of environmental problems since the industrial revolution. The hypotheses of the project suggest that these historical trends may be explained by studying the interplay between the five, primary techno-economic paradigms since the industrial revolution (textile industries, railways, chemical and electrical industries, "fordism" and mass-consumption industries, and microelectronics), the systems of energy production (fossil fuels in particular) as well as the development of the international division of labor.

To be completed: Spring 1997

Researcher: Sjur Kaasa

In collaboration with: Lars Mjøset
(**project leader**) - Institute for Social Research (ISF)

Funding: The Research Council of Norway

Keywords: Environmental history, technology history, long waves, business cycles, neo-schumpeterianism

Evaluation of Environmental Effects of an Energy Saving Policy in Hungary

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The main goal of the project is to demonstrate how measures to improve health and environment can be evaluated in countries with a very limited market economy. Local, regional and global effects will be treated in an integrated way.

A method using economic and environmental data to rank possible energy-saving measures will be developed. The project will show what information is needed to carry out such comparisons and what information is needed to study the sensitivity of the ranking to assumptions regarding prices, costs and effects on health and environment. An estimate of the social-economic value of a specific Hungarian energy-saving program will be made and the different components tentatively ranked.

The starting point for the analysis is an energy-saving package presented by the Hungarian authorities in connection with Hungary's report to the Climate Convention. The information on the costs of the measures however, is very limited. Lack of such information is probably typical for most countries with an economy in transition.

The project will show to what extent it is possible to evaluate projects with limited economic information. The project will also attempt to determine how the database can be improved most efficiently.

To be completed: 1.4.97

Project leader: Hans M. Seip

Funding: The Research Council of Norway

Keywords: Hungary, damage assessment, cost-benefit, health effects, measures

Institutional Requirements for Voluntary Agreements

The aim of this project is to determine how voluntary agreements compare to other policy tools in terms of effectiveness when

...Ongoing projects

meeting an environmental target, specifically in terms of cost-effectiveness and administrative effectiveness.

The project is divided into two parts. In the first part the potential of voluntary agreements to solve regional and international environmental problems will be compared to alternative policy tools. In the second part, some institutional requirements for such agreements are studied in terms of communication patterns, information flows, and industrial structure.

To be completed: 31.12.98

Project leader: Asbjørn Torvanger

In collaboration with: Espen Moen, Foundation for Research in Economics and Business Administration - Oslo (SNF), Kjell Sunnevåg SNF-Bergen.

Funding: The Research Council of Norway

Keywords: Efficient policy tools, international environmental problems, voluntary agreements

Integrated Assessment of Climate Change as a Likely Factor to Force Migration: A Case Study of the Nile Countries

This project deals with climate change as a force that triggers migration of people. It is assumed that climate change will increase the competition for basic resources, sometimes leading to large-scale migration. If the international community and aid organizations are to respond to this problem, it is essential to improve the knowledge of the interdependency of climate vulnerability issues and projected changes in climate parameters. Both factors will ultimately influence the migration process. The study will assess the scope of the problem of affected people. The underlying case-study area will be the Nile countries Egypt, Ethiopia and Sudan with their marginal agro-climatic zones and low lying delta areas.

The main theoretical objective is to explore methods of linking social decision-making processes about migration with

projected changes in climatic parameters. A more practical objective will be to see how different assumptions of climate sensitivity can be used to identify regions that are likely to be affected by migration within the Nile area.

To be completed: 2000

Doctoral thesis: Elisabeth Meze

Funding: The Research Council of Norway

Keywords: Egypt, Ethiopia, Sudan, climate change, forced migration

Modeling International Negotiations: Exploring the Settlement Range in the Global Climate Change Negotiations

The aim of this project is to develop a model which can be used to systematically explore (a) the political feasibility of alternative policy options, and (b) the settlement range of the global climate-change negotiations.

As a point of departure, the outcome of an international negotiation process is conceived of as a function of three major determinants: the configuration of participant country preferences (interests, positions), the distribution of relevant political resources ("power"), and the institutional setting (with particular attention paid to the decision rule[s]). The team pursues an incremental approach, starting out with a simple static model including only a small number of countries and a limited range of policy options.

To be completed: 1998

Researcher: Arild Underdal

In collaboration with: Fridtjof Nansen Institute. Future collaboration envisaged with research team led by Professor Harold K. Jacobson, University of Michigan, Ann Arbor

Funding: The Research Council of Norway

Keywords: Climate change, international negotiations

...Ongoing projects

Styrets beretning

In Norwegian

Senter for internasjonal klima- og miljøforskning (CICERO) ble opprettet ved Kgl. res. av 27. april 1990. Stiftelsens oppgave er å drive forskning, utredning, rådgivning og informasjon om klimarelaterte globale miljøspørsmål og internasjonal klimapolitikk med sikte på å fremskaffe kunnskap som kan bidra til å løse det menneskeskapte klimaproblemet og å styrke det internasjonale klimasamarbeidet. CICERO har en bred tverrfaglighet som spenner over statsvitenskap, sosiologi, sosialøkonomi, biologi, geofysikk, kjemi og naturforvaltning.

Kort om 1996

Fjoråret var preget av høy aktivitet ved senteret og oppdragstilgangen var god. CICEROs direktør siden høsten 1993, Helga Hernes, sluttet ved senteret medio august 1996. Kjell Arne Hagen fungerte som direktør fram til 01.01.97 da Knut H. Alfsen tiltrådte direktørstillingen etter internasjonal utlysning. Alfsen kom fra Seksjon for ressurs- og miljøøkonomi i Statistisk sentralbyrås forskningsavdeling.

Bemanning

I løpet av 1996 var 31 personer knyttet til senteret. Av disse var 24 ansatt, tilsvarende 18,8 årsverk. Antall forskerårsverk var 15. Ved utgangen av 1996 hadde senteret 23 ansatte. CICERO hadde to sivilarbeiderstillinger i 1996. I tillegg hadde én studentstipendiat kontorplass ved senteret. Tallene er omtrent de samme som for 1995.

I 1996 ble det utbetalt kr. 162.500 i samlet godtgjørelse til medlemmer av CICEROs styre og totalt kr. 410.000 i lønn og godtgjørelse til daglig leder.

Økonomiske nøkkeltall

Gjennom et høyt aktivitetsnivå i alle deler av organisasjonen ble 1996 et godt økonomisk år hvor CICEROs egenkapital ble styrket med 13,8%. Senteret har hatt en tilfredsstillende økonomisk utvikling i 1996 med god likviditet og soliditet. Likviditetsgraden er på 4,12, mens egenkapitalen ved inngangen til 1997 utgjorde 76,8% av gjeld og egenkapital.

Regnskapet for 1996 er gjort opp med et overskudd på kr. 724.268. Egenkapitalen er ved utgangen av 1996 på kr. 5.944.568. Overskuddet i 1996 vil bli tilført driftsfondet, som etter tilførsel av årsresultat vil være på kr. 5.894.568. Basisbevilgningens andel av samlede inntekter utgjorde i 1996 43,6%. Tilsvarende tall for 1993, 1994 og 1995 var henholdsvis 73,5%, 49,2% og 49,4%. Driftsresultatet var i 1996 på kr. 468.831, mens det i 1995 viste et underskudd på kr. 213.093.

Inntekter fra internasjonale oppdragsgivere utgjorde i 1996 21%, med 12% fra UNEP og 9% fra Verdensbanken. Fra nasjonale kilder utgjorde oppdragsinntekter fra ulike departementer 15% og fra Norges forskningsråd 9% av samlede inntekter.

Arbeidsmiljø

Generelt var arbeidsmiljøet ved CICERO bra. Sykefraværet i 1996 var på 4%. Virksomheten forurensrer ikke det ytre miljø.

Forskning og publisering

Senterets vitenskapelige personale er organisert i tre grupper: Sosialøkonomi, statsvitenskap/sosiologi og naturvitenskap. Samtidig er CICERO en tverrfaglig matriseorganisasjon der hovedaktivitetene går på tvers av gruppene. Det stilles krav til forskerne ved senteret om at de skal kunne kombinere grunnleggende vitenskapelig arbeid med anvendt forskning, utredning og rådgivning til norske myndigheter og internasjonale organisasjoner.

CICERO innførte i 1996 en organisering etter temaområder hvor det er utpekt faglig ansvarlige for hvert av de i alt seks områdene. Områdene er: Indirekte effekter av utslipp av drivhusgasser, Byrdefordeling, Felles gjennomføring av klimatiltak, Forhandlinger, Integreert forurensningskontroll, og Konsekvenser av klimændringer på naturressurser og samfunn. De strategiske instituttprogrammene er knyttet til to arbeidsfelter: Globale miljøproblemer med hovedvekt på klima, og Regionale og lokale miljøproblemer og tilpasning til miljøendringer. Programmene skal, i tråd med retningslinjene fra Forskningsrådet,

Oslo, 10. april 1997

Knut N. Kjær
Styrets leder

Tor Saglie

Inger Hanssen-Bauer

Anne Therese Hestenes

Asbjørn Rødseth

Hege Skjeie

Inger Johanne Wiese

Asbjørn Aaheim

Bente Herstad
Varamedlem

Raino Malnes
Varamedlem

Knut H. Alfsen
Direktør

bidra til å sikre den langsiktige utviklingen ved senteret. Støtte til tverrfaglig metodeutvikling, kompetansehevede prosjekter og internasjonal publisering gis prioritet.

Det var en nedgang i interne publikasjoner i 1996 i forhold til de foregående år. Derimot har eksternt publisering økt, samtidig som det har vært en markant økning populærvitenskapelig formidling.

Informasjonsvirksomhet

CICERO har aldri tidligere hatt så omfattende informasjonsvirksomhet som i 1996. Foruten at aktiviteter som nyhetsbrevet *Cicerone* og Klimaforum ble videreført, var senterets medarbeidere hyppige deltakere i den offentlige debatten. CICERO har i 1996 også laget en hjemmeside på Internett (<http://www.cicero.uio.no/>), samt utarbeidet en presentasjonsbrosjyre. I begynnelsen av 1996 ble en det ansatt en informasjonsmedarbeider i halv stilling.

Klimaforum møttes tre ganger i 1996. Deltakerne kommer fra næringsliv, myndigheter og forskning. Formålet er å formidle kunnskap og skape dialog om klimapolitiske emner. Femten bedrifter er med. I juni var MIT Global Forum medarrangør av en konferanse om byrdefordeling under Klimakonvensjonen, åpnet av statsminister Gro Harlem Brundtland.

I november arrangerte CICERO to konferanser om klimaendring og sårbarhet i Afrika. Den ene konferansen var et samarbeid med Verdensbanken.

Forsknings samarbeid

CICEROs tre seniorforskere samt en forsker er fast tilknyttet Universitetet i Oslo. Senterets fire doktorgradsstipendiater deltar alle i den organiserte doktorgradsutdannelsen ved UiO. Én av stipendiatene leverte sin avhandling i 1996.

CICERO fikk i 1996 ansvaret for å koordinere forskningsprogrammet «Samfunnsmessige rammebetingelser og virkemidler for norsk energi- og miljøpolitikk» (SAMRAM) i Norges forskningsråd.

Gjennom særskilte midler som Norges forskningsråd har stilt til rådighet for samarbeidstiltak mellom de utenriks-

politiske institutter i Osloregionen, har CICERO i løpet av 1996 kunnet utvide samarbeidet med Fridtjof Nansens Institutt.

Helga Hernes var leder av Norwegian Consortium for Energy and Environment (NORCE) inntil hun sluttet ved CICERO. Hovedvirkefeltet for NORCE er miljø- og energirelaterte analyser med spesiell vekt på forurensning, klima og energiøkonomisering både globalt, regionalt og nasjonalt. Konsortiets aktiviteter har så langt ikke vært av et omfang som forventet. Ulike modeller for videreføring vil bli drøftet.

CICEROs arbeidsfelt gjør internasjonalt forskningssamarbeid viktig. Det er opprettet et betydelig nett av samarbeidspartnere i utlandet. Samarbeidet er i liten grad basert på samarbeid mellom institusjoner, men mer basert på samarbeid mellom forskere.

CICEROs organisasjon

I løpet av 1996 ble det gjennomført endringer i CICEROs organisasjon og lederne for hver av gruppene fikk utvidet ansvar. Parallelt ble det foretatt omlegginger av økonomistyringssystemet ved senteret. 1996 var det første hele driftsåret hvor det nye systemet lå til grunn for virksomheten. Erfaringene har vært positive.

Rådet og styret

Rådet møtte én gang i 1996 og behandlet blant annet senterets strategiske plan.

Miljøverndepartementet oppnevnte i november 1994 et nytt styre med funksjonstid fram til 1. oktober 1996. Funksjonstiden ble senere utvidet inntil ny direktør var tilsatt. Nytt styre ble oppnevnt i februar 1997 for perioden 21.02.97-20.02.99 med spesialrådgiver Knut N. Kjær, Norges Bank, som styreformann. Direktør Terje Osmundsen, Kværner ASA, ledet styret fra høsten 1994 til 1997. Universitetsdirektør Tor Saglie har i denne perioden vært styrets nestleder. Fra høsten 1996 har CICEROs ansatte en representant i senterets styre.

Styret hadde i 1996 tre ordinære møter, samt tre ekstraordinære styremøter i anledning tilsetting av ny direktør.

Resultatregnskap for CICERO 1996

	Noter	1996	1995
Driftsinntekter			
Prosjektinntekter	1	6 441 503	4 957 861
Statistilskudd		5 189 000	5 075 000
Andre driftsinntekter		13 000	
		<u>11 643 503</u>	<u>10 032 861</u>
Driftskostnader			
Innkjøp av FoU og andre underleveranser		1 005 043	233 173
Lønn og sosiale kostnader		6 264 408	6 396 399
Husleie		880 405	816 645
Reiser		1 181 162	1 077 599
Konferanser og møter		365 448	147 492
Andre driftskostnader		1 001 057	1 085 373
Avskrivninger	2	493 817	414 273
Tap på fordringer	3	-16 668	75 000
		<u>11 174 672</u>	<u>10 245 954</u>
Driftsresultat		<u>468 831</u>	<u>-213 093</u>
Finansinntekter og -kostnader			
Renteinntekter		238 118	242 499
Netto agio		18 230	
Rentekostnader		911	5 841
Finansresultat		<u>255 437</u>	<u>236 658</u>
Årsresultat		<u>724 268</u>	<u>23 565</u>
Disponering av årets resultat			
Overført driftsfond		724 267	23 565

Balanse for CICERO pr. 31.12.96

	Noter	1996	1995
EIENDELER			
Omløpsmidler			
Kontanter og bankinnskudd	4	5 799 363	6 115 588
Kundefordringer		994 724	652 632
Andre fordringer		48 743	
Utført/ikke fakturert arbeid	5	566 039	
		<u>7 408 868</u>	<u>6 768 220</u>
Anleggsmidler	3	333 656	588 840
Sum eiendeler		<u>7 742 524</u>	<u>7 357 060</u>
GJELD OG EGENKAPITAL			
Kortsiktig gjeld			
Leverandørgjeld		295 622	48 025
Skyldig forskuddstrekk, arbeidsgiveravgift, pensjonsinnskudd, fagforeningskontingent og feriepenger		1 004 569	989 793
Forskuddsbetalte prosjektmidler		404 247	1 001 453
Annen gjeld	6	93 517	97 488
		<u>1 797 955</u>	<u>2 136 759</u>
Egenkapital			
Grunnkapital		50 000	50 000
Driftsfond (5.170.301+724.267)		5 894 568	5 170 301
		<u>5 944 568</u>	<u>5 220 301</u>
Sum gjeld og egenkapital		<u>7 742 524</u>	<u>7 357 060</u>

**Resultatregnskap
Balanse
Revisor**

Regnskapet er revidert og godkjent av Riksrevisjonen

Kontantstrømanalyse

	1996
Årets resultat	724 267
Avskrivninger	493 817
Tilført fra årets virksomhet	<u>1 218 084</u>
Endringer i kundefordringer, leverandørgjeld og lager	-1 295 677
Netto likviditetsendring fra virksomheten	<u>-77 593</u>
Investering i varige driftsmidler	<u>238 633</u>
Netto likviditetsendring	<u>-316 226</u>
Likviditetsbeholdning pr. 01.01	6 115 588
Likviditetsbeholdning pr. 31.12	<u>5 799 362</u>

Note 1: Prosjektinntekter

Prosentvis fordeling av prosjektinntektene på oppdragsgivere:

Departementer	15 %	UNEP	12 %
Forskningsrådet	9 %	Verdensbanken	9 %
Andre off. institusjoner	6 %	Organisasjoner/stiftelser	2 %
Næringsliv m.m.	2 %		
			sum 55 %

Note 2: Varige driftsmidler

	Datautstyr	Kontorutstyr	Sum
Ansk.kostn.pr.1.1.96	774 363	468 456	1 242 819
Årets investeringer	238 633		238 633
Avgang til ansk.kost.			0
Akkumulerte avskrivninger pr. 31.12.96	731 671	416 125	1 147 796
Bokført verdi pr. 31.12.96	<u>281 325</u>	<u>52 331</u>	<u>333 656</u>

Årets avskrivninger 337 665 156 152 **493 817**

Avskrivningsmetode Lineær avskrivning over 3 år

Investering i varige driftsmidler de siste 3 år (tidligere års anskaffelser ble kostnadsført i sin helhet)

År	Datautstyr	Kontorutstyr	Sum
1994	407 655	311 463	719 118
1995	366 708	156 993	523 701
1996	238 633		238 633
Sum	<u>1 012 996</u>	<u>468 456</u>	<u>1 481 452</u>

Note 3: Tap på fordringer

Kredit tap på fordringer skyldes at det i regnskapet for 1995 ble avsatt kr. 75.000 for forventet andel underskudd i NORCE. Virkelig andel underskudd ser nå ut til å bli i underkant av kr. 60.000.

Omløpsmidler

Omløpsmidlene er vurdert til virkelig verdi, og ikke høyere enn anskaffelseskostnad.

Note 4: Kontanter og bankinnskudd

Posten inkluderer en bankkonto i USD, som står oppført i balansen med kurs pr. 31.12.96. Regnskapsposter i utenlandsk valuta i løpet av året er inntekts- og kostnadsført til periodens kurs.

Note 5: Utført/ikke fakturert arbeid

Posten består av direkte lønnskostnader ved den nedlagte arbeidsinnsats med tillegg av direkte prosjektutlegg og andel felleskostnader.

Note 6: Annen gjeld

Denne posten består av avsetning for påløpte, ikke fakturerte, kostnader pr. 31.12.96.

**Kontantstrøm-
analyse
Noter**

The Politics of Environmental Reform in the Third World: The Contrasting Cases of Brazil and Indonesia 1988-1992

Between 1988 and 1992, Brazil implemented important changes in regulatory policies focused on the management of tropical moist forest land, particularly Amazonia. Deforestation in Brazil was caused by the uncontrolled, government-sponsored extension of ranching. Large family-based and corporate ranchers played a major role in forest conversion in the region. These ranches were affected by the most important regulatory changes, including cancellations of various subsidies for ranching and the implementation of environmental monitoring. Though severely hampered by serious organizational and financial problems, reforms in Brazil represented a break with the past. Changes were especially motivated by concerns for the contribution of deforestation to global warming. A main indicator of the extent of change in Brazil is the wave of protests from ranchers and business organizations motivated by reforms.

The Indonesian government also expressed global environmental concerns. Much like the Brazilian ranching sector, the logging sector in Indonesia was out of control. It was recognized both by government agencies and the environmental non-governmental organizations (NGOs) that the regulatory regime of the sector encouraged short-sighted, environmentally destructive strategies. Though regulatory changes were signaled by the government in this period, only small changes were actually implemented. The destructive incentive regime continued. The same was the case with ground-level inspection efforts. The provincial branches of the regulatory authority were still hampered by heavy corruption.

Hypotheses based on differences in dependency, financial and ecological interdependence as well as hypotheses focused on differences in the influences of domestic government agencies and social

groups fail to explain the observed outcome. The contrast is understood as the outcome of a combination of external and internal incentives, the organization of domestic societal groups, and the ability of domestic NGOs to connect themselves to foreign NGOs with an ability to put pressure on financing institutions and influence consumer behavior in foreign markets.

To be completed: Submitted

Doctoral thesis: Sjur Kasa

Funding: The Research Council of Norway

Keywords: Brazil, Indonesia, forest policy, environmental regulation

Policy-making Behavior in Climate Change Policy: A Comparative Analysis of Four Annex I States

The study investigates policy-making behavior in climate-change policy by conducting a comparative analysis of Norway, France, Germany and Poland. The objective is to give the background and reason for:

- 1) each country's position in the climate-change negotiation process
- 2) the independent variables which influence both policy choices and perceptions of the range of policy choices at the national level

In addition the study will develop information on both systemic and domestic variables that govern policy-making behavior. Investigations at the systemic level will be based on the assumption that the countries' perceptions of abatement costs and damage costs play a deciding role.

At the domestic level, the basic assumption is that policy-making processes are influenced both by societal demand and support, as well as governmental supply of abatement policies. Furthermore, an assumption is made about social learning and policy diffusion as important influential mechanisms.

The causal chains between factors such as national interests, domestic politics,

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problem perception, knowledge and attitude, and the actual policy measures and strategies chosen will be established.

To be completed: 2000

Doctoral thesis: Guri Bang Søvting

Funding: The Research Council of Norway

Keywords: Climate change policy and decision-making

Quantification of the Impacts of NOx Emissions on Climate Through Changes in Tropospheric O₃ and CH₄

Studies show that emissions of nitrogen oxides (NOx) have a dual role with respect to climate. Through production of tropospheric ozone (O₃), NOx contributes to warming. But NOx also reduces the levels of methane (CH₄), thereby giving a cooling effect. For NOx from surface sources, previous studies indicate that these opposing effects may be of similar magnitude. However, due to methodological limitations and insufficient knowledge it has not been possible to say whether emissions of NOx from surface sources in a global perspective have a positive or a negative net effect on climate through changes in O₃ and CH₄.

The overall objective of the project is to obtain more reliable estimates of the impacts of emissions of NOx from *surface* sources on climate through the responses in tropospheric O₃ and CH₄. How the climate impacts, quantified in terms of radiative forcing, vary in time and space and also with variations in the geographical localization of the emissions, will be closely examined. The lifetime of NOx vary from hours to days, giving large spatial variations in the levels of NOx. Due to nonlinearities in the O₃ and OH chemistry there are also large differences in the effect of NOx on O₃ and CH₄. This requires the use of three-dimensional chemistry and transport models in studies of climate effects from NOx emissions. The impacts of NOx emissions on both CH₄ and O₃ will

be studied using a three-dimensional chemistry/transport model of the global troposphere. The calculations of radiative forcing due to ozone changes is calculated by professor Wei-Chyung Wang and his group in Albany, USA.

We have selected six geographical regions representing different chemical and physical conditions, and the emissions of NOx in these regions have been *reduced* by 20%. Preliminary results show that the sensitivity in the chemical responses and the radiative forcing due to changes in O₃ and CH₄ show large variations between the regions. The ozone and methane forcing are of opposite sign and generally of similar magnitude.

To be completed: 31.12.97

Project leader: Jan Fuglestad

In collaboration with: Ivar Isaksen, Terje Berntsen, Wei-Chyung Wang

Funding: The Research Council of Norway, The Norwegian State Pollution Control Authority (SFT)

Keywords: NOx, ozone, methane, radiative forcing of climate

The Role of Institutions in Global Environmental Change

The objective of the project is to develop an international and interdisciplinary program of research regarding the role of institutions in global environmental change. The program is scheduled to become a "core project" of the International Human Dimensions of Global Environmental Change Program (IHDP). The overall purpose of the research program being developed is to summarize, integrate and extend the knowledge and understanding about the ways in which various kinds of institutions - ranging from governments to markets - influence human activities causing global environmental change, as well as individual and collective responses to such change. A scoping report was submitted to the IHDP Scientific Committee in November 1996.

To be completed: No set date

Project leaders: Arild Underdal, CICERO,

...Ongoing projects

and Oran R. Young, Dartmouth College, US
In collaboration with: Several scholars in America, Europe, Asia and Australia
Funding: IHDP
Keywords: Institutions, global change, environment

Strategies for EU Leadership for Climate and Sustainability Regimes

The project aims at exploring possible joint strategies for EU countries in achieving sustainable development, with particular emphasis on climate policy. The project will analyze countries' attitudes towards common initiatives to achieve sustainability. Economic, political and institutional frameworks for an international climate regime will be analysed on three levels: Within the EU, global preconditions, and the EU's role in the development of an international regime. CICERO's contribution is to try to identify specific interests within a number of EU countries on the background of economic performance, sector composition and pattern of energy use.

To be completed: 8.98

Project leader: H. Asbjørn Aaheim

In collaboration with: Fridtjof Nansen Institute (FNI), Royal Institute of International Affairs - UK

Funding: EU, The Research Council of Norway

Keywords: Climate policy regimes, EU

Structure and Agent in Scientific Diplomacy

Science constitutes a central component of international environmental policy-making. Still, the conditions for, and mechanisms by, which scientific knowledge is transformed into premises for policy decisions have, and to a very limited extent, been subject to systematic analysis. The study investigates, how the extent to which the institutional arrangements of the science-policy dialogue may influence and serve as instruments for facilitating the transforma-

tion of scientific knowledge into decision premises. The study also explores the role and impact of "scientific élites" in performing leadership functions in the process and, in particular, the extent to which leadership performance may serve as a possible mechanism by which the transformation of knowledge takes place. The project is a case study of the role and function of the Intergovernmental Panel on Climate Change (IPCC) during the period from 1988 to 1995.

To be completed: Spring 1998

Doctoral thesis: Tora Skodvin

Funding: The Research Council of Norway

Keywords: International environmental management (processes, institutions)

Towards Sustainable Development and Consumption in East Asia?

The project aims to document the development of environmental problems created by patterns of production and consumption in two newly industrializing East Asian countries, South Korea and Taiwan. Former attempts to classify these countries along environmental dimensions of production and consumption have concluded that they follow a lean Japanese development pattern in terms of energy consumption and private consumption of cars and beef. However, trends during the 1990s indicate that the consumption patterns now deviate from the Japanese model and increasingly resemble the highly polluting and resource intensive U.S. model. In the project, we analyze this hypothesis further. If correct, this trend will be explained through hypotheses focusing on the effects of international energy prices, U.S. trade policies and national environmental regimes.

To be completed: 31.12.97

Researcher: Sjur Kasa

In collaboration with: Lars Mjøset (project leader) - University of Oslo

Funding: The Research Council of Norway

...Ongoing projects

Keywords: Taiwan, South Korea, sustainable consumption, trade and the environment

Towards a Sustainable Energy System - A Long Term Transition Strategy

There is a growing recognition that a sustainable energy system is a prerequisite for sustainable development and, furthermore, that today's energy use is not sustainable. The supply side of a sustainable energy system must be dominated by renewable alternatives, but even with a renewable supply side, the demand side must be developed in the direction of maximum efficiency.

The main objective is to analyze the macro perspectives of the transition challenge and assess the decarbonization and the efficiency improvements in an overall, long-term strategic framework.

The project will describe the state-of-the-art technology and competitiveness for new renewable energy resources, and the necessary means to accelerate the introduction of tomorrow's energy systems. Methods to achieve reduction of energy demand will be discussed. An analysis of supply and demand will be integrated in a total transition strategy. The project will pay particular attention to the energy consequences of high-growth introduction of the renewable system. Due to the energy requirements associated with developing the new energy system, fossil fuels may be needed under certain growth assumptions exceeding the renewable systems contribution.

To be completed: 1.4.97

Project leader: Øystein Dahle

Funding: The Ministry of Petroleum and Energy

Keywords: Energy, renewable energy sources, sustainability

UNEP Country Case Studies Program on Climate Change Impacts and Adaptations Assessment

The project will test the IPCC's guidelines

for impact assessments and adaptation in four countries - Estonia, Antigua-Barbuda, Cameroon and Pakistan. CICERO's role is to coordinate the technical assistance to the four national project teams.

CICERO organizes technical training, workshops, seminars, etc. and advisory services for the four national teams as needed. CICERO will use the expertise from an international Technical Assistance Team. The Team will consist of technical experts from UNEP, IPCC and CICERO among others. The Project will lead to capacity building in the countries, contribute to the preparation of the country studies and suggest improvements to the IPCC's guidelines for climate impact assessments.

To be completed: 30.9.97

Project leader: Arne Dalfelt

Funding: The United Nations Environment Program (UNEP), the Global Environment Facility (GEF)

Keywords: Estonia, Antigua-Barbuda, Cameroon, Pakistan, climate change, assessment, adaptation

Uncertainty and the Greenhouse Effect

The aim of this project is to improve our ability to make optimal climate policy decisions in a situation with many types of uncertainties.

The project is divided into three parts. The first part studies optimal investments in generating new knowledge, whereas the second part studies irreversible damages and abatement measures. The last part studies how an optimal climate policy is affected by risk aversion, allocation of consumption over time, and habit formation.

To be completed: 31.12.99

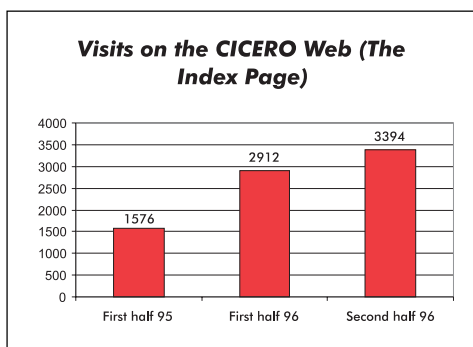
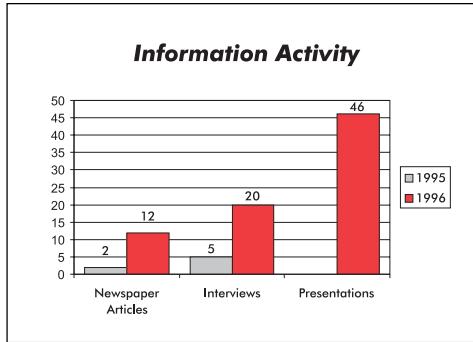
Researcher: Asbjørn Torvanger

In collaboration with: Snorre Kverndokk (project leader) - Statistics Norway

Funding: The Research Council of Norway

...Ongoing projects

4. Information



The information management of CICERO

The volume of the information activities at CICERO in 1996 was at its highest level ever. Of particular importance was the active engagement in the public debate on climate issues. The number of presentations given at conferences etc. also increased as shown in the diagram to the left. A brochure presenting CICERO was published in both English and Norwegian. In the beginning of 1996 an information officer started working half-time.

World Wide Web

The Center's presence on the World Wide Web was improved. The site now contains detailed information about CICERO, its research and its employees. The number of visits to the site have been climbing steadily (see figure).

Newsletter

The newsletter *Cicerone* was published four times in 1996 as volume five. The newsletter has a circulation of about 1000 and is distributed to ministries, directorates, businesses, research institutions, schools, as well as individual persons.

Conferences

Climate Forum met three times in 1996. The forum assembles members from industry and business, as well as government and researchers, to share information about trends of development with regard to international climate research and policies, and to improve the dialog among the parties involved. Fifteen corporations are members of the forum. In June 1996 Climate Forum was organized in cooperation with MIT's Global Forum. The conference was called *Burden Sharing Under the Climate Convention* and gathered over 150 delegates. Norway's then Prime Minister, Gro Harlem Brundtland, held the keynote speech.

In November CICERO organized two international conferences addressing the challenges that climate change represents for the African continent. One of these conferences was arranged jointly by CICERO and the World Bank.

5. Personnel

During 1996 the following persons were employed by CICERO. If not explicitly indicated, the employee was working full-time.

- Aunan, Kristin - Research Fellow (biology/chemistry)
- Berntsen, Terje - Senior Research Fellow, (geophysics) (50%)
- Bloch, Vilni - Conscientious Objector, (until 19 September 1996)
- Borg, Lene Kristin - Accountant
- Dahle, Øystein - Senior Research Fellow (20%) (from 9 February 1996)
- Dalfelt, Arne - Senior Environmental Advisor (80%)
- Fuglestvedt, Jan Sigurd - Research Director and Senior Research Fellow (chemistry)
- Hagem, Cathrine - Research Fellow (economics)
- Hagen, Kjell Arne - Assistant Director/ Research Coordinator
- Hernes, Helga - Director (until 15 August 1996)
- Holtsmark, Bjart J. - Senior Research Fellow (economics)
- Ihlen, Øyvind - Information Officer (50%)
- Isaksen, Ivar S. A. - Professor/Senior Research Fellow (geophysics) (50%)
- Jacobson, Harold K. - Visiting research fellow 10 October - 7 November 1996
- Kasa, Sjur - Research Fellow, (sociology)
- Meze, Elisabeth - Research Assistant (from 19 February 1996)
- Murvoll, Mariann - Post Graduate Student (political science)
- Mytting, Tor Sigurd - Conscientious Objector, (from 3 September 1996)
- Nordlund, Berit - Secretary
- Næss, Lars Otto - Research Assistant
- Ringius, Lasse - Research Director and Senior Research Fellow (political science)

- Rørvik, Frode - Information Technology Manager (30%)
- Seip, Hans Martin - Professor/Senior Research Fellow (chemistry) (20%)
- Selrod, Rolf - Senior Environmental Advisor (until 30 April 1996)
- Skodvin, Tora - Research Fellow (political science)
- Sundstøl, Arnt - Conscientious Objector, (from 18 September 1996)
- Søvting, Guri Bang - Research Assistant (political science)
- Torrisen, Grethe - Research Fellow (economics) (until 30 April 1996)
- Torvanger, Asbjørn - Research Director and Senior Research Fellow (economics)
- Underdal, Arild - Professor/Senior Research Fellow (political science) (sabbatical)
- Aaheim, Asbjørn - Senior Research Fellow (economics)

Four of our part-time employed Senior Researchers are permanently affiliated with the University of Oslo. Senior Research Fellow Berntsen and Professor Isaksen share their time equally between CICERO and the Institute of Geophysics. Professor Seip and Professor Underdal each have 20% part-time positions at CICERO. Additionally, Director Hernes was Professor II at the Institute of Political Science at the University of Oslo.

All of our Research Fellows are taking part in doctoral courses at the University of Oslo. Seven of the Researchers at CICERO hold doctorates.

**Staff members
and their
affiliation**

6. Advisory Board and Board of Directors

Advisory Board 1994 – 1996

- Ullring, Svein – President and CEO, Det norske Veritas (chair)
- Salbu, Brit – Professor, the Agricultural University of Norway (co-chair)
- Astrup, Erle Grieg – Ph.D, Corporate Specialist, Elkem ASA
- Bojer, Hilde – Head of Department, Department of Economics, the University of Oslo
- Bugge, Hans Christian – Associate Professor, Faculty of Law, the University of Oslo
- Faanes, Turid – Scientist, SINTEF-NHL, the University of Trondheim
- Grammeltvedt, Arne – Director, Norwegian Meteorological Institute
- Hannay, Alastair – Professor, Department of Linguistics and Philosophy, the University of Oslo
- Heintz, Natascha – Senior Curator, Paleontological Museum, the University of Oslo
- Johnson, Hilde Frafjord – Member of Parliament
- Mangerud, Jan – Professor, Department of Geology, the University of Bergen
- Nordheim, Karita Bekkemellem – Member of Parliament
- Østreng, Willy – Director, Fridtjof Nansen Institute
- Aakvaag, Torvild – Chairman of the Board, Norsk Hydro

The advisory board met once in 1996.

Board of Directors November 1994 – February 1997

- Osmundsen, Terje – Director, Kværner Water Systems AS (chair)
- Saglie, Tor – University Director, the University of Oslo (co-chair)
- Cappelen, Frede – Advisor, Statoil
- Heimdal, Berit Riddervold – Professor, Department of Fisheries and Marine-Biology, University of Bergen
- Midgaard, Knut – Professor, Department of Economics, the University of Oslo

- Rødseth, Asbjørn – Professor, Department of Economics, the University of Oslo
- Wiese, Inger Johanne – Advisor, the Ministry of the Environment
- Aaheim, Asbjørn – Senior Researcher, CICERO (from Autumn 1996)
- Henriksen, Ellen – Research Fellow, Department of Physics, the University of Oslo (alternate member)
- Herstad, Bente – Advisor, the Ministry of the Environment (alternate member)

The board of directors held 6 meetings in 1996.

Board of Directors February 1997 – 1999

- Kjær, Knut N. – Special Advisor, Central Bank of Norway (chair)
- Saglie, Tor – University Director, the University of Oslo (co-chair)
- Hanssen-Bauer, Inger – Senior Scientist, the Norwegian Meteorological Institute
- Hestenes, Anne Therese – Senior Vice President, Statoil
- Rødseth, Asbjørn – Professor, Department of Economics, the University of Oslo
- Skjeie, Hege – Associate Professor, Department of Political Science, the University of Oslo
- Wiese, Inger Johanne – Advisor, the Ministry of the Environment
- Aaheim, Asbjørn – Senior Researcher, CICERO
- Herstad, Bente – Advisor, the Ministry of the Environment (alternate member)
- Raino Malnes – Professor, Department of Political Science, the University of Oslo (alternate member)

Members of the boards

7. Publications

CICERO Publications

CICERO Reports

- R 96:1 Aaheim, A.H.: *Verdien av klimatiltak*
- R 96:2 Ringius, L.; A. Torvanger and E. Meze: *Climate Policy, Burden Sharing and the Nordic Countries: Present State of Analysis and Need for Further Analysis*
- R 96:3 Torvanger, A.; T. Berntsen, J.S. Fuglestvedt, B. Holtsmark, L. Ringius and A. Aaheim: *Exploring Distribution of Commitments: A Follow-up to the Berlin Mandate*
- R 96:4 Fuglestvedt, J.S. and T. Skodvin: *A Comprehensive Approach to Climate Change: Options and Obstacles*
- R 96:5 Dalfelt, A.; L.O. Næss, R.T.M. Sutamihardja and N. Gintings: *Feasibility Study on Reforestation of Degraded Grasslands in Indonesia as a Climate Change Mitigation Option*
- R 96:6 Hagem, C.: *Climate Agreements under Limited Participation, Asymmetric Information and Market Imperfections: A summary of a Dr.polit. thesis*
- R 96:7 Holtsmark, B.: *"Deling av arbeid", arbeidsløshet og miljøproblemer: En drøfting av noen kortsiktige og langsiktige sammenhenger*
- R 96:8 Ringius, L.; T. Downing, M. Hulme, D. Waughray, R. Selrod: *Climate Change in Africa: Issues and Regional Strategy*

CICERO Working papers

- WP 96:1 Hagem, C.: *The Value of Information and the Design of a Climate Contract Under Asymmetric Information Both Before and After the Contract is Signed*
- WP 96:2 Hagem, C. and H. Westskog: *The Design of a Tradeable CO₂-quota System under Market Imperfections*
- WP 96:3 Holtsmark, B.: *Kortere*

arbeidstid og miljøproblemer: Noen regneeksempler for å illustrere mulige kortsiktige og langsiktige sammenhenger

CICERO Policy notes

- PN 96:1 Seip, H.M.; H.A. Aaheim and K. Aunan: *Energy, Climate and Air Pollution: What Do We Know and How Should We Act?*
- PN 96:2 Fuglestvedt, J.; M. Murvoll: *Noen sentrale konklusjoner i andre hovedrapport fra FNs klimapanel (IPCC 1995)*
- PN 96:3 Isaksen, I.S.A.: *The Ozone Depletion Problem*

External Publications

Publications with Referee

- **Aunan, K.:** "Exposure-response Function for Health Effects of Air Pollution Based on Epidemiological Findings", *Risk Analysis* 16(5)
- **Berntsen, T.; I.S.A. Isaksen, W.-C. Wang, X.-Z. Liang:** "Impacts of Increased Anthropogenic Emissions in Asia on Tropospheric Ozone and Climate: A Global 3-D Model Study", *Tellus* 48 (B), 13-32
- **Berntsen, T.; I.S.A. Isaksen, J.S. Fuglestvedt, G. Myhre, F. Stordal, R.S. Freckleton, K.P. Shine:** "Effects of Anthropogenic Emissions on Tropospheric Ozone and its Radiative Forcing", Submitted to *Journal of Geophysics. Res.* December 1996
- **Berntsen, T.; I.S.A. Isaksen, G. Myhre, J.S. Fuglestvedt:** "Changes in Tropospheric Photochemistry: Implications for Climate. A Global 3-D Model Study", *Proceedings from XVIII Quadrennial Ozone Symposium L'Aquila*
- **Fløisand, I.; F. Stordal, B. Rognerud, I.S.A. Isaksen, N. Larsen, B. Knudsen:** "Modelled Chemical Ozone Change over Europe During the Winters 1992 to 1995", *Proceedings from XVIII Quadrennial Ozone Symposium L'Aquila*

**CICERO
Publications**

**External
Publications**

- **Fuglestedt, J.S., I.S.A. Isaksen, W.-C. Wang:** “Estimates of Indirect Global Warming Potentials for CH₄, CO and NO_x”, *Climatic Change*, vol 34 (405-437)
- **Fuglestedt, J.; T. Berntsen, I.S.A. Isaksen, H. Mao, X.-Z. Liang, W.-C. Wang:** “Impacts of Reduced NO_x Emissions on Radiative Forcing Through Changes in Tropospheric O₃ and CH₄: A Global 3-D Model Study”, *Proceedings from XVIII Quadrennial Ozone Symposium L’Aquila*
- **Hagem, C.:** “Joint Implementation Under Asymmetric Information and Strategic Behavior”, *Environmental and Resource Economics* 8 (431-447)
- **Isaksen, I.S.A.:** Intergovernmental Panel on Climate Change 1995 (IPCC). Lead author. Chapter 2, WGI
- **Isaksen, I.S.A.; B. Rognerud:** “Model Analysis of Man Made and Natural Causes for Recent Ozone Depletion”, *Proceedings from XVIII Quadrennial Ozone Symposium L’Aquila*
- Larssen, T.; X. Xiong, R. Vogt, **H.M. Seip, B. Liao, D. Zhao:** “Studies of Soils, Soil Water and Stream Water at a Small Catchment Near Guiyang, China”, *Water Air Soil Pollution*
- Myhre, G; B. Rognerud, **I.S.A. Isaksen, F. Stordal:** “Radiative Forcing due to Stratospheric Ozone”, *Proceedings from XVIII Quadrennial Ozone Symposium L’Aquila*
- **Ringius, L.:** “Environmental NGOs and Regime Change: The Case of Ocean Dumping of Radioactive Waste”, *European Journal of International Politics* vol 3 no1
- Rummukainen, M; **I.S.A. Isaksen, F. Stordal:** “Global 3-D Model Calculations on Ozone During a Northern Hemispheric Winter”, *Proceedings from XVIII Quadrennial Ozone Symposium L’Aquila*
- **Torvanger, A.:** “Uncertain Climate Change in an Intergenerational Planning Model”, *Environmental and Resource Economics*
- Wang, W.-C.; H. Mao, **I.S.A. Isaksen,**

- J.S. Fuglestedt, S. Karlsdottir:** “Indirect Effect of Increasing Atmospheric Methane on the Radiative Forcing through Climate-Chemistry Interaction”, *Proceedings from XVIII Quadrennial Ozone Symposium L’Aquila*
- Zerefos, C.S.; K. Tourpali, **I.S.A. Isaksen, B. Rognerud, B.R. Bojkow, C.J.E. Schuurmans:** “The Solar Output and Total Ozone”, *Proceedings from XVIII Quadrennial Ozone Symposium L’Aquila*

Books

- **Aunan, K.:** “Jakten på den reelle risiko: Som man roper i skogen får man svar?” in *Lesebok i miljøadministrative metoder*, Telemark College
- **Berntsen, T.:** “Ozonlaget” in Henriksen, P.; K.A. Tvedt: *Aschehoug Gyldendals Store Norske Leksikon, Supplement 1996*, Kunnskapsforlaget, Oslo
- Bakken, E.; H.O. Bergesen, B. Herstad, **I.S.A. Isaksen, R. Kaarhus, E. Løberslie, D. McNeill, J. Sørensen, A. Vatn, N. Witoszek:** *Forskningens bidrag til en bærekraftig utvikling. Perspektivanalyse for norsk miljø og utviklingsforskning for perioden 1995-2005*
- **Fuglestedt, J.S.:** “Klimaendringer” in Henriksen, P.; K.A. Tvedt: *Aschehoug Gyldendals Store Norske Leksikon, Supplement 1996*, Kunnskapsforlaget
- **Isaksen, I.S.A.; J.E. Jonson, T.K. Berntsen:** *Model Studies of Ozone on Regional Scales in the Troposphere. The Eurotrac Final Report*. Springer publishing Co
- **Kasa, S.:** “Brazil: The Politics of Climate Change” in Gunnar Fermann (ed), *The Politics of Climate Change*, Scandinavian University Press
- Munasinghe, M.; P. Meier, M. Hoel, S.W. Hong and **A. Aaheim:** “Applicability of Techniques of Cost-Benefit Analysis to Climate Change” in *Climate Change 1995: Economic and Social Dimensions of Climate Change*, IPCC/ Cambridge University Press

...Publications with Referee Books

- **Ringius, L.;** J. Holm, B. Klemmensen: “Denmark’s Environmental Aid to Eastern Europe: Present and Future” in R. Löfstedt and G. Sjöstedt (eds.): *Environmental Aid Programmes to Eastern Europe: Area Studies and Theoretical Applications*. Avebury Studies in Green Research, Aldershot, England.
- **Ringius, L.:** “The Environmental Action Plan Approach: A Milestone in Pollution Control in the Baltic Sea” in Hjorth, R (ed): *Baltic Environmental Cooperation: A Regime in Transition. Water and Environmental Studies*, Linköping University, Report 23
- **Ringius, L.;** **A. Torvanger, E. Meze:** *Climate Policy, Burden Sharing and the Nordic Countries*, Nordic Council of Ministers
- **Torvanger, A.:** “Choosing an Efficient Climate Policy” in Gunnar Fermann (ed), *The Politics of Climate Change*, Scandinavian University Press
- Hanf, K.; **A. Underdal:** “Domesticating International Commitments: Linking National and International Decision-Making”, in O.R. Young (ed): *The International Political Economy and International Institutions, Vol. II*. Edward Elgar. Cheltenham, UK
- **Aaheim, A.:** “Resource and Environmental Policy in Norway”, Nordisk Råd
- “Ozone: Climate Chemistry Interactions”, Final Report to the European Commission
- **Fuglestad, J.:** “Hovedkonklusjoner fra IPCCs arbeidsgrupper: Naturvitenskapen”, Motmelding til St meld no 38 (1995-96) Om gasskraftverk i Norge. Klimaalliansen
- **Næss, L.O.:** “Skogtiltak i Indonesia: CO₂-binding eller lokal nytte?”, Norsk Skogbruk no 12
- Readings, C.; **I.S.A. Isaksen et al:** “OMI-Ozone Monitoring Instrument for Metop ESA WPP-123”
- **Ringius, L., G. B. Søfting:** “Norsk implementering av Klimakonvensjonen” *Monitor 21: Fra Rio til New York*. Program for Research and Documentation for a Sustainable Society (ProSus)
- **Ringius, L., B. Holtmark, J. Matlary, E. B. Sørensen:** “Consistency of World Bank Country Assistance with Client Country Commitments under the FCCC: CICERO Case Studies for Czech Rep., Poland, and Hungary”, World Bank Environment Dep. Working Paper
- **Aaheim, A.:** “Hovedkonklusjoner fra IPCCs arbeidsgrupper: Sosiale og økonomiske virkninger av klimændringer”, Motmelding til St meld no 38 (1995-96) Om gasskraftverk i Norge. Klimaalliansen.
- **Aaheim, A.:** “Global klimapolitikk og framtidige generasjoner” i Kirke og Kultur no 3
- **Aaheim, A.:** “Comparing the Costs of Climate Policies Among Countries”, Proceedings from NATO workshop in Moskva, April

Other Publications

- **Aunan, K.;** **H.M. Seip:** “Methodologies for Health Impact Assessment as Part of an Integrated Approach to Reduce Effects of Air Pollution”, Proceedings from the WHO-seminar on Health-Related Air Quality Indicators and Their Application in Health Impact Assessment, HEGIS, Sonsnowiec, Poland, November
- Camy-Peyret, C.; **I.S.A. Isaksen et al:** “The Partitioning of ClOy in the Stratosphere”, Final Report to the European Commission on Contract EV5V-CT93-0346
- Christensen B.; **I.S.A. Isaksen et al:**

Papers and Posters

- **Berntsen, T.;** **J. Fuglestad, I.S.A. Isaksen, G. Myhre:** “Changes in Tropospheric Photochemistry: Implications for Climate”, Poster presented on Quadrennial Ozone Symposium L’Aquila, Itaila, September
- **Fuglestad, J.;** **T. Berntsen, I.S.A. Isaksen, W.-C. Wang, X.-Z. Liang, H. Mao:** “Impacts of Reduced NO_x Emis-

...Books
Other Publications
Papers and Posters

- sions on Radiative Forcing through Changes in Tropospheric O₃ and CH₄: A Global 3-D Model Study”, Poster presented on Quadrennial Ozone Symposium L’Aquila, Itaila, September
- Hanf; K.; **A. Underdal**: “The Domestic Basis of International Environmental Agreements: Modeling National/International Linkages”, International workshop, Ede, Netherlands, February
 - Hanf; K.; **A. Underdal**: “The Domestic Basis of International Environmental Agreements: Modeling National/International Linkages”, Brussels, October
 - **Holtmark, B.**: “Winners and Losers in a Climate Agreement”, Annual Meeting in European Economic Associations, Istanbul, August
 - **Isaksen, I.S.A.**: “Effects of Climate-chemistry Interactions on the Radiative Forcing of Increasing Atmospheric Methane”, XVIII Quadrennial Ozone Symposium L’Aquila, September
 - **Seip, H.M.; K. Anan, A. Aaheim**: “Energy, Climate and Air Pollution: What do We Know and How Should We Act?”, 46th Pugwash Conference, September
 - **Underdal, A.**; O.R. Young: “Scooping Report on Institutions”, Annual Conference, International Association for the Study of Common Property, University of California, Berkeley, June
 - **Aaheim, A.**: “Resource and Environmental Policy in Norway”, Nordic-Baltic Conference, Bornholm, April

Presentations

...Papers and Posters Presentations

- **Anan, K.**: “Globale klimaendringer”, Agricultural University of Norway; Ås
- **Berntsen, T.**: “Klimaendringer: Nye funn fra IPCC-95”, Faglig pedagogisk dag 96; Oslo
- **Berntsen, T.**: “Hovedkonklusjoner i IPCC-95”, Statoil; Stavanger
- **Berntsen, T.**: “Klimaendringer: Nye funn fra IPCC-95”, Agricultural University of Norway; Ås
- **Berntsen, T.**: “Endringer i atmosfæren, ozonlaget og drivhuseffekt”, Norsk Kjemisk Selskap; Kristiansand
- **Berntsen, T.**: “Ozon og klima”, Center for Development and the Environment; Oslo
- **Berntsen, T.**: “Drivhuseffekt og klimaproblemer: Om prosess, status og utfordringer”, Department of Physics, University of Oslo
- **Berntsen, T.**: “Ozonlaget, kjemiske endringer, Montreal-avtale utfordringer”, Department of Physics, University of Oslo
- **Dalfelt, A.**: “Forestry and Climatic Change”, Telemark College; Bø
- **Fuglestad, J.**: “Hva sier FN’s klimapanel om menneskeskapte klimaendringer?”, The Norwegian Parliament; Oslo
- **Fuglestad, J.**: “Klimaendringer”, Debate, Trøndelag European Youth; Trondheim
- **Fuglestad, J.**: “Hva sier FN’s klimapanel om menneskeskapte klimaendringer?”, Forskningsdagene 96; Oslo
- **Fuglestad, J.**: “Hva sier FN’s klimapanel om menneskeskapte klimaendringer?”, Norsk kjemisk selskap og teknisk forening; Sarpsborg
- **Fuglestad, J.**: “Klimagasser, klimaendringer, trusselbilder”, LUFOR - Luftforurensningsrådet i Rogaland; Stavanger
- **Hagem, C.**: “Market Power in a System of Tradable CO₂ Emission Quotas in a Dynamic Model”, Centre for Development and the Environment; Oslo
- **Hagem, C.**: “The Value of Information and the Design of a Climate Contract under Asymmetric Information and Uncertainty”, Department of Economics, University of Oslo
- **Holtmark, B.**: “Økonomiske virkninger av en klimaavtale”, Open days at the University of Oslo
- **Holtmark, B.**: “The Burdensharing Project”, COP-2; Berlin
- **Holtmark, B.**: “Finnes det en rettferdig byrdefordeling i internasjonal klimapolitikk?”, Forskningsdagene 96; Oslo
- **Isaksen, I.S.A.**: SASS Steering group, January, Irvine University; California

...Presentations

- **Isaksen, I.S.A.:** "Ozon og klima", February, Center for Development and the Environment, Oslo
- **Isaksen, I.S.A.:** "Klimarapporten og klimaendringer", February, Polyteknisk Forening; Oslo
- **Isaksen, I.S.A.:** "Klimaprosessen", February, Faculty of Journalism, Oslo College
- **Isaksen, I.S.A.:** "Konklusjoner fra IPCC", March, Climate and Ozone-Meeting, March; Bergen
- **Isaksen, I.S.A.:** IGBP Keynote speech, April; Høvik, Oslo
- **Isaksen, I.S.A.:** IGAC, April; Høvik, Oslo
- **Isaksen, I.S.A.:** "Hva sier FN's klimapanel IPCC (og hva sier det ikke)?", Kjeleforeningens Annual Meeting, May; Oslo
- **Isaksen, I.S.A.:** PAUR, June; Athen
- **Isaksen, I.S.A.:** "Global Warming", June, Center for Development and the Environment; Oslo
- **Isaksen, I.S.A.:** ESA, June; Granada
- **Isaksen, I.S.A.:** "Multi-Gas Control Proposals: Analysis and Implementation", Burden Sharing Under the Climate Convention, MIT/CICERO Seminar, June; Oslo
- **Isaksen, I.S.A.:** Norsk Hydro, June; Oslo
- **Isaksen, I.S.A.:** XVIII Quadrennial Ozone Symposium L'Aquila, September; Italy
- **Isaksen, I.S.A.:** SVs millennium conference, September; Oslo
- **Isaksen, I.S.A.:** MIPAS, Karlsruhe, October; Germany
- **Isaksen, I.S.A.:** NISK, October; Oslo
- **Isaksen, I.S.A.:** Department of Philosophy, October; Oslo
- **Isaksen, I.S.A.:** NERSC, November; Bergen
- **Isaksen, I.S.A.:** Meeting on aircraft emissions, December; Taipei, Taiwan
- **Isaksen, I.S.A.:** Vitenskapsakademiet, December; Oslo
- **Kasa, S.:** "Brazil and Indonesia: The Politics of Environmental Reform 1988-1993", Oslo
- **Ringius, L.:** "Adapting to Climate Change in Africa: A CICERO/World Bank project", CICERO Seminar Climate Change and Vulnerability in Africa; Oslo
- **Ringius, L.:** "Climate Change Adaptation in Africa: Options and Constraints", World Bank Seminar; Washington D.C.
- **Ringius, L.:** "Climate Change Adaptation in Africa", The Nordic Climate Seminar and Workshop, Stockholm Environment Institute; Stockholm, Sweden
- **Seip, H.M.:** "Miljøproblemer i Kina: Noen aktuelle kinesisk-norske samarbeidsprosjekter", Agder College
- **Seip, H.M.:** "Energy, Climate and Air Pollution: What do We Know and How Should We Act?", 46th Pugwash Conference on Science and World Affairs; Lahti, Finland
- **Torvanger, A.:** "Insights From the CICERO Project on Burdensharing", *Burdensharing Under the Climate Convention*; Oslo
- **Torvanger, A.:** "The Burdensharing Project", COP-2; Berlin
- **Torvanger, A.:** "Perspektiv og utfordringer for Noreg etter dei siste klimaforhandlingane", Klimaforum; Oslo
- **Torvanger, A.:** "Economic Issues Related to Climate Change", Climate Change and Vulnerability in Africa; Vetre, Asker
- **Underdal, A.:** "The Scandinavian Countries in World Politics", Dartmouth College; UK
- **Underdal, A.:** "Keynote Speech on the Concept of 'Globality' in the Study of Environmental Change", International symposium, Linköping University; Sweden
- **Underdal, A.:** "Statsvitenskap som partner i tverrfaglig forskning", Student Seminar; Sundvolden
- **Aaheim, A.:** "Miljøtiltak" for statssekretærutvalg for miljøspørsmål; Oslo
- **Aaheim, A.:** "Miljø og økonomi", Department of Chemistry, University of Oslo
- **Aaheim, A.:** "Presentasjon av CICERO

og tverrfaglig klimaforskning”, Faculty of Journalism, Oslo College

- **Aaheim, A.:** “Byrdefordeling og Norges situasjon”, Statssekretærutvalget for Langtidsprogrammet; Oslo
- **Aaheim, A.:** “Er Norge pådrivere eller sinker i klimaforhandlingene?”, Forskningsdagene 96; Oslo
- **Aaheim, A.:** “Hvorfor er byrdefordeling viktig for Norge?”, Climate Forum; Oslo

Newspaper and Magazine Articles

- **Berntsen, T.:** “Hva betyr havet for klimaendringer?”, Norsk Oljerevy no 10
- **Fuglestedt, J., H.M. Seip:** “Bakke og føre var-prinsippet”, Aftenposten (27.3.)
- **Fuglestedt, J., H.M. Seip:** “Sannsynnlige svar finnes”, Aftenposten (12.5.)
- **Fuglestedt, J., H.M. Seip:** “Tro og kunnskap i klimadebatten”, Aftenposten (12.11.)
- **Hernes, H.:** “Klimaavtale kan koste dyrt”, Arbeiderbladet (8.7.)
- **Isaksen, I.S.A.:** “FNs klimapanel og klimaendringer”, Hvor Hender Det? NUPI - Norsk utenrikspolitisk institutt (13.5.)
- **Isaksen, I.S.A.:** “Målinger i riktig høyder”, Aftenposten (August)
- **Ringius, L.:** “Bendiksens fordreining”, Aftenposten (23.11.)
- **Seip, H.M., J. Fuglestedt:** “Justerings-tid for ekstra CO₂ avgjør, ikke midlere oppholdstid for enkeltmolekyler”, Norsk Oljerevy no 9
- **Seip H.M., J. Fuglestedt:** “Segalstad misforstår FN’s klimapanel”, Norsk Oljerevy no 11
- **Aaheim, A.H.:** “Klimameldingen og symbolpolitikk”, N&M Bulletin no 5
- **Aaheim, A.H.:** “Skeptisk til økonomers miljøvennlighet?”, N&M Bulletin no 9
- **Aaheim, A.H.:** “Sinker og pådrivere i klimaforhandlingene”, N&M Bulletin no 13

Interviews

- **Fuglestedt, J.:** Bellona Magasin no 1
- **Fuglestedt, J.:** Nationen (1.3.)
- **Fuglestedt, J.:** Nationen (22.3.)
- **Fuglestedt, J.:** Stavanger Aftenblad (20.11.)
- **Fuglestedt, J.:** NRK Dagsnytt (12.12.)
- **Hernes, H.; I.S.A. Isaksen:** Apollon no 1
- **Holtmark, B.:** Klassekampen (6.11.)
- **Isaksen, I.S.A.:** Radio Nettverk (17.2.)
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- **Isaksen, I.S.A.:** Adresseavisen (9.5.)
- **Isaksen, I.S.A.:** NRK Dagsnytt (June)
- **Isaksen, I.S.A.:** NRK Her og Nå (July)
- **Isaksen, I.S.A.:** Dagbladet (July)
- **Isaksen, I.S.A.:** Stavanger Aftenblad (20.11.)
- **Ringius, L.; B. Holtmark:** Apollon no 1
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- **Aaheim, A. H.:** “Vil vi overleve en grønn politikk?” *Bærekraftig økonomi, Sosialøkonomen*
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- Global climate and regional environment effects in developing and industrialized countries. Integrated assessments include sustainable energy use and production, and optimal environmental and resource management.
- Indirect effects of emissions and feedback mechanisms in the climate system as a result of chemical processes in the atmosphere.