

UNITED NATIONS ENVIRONMENT PROGRAMME

EVALUATION OF THE UNITED NATIONS ENVIRONMENT PROGRAMME  
COLLABORATING CENTRE ON ENERGY AND ENVIRONMENT (UCCEE)

PHASES III AND IV (1995-1999)

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## Acronyms

ADB	Asian Development Bank
AFREPREN	African Energy Policy Research Network
AREED	Africa Rural Energy Enterprise Development
BFMS	Budget and Financial Management Service (UNON)
CDM	Clean Development Mechanism
CEDRL	Canadian Energy Diversification Research Laboratory
DANIDA	Danish International Development Agency
DPCSD	United Nations Department for Policy Coordination and Sustainable Development
DTIE	Division of Technology, Industry and Economics (UNEP)
ECLAC	Economic Commission for Latin America and the Caribbean
GEF	Global Environment Facility
IDB	Interamerican Development Bank
IDEE/FB	Instituto de Economía Energetica de la Fundación Bariloche
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IRP	Integrated Resource Planning
LBNL	Lawrence Berkeley National Laboratory
LEAP/EDB	Long-range Energy Alternatives Planning/Environmental Data Base
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
OLADE	Latin American Energy Organization
RET/EE	Renewable Energy Technology/Energy Efficiency
RNL	Risø National Laboratory
SADC	Southern African Development Community
SAP	Scientific Advisory Panel
SAR	Second Assessment Report
SBSTA	Subsidiary Body for Scientific and Technological Advice
SEAF	Sustainable Energy Advisory Facility
SEI-B	Stockholm Environment Institute's Boston centre
SYS	Systems Analysis Department of RNL
TERI	Tata Energy Research Institute
UCCEE	UNEP Collaborating Centre for Energy and Environment
UNCNRSEED	United Nations Committee on New and Renewable Sources of Energy and on Energy for Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFIP	United Nations Foundation for International Partnerships
UNIDO	United Nations Industrial Development Organization

## Executive summary

1. The United Nations Environment Programme (UNEP) Collaborating Centre for Energy and Environment (UCCEE) was established in October 1990 under a tripartite agreement between UNEP, the Danish Ministry of Foreign Affairs through the Danish International Development Agency (Danida) and the Risø National Laboratory (RNL). The agreement provided for the setting up of a tripartite Management and Policy Committee (MPC) to oversee the Centre, and stipulated that the Centre should be established as a UNEP project implemented by the Risø National Laboratory for an initial period of four years in two phases.

2. The first phase (UNEP project FP/2103-90-01) covered the period from establishment of the centre until September 1992, and the second phase (UNEP project FP/CP/2103-92-01) covered the period from October 1992 to the end of 1994. As part of the second phase, an evaluation was made (Davidson, 1994). On the basis of the results of that evaluation and recommendations for strengthening the Centre, a new agreement was signed for the Centre to continue as a UNEP project implemented by RNL. The third phase (UNEP project FP/CP/0904-95-01) covered the period from January 1995 to December 1997, and the fourth phase (UNEP project FP/CP/2200-98-02) covered the period from January 1998 to the end of 1999. Phase V (UNEP project FP/CP/4040-00-11) is currently under way, covering the period from January 2000 to December 2001.

3. The main function of the centre is to support UNEP in planning and implementing its energy policy and programme. The general objective of the centre is to promote and facilitate incorporation of environmental considerations into energy policy and planning, especially in developing countries. In addition to its energy programme support function, the Centre provides substantive support to UNEP in the areas of climate change, economics and activities related to UNEP's role as an implementing agency of the Global Environment Facility (GEF). The Centre is located on the campus of RNL in Roskilde, Denmark, and has a current staff of 20 professionals, doctoral students and a secretary.

4. The Management and Policy Committee (MPC) decided that an evaluation of the centre's activities would be carried out in early 2001 during Phase V in order to assess the overall performance of the centre from 1995 until 1999, the two phases completed since the previous evaluation. A consultant was appointed by the UNEP Evaluation and Oversight Unit to make the evaluation.

5. The evaluation began on 22 January 2001 with site visits, interviews and a review of documents available. Site visits were made to the UNEP Division of Technology, Industry and Economics (DTIE) in Paris, UCCEE, Risø/SYS in Roskilde and DANIDA in Copenhagen.

6. Execution of the GEF project "Economics of Greenhouse Gas Limitations – Phase I: Establishment of a Methodological Framework for Climate Change Mitigation Assessment" was the most important achievement of the centre during Phase III (1995-1997), with the resulting methodological guidelines providing an important contribution to the climate change process. Training courses, workshops, publications and research at the centre have influenced policy makers and planners and have provided data and planning methods for developing countries.

7. The emphasis on climate change activities during this period reflected the growing relevance of this emerging issue and of the activities of the United Nations Framework Convention on Climate Change, which gained momentum with the Kyoto Protocol, signed in December 1997. It was also a result of follow-up to research on greenhouse gas abatement during the initial phases of the centre that led to its recognition as the leading institution on mitigation methodology development.

8. The activities of the UNEP energy programme have increased substantially since the appointment of a senior programme officer in October 1998 and four additional persons working on energy issues in 1999. This has led to development of a new energy policy and a draft energy strategy. New initiatives were undertaken to implement this energy strategy after an increase in funding for the period 1998 to 2000. Moreover, the Danish Ministry for Foreign Affairs, through DANIDA, and the Global Environment Facility have provided substantial additional funding for the energy subprogramme, allowing implementation of additional projects.

9. The increased activities have led to an expansion of the centre's functions, thanks to collaboration with the UNEP Energy Unit. The UNEP Energy Unit is rooted in the tradition of the UNEP Paris office of ties with the private sector, business associations and financial institutions, while the centre has usually worked with other research institutions, non-governmental organizations and government institutions. The Global Environment Facility and United Nations Foundation projects have allowed the centre to launch innovative activities with financial institutions and rural energy enterprises that have led to a substantial increase in additional funding besides the UNEP project, which now pays for two thirds of the centre's professional staff. This had led to new activities and functions for the centre.
10. The centre has ensured participation of UNEP in international forums on energy issues and has helped UNEP to coordinate with other United Nations agencies in areas such as renewable energy technologies and the Convention on Climate Change.
11. The flexibility of the original agreement was found to be a valuable asset of the centre, and the research at RNL has provided the basis for fruitful scientific results and a large number of excellent publications. The centre has regularly hosted guest researchers and Ph.D. students. Current facilities are appropriate and satisfactory for the centre's needs, especially since the construction in 1996 of new premises, which substantially improved the physical setting. Communications between the centre and the UNEP Energy Unit are excellent, allowing for efficient cooperation.
12. The resources available to the centre are sufficient and are complemented by other funds for specific projects. The current financial management of the centre by the UNON Budget and Financial Management Service (UNON/BFMS) is effective, and this arrangement is acceptable to the funding institutions.
13. The number of publications has continuously increased during the period covered by this evaluation. The articles, technical reports, books, booklets and the newsletter are of a high standard. One of the centre's major scientific achievements is the work performed for the Intergovernmental Panel on Climate Change (IPCC).
14. Implementation of the centre's projects by national teams has led to better understanding of mitigation analysis in the participating countries and increased their use of this tool, improving climate change mitigation analyses. The future integration of climate change mitigation into national policy decision-making will depend on follow-up activities after the centre's projects. In most cases, the institutional sustainability of this analysis has not yet been reached.
15. The centre is expanding its activities beyond official institutions to the private sector. On the whole, UCCEE was found to be functioning well but with a need for minor adjustments because of an increased level of activities. The general objectives of activities are valid, but difficult to achieve within the project periods and at the current level of funding and staffing. The long-term targets can be achieved only over a long period because national energy policy and planning is a time-consuming and complex process. It is recommended that the objectives of future UCCEE projects be carefully designed to take into account the reality of the centre's activities.
16. The scope of the centre's activities in 1998-1999 was not yet as comprehensive as stated in the UNEP Energy programme and the centre's objectives and strategy. It is important to avoid further discontinuity in the centre's work on power-sector reform, and it is recommended that a compromise be found between the centre's objectives, strategy and work programme and its limited staff, resources and expertise in order to make a significant contribution in new areas of activity.
17. The administration of projects has usually been very efficiently handled at UCCEE, which seems to be ideal for this type of project, allowing flexibility for distinct national circumstances. Monitoring of the centre's activities has followed standard RNL practice and seems well suited to UCCEE projects.
18. Given the expansion of the centre's activities, it seems appropriate to evaluate more frequently than once every seven years. There is a need to review the project's basic assumptions, although there is no need to review the centre's mission, approach and strategy.

19. Overall, the dissemination of the project results and follow-up activities can also be considered quite successful, reaching the most pertinent audiences. However, much remains to be done in order to make the centre better known and increase the number of hits on the UCCEE Web site, leading to effective contacts and activities. The main task ahead to maximize the dissemination of project results is to ensure as a routine procedure the translation of the national studies into national languages and their wide distribution within each participating country.
20. There is a clear need for a plan for information and publication dissemination for the centre linked with the UNEP Energy Unit. This plan should include preparation of popular materials for broader audiences. Press contacts should be established on a permanent basis. Better liaison with the UNEP Press Office could be organized for help on this issue. Hiring journalists with experience in scientific dissemination for the preparation of specific materials (articles for the newsletter, summaries of project findings, etc.) should be done on a regular basis.
21. The increased level of activities of the centre demands not only staff growth but also some adjustments in its structure and minor changes in the functions performed. The growth of the staff should be limited, as it would be unadvisable to go beyond the level of 20 people within the current structure. It can be complemented with an increase in the number of guest researchers and Ph.D. students, attracting more good candidates, particularly from developing countries.
22. On the other hand, the senior professional staff of the centre could well be asked to take on increased responsibility in the general management of activities. Given the increased activities of the centre, it seems crucial to allow for decentralized management of subprogrammes by senior professional staff, going beyond the decentralized management of single projects. Together with the hiring of an assistant manager, this would allow for reducing the current overburden on the head of the centre.
23. Particularly relevant to help the centre to shift from a project focus to a subprogramme focus would be the establishment of a network of regional centres collaborating with UCCEE through a joint long-term programme, in addition to specific short-term activities. Working closely and strengthening linkages with the UNEP Energy Unit, the centre should play a catalytic role in linking existing energy and environment centres of excellence in industrialized and developing countries in order to promote approaches to sustainable energy.
24. The establishment of a UNEP climate change task force is recommended to integrate UNEP services in the field of climate change. The centre could play a catalytic role in this initiative.
25. It is recommended that the centre move towards greater emphasis on sustainable energy development from the viewpoint of developing countries, but through incremental additions to existing activities and expertise rather than big jumps into completely new areas. Given the potential of the Clean Development Mechanism to foster sustainable development in developing countries, allowing for convergence between global climate protection and national development objectives, this area is a good niche for increased activity by the centre.
26. Another priority is the promotion, wide dissemination, strengthening and extension of initiatives such as the Sustainable Energy Advisory Facility, allowing for a more needs-oriented approach to meet requests from energy and environment policy makers in developing countries. The centre is in a unique position to support a UNEP role of clearing house, helping decision makers in developing countries to find the most up-to-date information on energy-environment issues, related not only to climate change but also to various national priorities in this field.
27. The impressive progress made by the centre in the field of renewable energy techniques should be continued and further expanded, as there is a clear “institutional gap” to be filled by the centre with the UNEP Energy Unit in this area. A similar move should also be taken in the areas of energy efficiency and sustainable transportation.

## Introduction

1. An evaluation mission assessed the overall performance of the United Nations Environment Programme Collaborating centre for Energy and Environment (UCCEE) in Roskilde, Denmark, from 1995 to 1999 and made recommendations for improvements in the scope, organization and quality of the centre's work programme and output. The mission was conducted by the author of this report during the last week of January 2001 in Paris, Roskilde and Copenhagen. This report reviews the activities of UCCEE from 1995 to 1999, discusses the accomplishments of the work programme and constraints encountered, and proposes specific actions for UCCEE to continue to carry out its activities with increased effectiveness.

### I. BACKGROUND

#### A. Origins

2. The main functions of UNEP are to motivate and inspire, improve action and awareness in environmental concerns, coordinate the environmental activities of the United Nations and work towards achieving the cooperation and participation of governments, the international scientific communities and non-governmental organizations. These functions are satisfied by various activities in global environment monitoring, environmental action plans and several support measures. Due to a high demand for varied specialized skills and expertise to undertake these activities effectively, UNEP collaborates with existing institutions or joins in establishing new ones.

3. Growing realization of the strong interactions between energy production and use and its environmental impact led to the decision within UNEP to set up a unit outside UNEP to tackle this issue. Addressing this issue requires the development of new tools and techniques that energy policies lack in treating environmental concerns. The idea of forming this unit was sparked by the draft report of the Intergovernmental Panel on Climate Change (IPCC) in 1990, which called for significant reduction in carbon dioxide emissions in the energy sector. UNEP was convinced that such a unit should have highly trained professionals and a flexible management structure, preferably in an existing institution. Establishing an entirely new institution would have required large resources and a long gestation period, while collaboration with an existing institution would provide a viable option for UNEP.

4. UNEP undertook a survey of existing institutions with demonstrated skills in the development of tools and techniques to cope with energy and environment interactions. Based on academic excellence in energy, an existing information and data-processing facility, available funding and good communication facilities within the right geopolitical context, the National Laboratory (RNL) was chosen. The willingness of the Danish Ministry of Foreign Affairs to support financially such a unit through the Danish International Development Agency (Danida) contributed to this decision. It was agreed that UCCEE would be an independent unit within the System Analysis Department (SYS) of RNL but would share common facilities in the department. UNEP headquarters was assigned a catalytic role for the centre and the responsibility of its financial management.

#### B. Status

5. The UNEP Collaborating centre for Energy and Environment (UCCEE) was established in October 1990 based on a tripartite agreement between UNEP, the Danish Ministry of Foreign Affairs through Danida and the Riso National Laboratory (RNL). The agreement provided general guidelines for the establishment, management, objectives and activities of the centre and the setting-up of a tripartite Management and Policy Committee (MPC) to oversee the centre. The centre was established for an initial period of four years in two phases as a UNEP project implemented by Riso.

6. The first phase (UNEP project FP/CP/2103-90-01) covered the period from the start of the centre to September 1992, and the second phase (UNEP project FP/CP/2103-92-01), which commenced in October 1992, was completed at the end of 1994. As part of the second phase, an international evaluation was undertaken (Davidson, 1994). Based on the positive outcome of this evaluation and a set of

recommendations for strengthening the centre, a new agreement was signed between Danida, RNL and UNEP on 2 December 1994.

7. The three organizations agreed that the centre should continue as a UNEP project implemented by RNL. The third phase (UNEP project FP/CP/0904-95-01) covered the period from January 1995 to December 1997, and the fourth phase (UNEP project FP/CP/2200-98-02), which commenced in January 1998, was completed at the end of 1999. Phase V (UNEP project FP/CP/4040-00-11) is currently under way, covering the period from January 2000 to December 2001. The centre continues under the overall supervision of the Management and Policy Committee (MPC), and a Scientific Advisory Panel (SAP) was established in 1995.

### C. Objectives and activities

8. The establishment of the centre was a reflection of the increasing recognition of the adverse environmental effects of present patterns of global energy production and consumption. The contributions to global climate change, acidification of ecosystems, deforestation, urban air pollution and indoor health hazards in rural homes from the burning of wood represent major environmental problems. The main function of the centre is to support UNEP in planning and implementing its energy policy and programme. The general objective of the centre is to promote and facilitate the incorporation of environmental considerations into energy policy and planning, especially in developing countries.

9. In addition to its energy programme support function, the centre provides substantive support to UNEP in a number of other areas, mainly on climate change issues, economics and activities related to UNEP's role as an implementing agency of the Global Environment Facility (GEF).

10. The organizational structure of UNEP was changed in 1999, during the fourth phase, and a new functional structure was adopted. The energy subprogramme is now part of the Energy and Ozone Action Unit in the Division of Technology, Industry and Economics (DTIE). UNEP's energy activities remain concentrated in the UNEP Paris office.

11. The activities of the centre are organized as subprogramme areas that follow UNEP's priorities and draft strategy on energy. The centre's work programme has been dynamic and flexible in each phase, and it is the responsibility of the MPC to approve major activities and advise on programme directions semi-annually. In addition, the centre follows RNL's internal planning and programme. This involves annual planning and evaluation of major achievements, broad performance indicators, economic results, etc. It is worth noting that RNL, as part of its new four-year contract with the Danish Government, is strongly committed to supporting the centre.

12. The activities of the centre are organized in the following subprogrammes, which have evolved over time to reflect current priorities within the broad programme:

- (a) Climate change mitigation analysis;
- (b) Environmental and development economics;
- (c) Regional and international policy instruments;
- (d) Energy sector reform;
- (e) Renewable energy and energy efficiency;
- (f) Transportation.

13. Development of methodologies, analytical tools and support to capacity-building are cross-cutting issues that generally govern activities in all subprogrammes. Under the general mandate of promoting the integration of environmental concerns into national energy planning and policy, UCCEE activities focus on:

- (a) Scientific support to UNEP, including project development, monitoring and implementation;
- (b) Energy-environment planning methodologies;
- (c) Guidelines for climate change mitigation analysis;
- (d) Demonstration projects at the national and subregional levels, involving relevant local institutions;
- (e) Capacity-building support at national and subregional levels in energy-environment planning and climate-change mitigation analysis;
- (f) Organization of workshops, seminars and training programmes for UNEP involving relevant actors at national, subregional and global levels;
- (g) Promotion of energy efficiency and conservation through demand-side management and integrated resource planning;
- (h) Promotion of the use of clean energy resources, including the sustainable use of biomass;
- (i) Awareness raising at public and policy levels about the environmental impact of energy production and use;
- (j) Facilitation of information exchange among key actors at the global, regional and national levels.

#### D. Management and staffing

14 The policy-making and executive functions of UCCEE are the responsibility of its Management and Policy Committee (MPC), which is formed by representatives from the three founding organizations and the head of the centre. MPC has the following functions:

- (a) Overall responsibility for policy and programme matters within the mandate of the UNEP project;
- (b) Semi-annual meetings to review results and performance and approve detailed work plans and status reports on activities;
- (c) Review and approval of any formal agreements and the use of subcontract funding available in the UNEP project;
- (d) Review of travel plans and completed travel;
- (e) Establishment of guidelines for hiring staff financed by the UNEP project;
- (f) Review and monitoring of projects funded by other sponsoring organizations to ensure that they are within the general mandate of the centre.

15. In 1995, the centre's Scientific Advisory Panel was established, following a recommendation by the first independent evaluation of the centre in 1994. MPC defined the composition of the panel, seeking a regional balance, and invited individual experts to act in their personal capacity as SAP members. After the three initial annual meetings, the composition of the panel was changed for the period 1998-2000 (see annex 3 for details of the composition of the panel). It was agreed that the SAP meetings would include designated UNEP, RNL and Danida observers, with the head of the centre acting as its secretary. SAP meets annually to assist MPC in exercising its overall responsibility for policy and programme matters. In particular, the SAP is asked to provide MPC with:

- (a) Strategic advice on directions for the centre's activities in the future. The advice should reflect existing and emerging regional priority issues in energy and environment with due consideration to the centre's general mandate.
- (b) Scientific advice on existing programmes and projects;
- (c) Assessments of quality, relevance and impact of ongoing and planned activities;
- (d) Facilitation of links with national, regional and international institutions that might benefit from or contribute to the work of the centre.

16. Daily activities are managed by the head of the centre, who supervises a staff employed under the terms and conditions governing employment at RNL. A core staff is funded through the joint UNEP/Danida/RNL project, which includes the head of the centre and professional staff (five members during phase III and six during phase IV). Additional staff is funded by other contracts and has been increasing allowing the centre to reach during phase IV a total of 15 professionals and a secretary (see annex 4 for a staff list during phases III and IV). The centre also hosts guest researchers (mainly from developing countries visiting the centre for a month or more each year) and Ph.D. students and makes use of temporary consultants for specific short-term assignments.

17. The staff in the centre are employed for their specific skills and knowledge and are allocated functions according to their expertise. There are no clear subunits within the centre. The overall management and guidance are provided by the head of the centre, and the technical activities are carried out by the professional staff. The centre does not have special staff with responsibility for financing or documentation activities. The secretarial and documentation duties are carried out by the support staff. UNEP is responsible for the financial management, in collaboration with RNL, as the centre's projects are subject to the same auditing by government auditors as are all other RNL projects. The administrative officer from RNL's System Analysis Department (SYS) acts as liaison with the Budget and Funds Management Service (BFMS) of the United Nations Office at Nairobi (UNON).

#### E. Facilities and funding

18. The centre is housed on the campus of RNL in Roskilde, Denmark. This arrangement allows the centre to benefit from the library and the computing and catering facilities of RNL. Initially, the centre was located in rooms next to the System Analysis Department. In 1996, new premises were inaugurated in a building specifically designed to meet the centre's needs, allowing for substantial improvement in its physical setting. The cost of building the new facilities was borne by RNL in addition to its contribution to the UCCEE project.

19. UCCEE started its activities with a first phase, from October 1990 to September 1992, that was funded up to \$1.35 million, with Danida contributing 67 per cent, UNEP 15 per cent and RNL (in kind) 18 per cent. The project was extended by phase II covering a longer period (October 1992 to December 1994) and with increased activities. The core funding was increased to \$2.15 million. Danida increased its share to 67.5 per cent, UNEP maintained its share at 15 per cent while RNL reduced its in-kind contribution slightly to 17.5 per cent of the total cost of the project. Expansion of activities and the budget continued during phase III, which was from January 1995 to December 1997, at a total cost of \$3.369 million, with Danida contributing 66 per cent, UNEP 16 per cent and RNL 18 per cent. Another increase in annual expenditures was made during phase IV, which lasted from January 1998 to December 1999. Its initial budget of \$2.5 million was increased by \$90,000 from UNEP Environment Fund. In the revised total of \$2.59 million, Danida's share was 69 per cent, UNEP contributed 13 per cent and RNL 18 per cent. Phase V of the project, from January 2000 to December 2001, has roughly the same budget \$2.624 million, with 70 per cent from Danida, 11 per cent from UNEP and 19 per cent in kind from RNL. The core funding of the five phases are summarized in Table 1.

20. The number of other projects carried out by the centre has been increasing over time, as well as annual contract income. In 1997, at the end of phase III, total contract income was around \$3.4 million, with eight projects for Danida, GEF, the United Nations Development programme (UNDP) and the Danish

Energy Agency accounting for two thirds of this amount, nearly double the core funding for phase III. In 1999, at the end of phase IV, the centre's total contract income had increased to \$3.85 million, with 13 projects for Danida, GEF, UNDP and the Danish Energy Agency accounting for 67.5 per cent of this amount, more than the double the core funding of phase IV.

21. A significant share of the centre's total contract income is channelled to institutions in developing countries for contract activities under joint projects. The amount of these funds reached \$1.2 million in 1997 (35 per cent of annual contract income) and increased to \$6 million in 1999 (40 per cent of annual contract income).

## II. PURPOSE AND METHODOLOGY OF THE EVALUATION

22. The first independent evaluation of the centre's activities was carried out in the first part of 1994 (Davidson, 1994). Provision was made in the basic agreement for a second evaluation in 1997, organized by UNEP on behalf of the three cooperating institutions. The project document for phase IV stated that "the project will be subject to an evaluation in late 1998". MPC has discussed the frequency and format of evaluations for the centre at several meetings. It was agreed that, beginning with regular annual meetings of SAP after 1995, and given the semi-annual meetings of MPC, and the close collaboration and activity coordination between DTIE and RNL, a continuous review process was already taking place, obviating a need to evaluate the centre frequently. Moreover, the UNEP Energy programme was evaluated in 1999 (Gregory, 1999), replacing the formal evaluation envisaged in the project document. However, as an in-depth evaluation of the centre was not included in the terms of reference for evaluation of the energy programme, it was agreed that a specific evaluation of the centre activities would be carried out in early 2001, during phase V.

23. UNEP headquarters was given the task of selecting consultants and formulating the terms of reference of the evaluation. A consultant was appointed by the UNEP Evaluation and Oversight Unit to undertake the evaluation with specified terms of reference (see annex 1 for details). The terms of reference specify that this evaluation is to assess overall performance of the centre from 1995 to 1999, the two phases completed since the previous evaluation. The centre's core activities during this period have been supported through two UNEP projects—phase III (1995-1997) and phase IV (1998-1999). The centre has significantly expanded its work programme and funding base through additional projects, either with UNEP/Danida or with other international or national funding institutions. The evaluation, therefore, covers the centre's full work programme, including the following aspects:

- (a) Appropriateness of the centre's work programme and activities in relation to emerging energy, environmental and development issues, specifically as they relate to UNEP's priorities and plans, especially its subprogramme on energy;
- (b) Effectiveness of the institutional arrangements (organization, staffing, support structure and relationship with the three founding institutions and the functioning of the MPC and SAP) in achieving the stated objectives;
- (c) Quality, relevance and impact of activities undertaken in relation to the direct target groups and relevant UNEP programmes;
- (d) The basic assumptions made in developing the project, particularly those related to: international energy markets, technological changes and national and regional institutional developments.
- (e) Whether changes in basic assumptions call for a review of the objectives, approach or strategy of UCCEE.

24. On the basis of this analysis, the evaluation was to arrive at general conclusions and make realistic recommendations for improvements in the scope, organization and quality of the centre's work programme and outputs.

25. The evaluation was carried by the author starting on 22 January 2001 for a period of six weeks over the first part of 2001. It involved site visits, interviews of relevant personnel and review of pertinent documents available at the various sites visited. The site visits to UNEP/DTIE in Paris, UCCEE and Riso/SYS in Roskilde and Danida in Copenhagen lasted for one week (see annex 2 for the list of persons contacted and the official itinerary of visits and annex 5 for the list of documents consulted).

26. The method used by the evaluator included the following:

- (a) Intensive discussions with the head of UCCEE and senior staff;
- (b) Personal inspection of the physical and technical facilities of UCCEE;
- (c) Participation in one routine weekly meeting of the centre's staff;
- (d) Interview of the head of Riso System Analysis Department (SYS);
- (e) Formal visit to the Danish Royal Ministry of Foreign Affairs;
- (f) Intensive discussions with the UNEP energy programme coordinator and staff;
- (g) Interview of the head of UNEP Division of Technology, Industry and Economics (DTIE);
- (h) Meeting with the fund programme management officer at UNEP headquarters;
- (i) Meeting with one SAP member (external international expert);
- (j) Review of available studies and publications undertaken by UCCEE;
- (k) Review of project documents and evaluation reports of the UNEP energy programme (Gregory, 1999), of UCCEE activities 1990-1994 (Davidson, 1994) and of an important UCCEE project on the economics of greenhouse gas limitations (phase I) carried out from 1996 to 1999 (La Rovere, 1999);
- (l) Review of all available reports, planning documents and relevant documents of a restricted nature such as minutes of meetings of MPC and SAP, as well as internal documentation.

27. Information obtained during the interviews, observations during site visits and review of files and documents available up to 26 January 2001 form the basis of this evaluation.

### III. PROGRAMME DESIGN AND ACCOMPLISHMENTS

28. This chapter will review the centre's work programme design and activities to ascertain the relevance of its priorities and plans, the efficiency of the project objectives, the quality and use of its outputs and its usefulness to UNEP and the Global Environment Facility (GEF).

#### A. Relevant goals of the Risø National Laboratory (RNL)

29. The objective of Risø National Laboratory (RNL) is to further technological development in energy, environment and materials. RNL celebrated its fortieth anniversary in 1998 and since its inception it has evolved from a nuclear-energy research institution to a multidisciplinary centre with a wide range of activities. All research activities at RNL are aimed at minimizing any adverse environmental impact from the production of energy. RNL is an independent government-supported institution with its own board and management. Core funding is provided through the Ministry of Research under a time-bound performance contract. The first contract ended in 1997 with an international evaluation with very positive results that formed the basis for a new four-year contract from 1998 to 2001.

30. The System Analysis Department (SYS) is one of the seven research departments within RNL, and carries out four research programmes:

- (a) Energy systems analysis;
- (b) Safety, reliability and human factors (created in 1999 by merging the programmes on man-machine interaction and industrial safety);
- (c) Technological scenarios;
- (d) Energy, environment and development planning (the internal institutional framework for UCCEE).

31. RNL is predominantly involved in technical research, and SYS is multi and interdisciplinary. Staff include economists, engineers, sociologists, psychologists and scientists with background in physics and chemistry. The department had 63 staff members at the end of 1999, and financial support in 1999 was approximately \$7 million. About one third of the financing was from core funds from the Danish Government, while the rest has come from contracts with research programmes in Denmark and the European Union, projects with institutions of the Danish Government, private companies and contracts with Danida and other bilateral aid organizations, UNEP and other United Nations agencies and the World Bank.

32. Research and development activities in SYS are focused on methods and models dealing with the interaction between various technologies, systems and human beings. The key priorities of the 2000-2002 three-year plan are:

- (a) Establishment of a centre for analysis of the environment, economy and society with the energy systems analysis programme and the policy analysis department of the National Environment Research Institute (located just north of RNL). This centre is a networking arrangement with a common board and scientific advisory panel.

- (b) Full establishment of the technology scenarios programme with a new programme head and approximately five staff members, a number of competitive contracts and an international scientific advisory panel.

#### B. Relevant goals of the Danish International Development Agency

33. Denmark is one of the European countries leading the call for reduction of carbon emissions as a means of slowing possible global warming. The Danish Government has given a clear indication of its commitment to preserving the global environment. Through its Overseas Development Assistance programme, channelled through the Danish International Development Agency (Danida), preservation of the global environment has been a priority, particularly in developing countries.

34. The Danish Royal Ministry of Foreign Affairs has actively focused on environmental issues and has actively cooperated with UNEP. A level of assistance of 1 per cent of GDP, which places Denmark among the most generous donors, will be maintained. Under the MIFRESTA programme initiated after the Rio Summit in 1992, total aid will increase with special focus on environmental issues.

#### C. Relevant UNEP goals and activities

35. The United Nations system-wide medium-term environment programme 1992–1997 had as its main objectives of the energy and environment subprogramme within the energy, industry and transportation programme:

- (a) Increasing integration of the management of environmental impacts of the production and use of energy, industrial activity and transportation into policy and planning;

- (b) Strengthening of national policies, institutions and capabilities for environmentally sound development in the energy, industrial, transportation and tourism sectors;

(c) Promotion of low-pollution and low-resource technologies and conversions, particularly in developing countries;

(d) Enhancement of the working environment of employees.

36 This strategy sought to develop methodologies and guidelines for national governments and to integrate environmental considerations into policy and planning. UNEP is the only agency within the United Nations addressing environmental issues on a global scale as its primary focus. Its role in energy complements work and programmes of other United Nations and national agencies, non-governmental organizations and private partners.

37. The general priority areas of UNEP relevant to energy, as approved by the nineteenth session of the Governing Council, include:

(a) Promotion of the implementation of global environmental conventions;

(b) Encouraging a shift to preventive rather than restorative measures in the production of goods and services, with an emphasis on capacity-building and the transfer of environmentally sound technologies to developing countries;

(c) A geographical emphasis on programmes and activities that benefit Africa.

38. The organizational structure of UNEP changed in 1998 during phase IV of the project. A new divisional structure was adopted and the energy subprogramme has become part of the Energy and OzonAction Unit in the Division of Technology, Industry and Economics (DTIE). The focus of UNEP's energy activities remain in the Paris office.

39. The overall impact and contribution of the UNEP energy subprogramme to improvement in the quality of environment has been tempered by a low level of funding and only one permanent staff member up to October 1998 (January 1999). The capability and efficiency of the subprogramme has substantially increased since a senior programme officer was appointed in October 1998 and permanent staff were appointed in 1999 (four people working on energy issues now). This has led to the development of a new energy policy and to the drafting of a new energy strategy with the following main objectives:

(a) Promotion of increased global investment in the use of renewable and non-carbon energy systems;

(b) Promotion of efforts to improve energy efficiency in intermediate and end-use applications;

(c) Promotion of the provision of better energy services and improvement of the overall management of existing energy systems.

40. The new overall objective is to provide policy makers with relevant, practical and timely information and improve their skills so that they can make better-informed decisions concerning energy policy, practices and investments. The new strategy promotes the exchange of information and raises awareness about cost-effective options for improving energy efficiency and the use of renewable energy sources. It seeks to develop and disseminate practical policies, strategies and tools and enhance the capacity to incorporate environmental analysis in energy policy planning in developing and transitional countries.

41. A number of new initiatives were undertaken to implement this strategy, thanks to an increase of core funding for the period 1998 to 2000. Moreover, the Danish Royal Ministry for Foreign Affairs, through the Danish International Development Agency (Danida), and GEF have provided substantial funding for the energy subprogramme, enabling UCCEE to undertake many projects for the energy subprogramme.

#### D. Work programme and activities – Phase III

42. During the period 1995–1997 (phase III), the centre’s work programme focused on climate change mitigation analysis, with complementary activities in areas such as general capacity-building (in energy and climate-change-related activities), national energy planning (power sector reform), energy efficiency (integrated resource planning), renewable energy (wind energy) and environmental and development economics (external assessment).

43. The following activities were the main activities during in this period (annex 5 provides a brief description of each activity):

(a) The project “Economics of Greenhouse Gas Limitations–Phase I: Establishment of a Methodological Framework for Climate Change Mitigation Assessment”, with financial support from the Global Environment Facility (GEF);

(b) The study “Greenhouse Gas Mitigation for Peru”, within a project involving institutional support, capacity-building and training with financial support from Danida;

(c) The project “Climate Change Mitigation in Southern Africa–Country Programmes, Regional Analysis and Collaboration” with financial support from Danida;

(d) The project “Enabling Activities for Egypt, Jordan and Lebanon–Capacity building for GHG Inventory and Action Plans” with financial support from UNDP/GEF;

(e) Collaboration with the Intergovernmental Panel on Climate Change (IPCC) and preparation of a report on mitigation and adaptation cost assessment;

(f) The project “Capacity-Building for Climate-Change-Related Activities in Burkina Faso” with financial support from Danida;

(g) Support to capacity-building in energy planning in Burkina Faso with financial support from the Danish Energy Agency;

(h) Elaboration of a report on wind energy for the United Nations Committee on New and Renewable Sources of Energy and on energy for development (UNCNRSEED), with financial support from Danida, UNEP and the United Nations Department for Policy Coordination and Sustainable Development (DPCSD subsequently changed to DESA);

(i) Publication of a training manual on integrated resource planning;

(j) Study of the environmental and social implications of power sector restructuring;

(k) Support to the UNEP project on “Incorporation of Environmental Considerations in Energy Planning in the People’s Republic of China”;

(l) Enhancement of the LEAP/EDB computer analysis tool;

(m) General support to the UNEP energy programme.

#### E. Work programme and activities – Phase IV

44 During the period 1998–1999, (phase IV), the centre’s work programme expanded considerably, mainly as a supporting and implementing organization for UNEP and Danida projects but also through contracts with bilateral and multilateral donors.

45. After discussions with the Scientific Advisory Panel (SAP) in 1996 and 1997, the following new subprogrammes were incorporated into the new work programme:

- (a) Climate change mitigation analysis methodologies;
- (b) Environmental and development economics;
- (c) National and international policy instruments;
- (d) Capacity-building concepts and practice;
- (e) Energy sector reform;
- (f) Energy efficiency, integrated resource planning and renewable energy technologies;
- (g) Sustainable transportation.

46. The following major projects were executed in association with the new UNEP energy subprogramme, leading to new functions for the centre (annex VI provides a brief description of each activity):

(a) Finalization of the project “Economics of Greenhouse Gas Limitations–Phase I: Establishment of a Methodological Framework for Climate Change Mitigation Assessment”, with financial support from UNEP and the Global Environment Facility;

(b) Creation of a renewable energy technology/energy efficiency (RET/EE) investment advisory facility with financial support from GEF and UNEP;

(c) Establishment of the Africa Rural Energy Enterprise Development (AREED) with financial support from the United Nations Foundation for International Partnerships, and the private sector;

(d) The project “Implementation of Renewable Energy Projects–Opportunities and Barriers” with financial support from Danida and UNEP;

(e) Upgrading of the RETScreen model;

(f) The project “Capacity-building on renewable energy technologies in the Pacific region” with financial support from Danida and UNEP;

(g) A general collaboration agreement with the Latin American Energy Organization (OLADE) on sustainable energy development;

(h) The project “Capacity Building for the Clean Development Mechanism (CDM)” in Gambia, Ghana, Uganda and Zimbabwe with financial support from Danida and UNEP;

(i) Involvement in the “National Communications Support Programme” implemented by UNDP in collaboration with UNEP and funded by the GEF and several bilateral donors;

(j) A programme on sustainable development and climate change finance with financial support from Danida and UNEP;

(k) Preparation of World Bank guidelines on climate change mitigation and the transport sector with financial support from GEF;

(l) Organization of a workshop on sustainable transport initiatives in developing countries”;

(m) Collaboration with the Intergovernmental Panel on Climate Change (IPCC);

(n) Participation in the study “Options for Emissions Trading” with financial support from the European Commission;

(o) General support to the UNEP energy programme.

#### F. Appropriateness of the work programme and activities

47. The basic agreement provides for significant flexibility with regard to the centre’s specific outputs, activities and work plans and delegates authority in this respect to the Management and Policy Committee (MPC). The descriptions of the work programme and activities in the two UNEP projects—phase III (1995-1997) and phase IV (1998-1999)—are more general than is normally the case in UNEP project documents.

48. During phase III, the activities of the centre were concentrated in the following areas:

(a) Energy–environment policy and planning (national planning studies, implementation, integrated resource planning, environmental data, planning guidelines, methodologies and tools);

(b) Climate change mitigation (GHG abatement costing studies and methodological guidelines, United Nations Framework Convention on Climate Change support activities and UNEP support to GEF project preparation);

(c) Information centre (publications, biannual newsletter, information upon request);

(d) Scientific back-up and programme support to UNEP (support to UNEP projects, ad-hoc assistance, designated representation in meetings).

49. In the UCCEE phase-IV project document, the activities of the centre were concentrated in the following areas:

(a) Promoting energy efficiency technologies and policies and low environmental impact energy resources (project on renewable energy barriers and report on wind energy);

(b) Promoting the use of methodologies, tools and approaches for incorporating environmental principles into energy sector analysis (climate change mitigation, environmental economics, integrated assessment and IPCC activities);

(c) Analysing environmental and social impacts of energy sector institutional restructuring (case studies of power sector reform in sub-Saharan Africa, Southeast Asia and Latin America);

(d) UNEP support and information activities (information centre, scientific back-up and programme support to UNEP).

50. The centre has significantly expanded its work programme and funding base through additional projects with UNEP/Danida or with other international or national funding institutions. This evaluation covers the centre’s full work programme.

### IV. WORK PROGRAMME AND ACTIVITIES

#### A. Work programme 1995-1997

51. In the period 1995-1997 (phase III), the centre consolidated its position as the leading institution on mitigation methodology development in the international arena. The basis of this capacity was the UNEP seminal project for GHG abatement costing studies carried out in the earlier phases of the centre’s work from 1991 to 1993. The GEF project “Economics of Greenhouse Gas Limitations—Phase I: Establishment of a Methodological Framework for Climate Change Mitigation Assessment” provided follow-up of the previous effort and broadened the analysis framework. It was undoubtedly the most important achievement

of the centre during phase III, with the resulting methodological guidelines providing a relevant contribution to the Convention on /climate Change process.

52. Most of the centre's activities during phase III were concentrated in the area of climate change mitigation (see activities "a" to "f" above), as a natural unfolding of the competence accumulated in this field. The intensity of the efforts and the accomplishments in the development of methodologies and analytical tools have allowed for a positive synergy and support for capacity-building in this field.

53. Complementary projects have tried to address the other priority areas in this period. In the field of environmental and development economics, the main effort was to produce guidelines allowing for integration of externality assessment in the climate change mitigation analysis undertaken in the case studies within the main project on the economics of GHG limitations. While the report on guidelines to calculate indirect costs and benefits of GHG limitations was published, its application was limited to the Mauritius case study (La Rovere, 1999).

54. Similarly, the main contribution to the area of national energy planning has come from the case studies on GHG limitations. A specific effort focused on the power sector reform, through case studies undertaken in sub-Saharan Africa and Argentina. Additional projects led by national institutions in China and India have also contributed in this area, addressing the issue of integrating environmental concerns into national energy planning.

55. Energy efficiency was also addressed through the analysis of energy efficiency measures as potential mitigation options in many case studies of the project on the economics of GHG limitations. A specific effort in this area was limited to the publication of a training manual in integrated resource planning. The main work on renewable energy has also occurred within the analysis of potential mitigation options in national case studies of the project on the economics of GHG limitations. A specific activity in this field has taken advantage of the positive synergy with other departments of RNL to produce a report on the state of the art of wind energy.

56. Finally, the main achievement in the development of energy-related environmental data and tools was the work on the LEAP/EDB model to incorporate the calculation of GHG emissions from energy systems, also used for climate change mitigation analysis.

57. The emphasis on climate change activities in this period was partly a natural reflection of the growing relevance of this global issue and of the Convention on Climate Change process, which gained momentum during preparation of the Kyoto Protocol, signed during the third Conference of the Parties in December 1997. It also resulted from follow-up to important research in GHG abatement studies during the initial phases of the centre, which allowed for its international recognition as the leading institution on the development of mitigation methodology.

58. It must be recognized that the centre's accomplishments during this period represented only a modest contribution to the very ambitious long-term results expected during phase III: "reduced pollution from energy activities while allowing the developing countries to meet their growing needs for energy services ...through more efficient use of depletable fossil energy resources and increased use of clean, renewable resources" (pages 6–7). Achievements of UCCEE during this period have made a limited contribution to the ambitious short-term targets established in the project document, including: "integration of environmental concerns in national energy policy and planning, trained and sensitised policy makers and planners, establishment and dissemination of environmental data, planning methods and policy tools". The emphasis on climate-change activities may provide an entry point but it is not exactly the primary focus of the centre's main objectives, which are "to promote and facilitate the incorporation of environmental aspects into energy policy and planning especially in developing countries" (project document, page 3).

59. The general objectives and targets stated in the project document were laudable, but difficult to achieve within the project period, at that level of funding and with the staff of UCCEE. The long-term targets can be achieved only over a long period of time because national energy policy and planning is a time-consuming and complex process. UCCEE has begun to provide a limited contribution to the achievement of short-term targets.

60. The training courses and workshops organized, the publications produced and distributed, and the provision for guest researchers at the centre have trained and sensitised some policy makers and planners and disseminated some environmental data and planning methods to the centre's audience in developing countries. However, during phase III, most of the centre's activities have directly addressed the global impact of energy projects and only in a few cases have they promoted integration of local environmental concerns into national energy policy and planning.

61. The difficulty of translating the centre's general objectives and phase III project targets into concrete activities more specifically focused on them was also partly due to the low level of funding and to the absence of senior professional staff at the UNEP energy programme during this period. The centre's contribution remained most valuable to other UNEP objectives, such as contributing effectively to progress in the Convention on Climate Change process.

#### B. Work programme 1998-1999

62. General support by the centre to UNEP has improved substantially thanks to the new UNEP energy subprogramme with a higher level of funding and a stronger UNEP energy unit operational since 1999 with senior professional staff appointed at the DTIE office in Paris. An excellent collaboration has started between the energy unit and the centre. This positive synergy has led to an impressive increase in external funding (contracts besides the UNEP centre project), which has reached a level covering roughly two thirds of the centre's professional staff.

63. In 1998-1999 (phase IV), the centre's activities expanded significantly and encompassed new subprogramme areas as recommended by the Scientific Advisory Panel. The implementation of the centre's new work programme structure began in this period, but while some areas were already consolidated, some subprogrammes were still at an incipient stage.

64. Climate change mitigation analysis methodologies - In this well-consolidated area, the main activity was continuation of the GEF project on the economics of greenhouse gas limitations, which started in the previous phase. The formal project was delayed until 2000 to ensure the completion of two national reports and to facilitate translation into national languages of two other national reports. A specific in-depth evaluation of this project was conducted in late 1999 (La Rovere, 1999).

65. Environmental and development economics - The development of a methodology under the GEF project on an approach to assessing broader social and environmental costs of mitigation was continued under the clean development mechanism subprogramme activities (Markandya, 1998 and 1999).

66. National and international policy instruments - This subprogramme has focused on the clean development mechanism of the Kyoto Protocol and joint implementation and emissions trading. Work has concentrated on establishing baselines and sustainability indicators.

67. The centre has supported UNEP's involvement in the preparation of a major programme on building capacity in the use of clean development mechanisms. This programme has been prepared by United Nations Conference on Science, Technology and Development (UNCTAD), UNDP, UNEP, UNIDO and the Convention on Climate Change secretariat, and funding has been requested from UNFIP and bilateral donors. UNEP has been given overall responsibility for methodology development and national pilot studies. It is expected that the centre will contribute significantly to UNEP's activities if the programme is funded. The programme was revised and received full endorsement by the fifth Conference of the Parties of the Convention on Climate Change.

68. Besides the capacity-building component embedded in other subprogrammes, the main specific activity under this subprogramme is the centre's participation in the national communications support programme, which was formally launched at the fourth session of the Conference of the Parties. The project is coordinated by UNDP, which has established a small support unit. UNEP is responsible for activities in Africa, and the centre is providing technical backstopping to UNDP and UNEP. The programme is coordinated by an advisory committee involving the two agencies, the centre and the Convention on Climate

Change and GEF secretariats. Future activities scheduled include a series of regional meetings for the exchange of experiences and targeted technical assistance support to specific regional or national activities.

69. Energy sector reform - There was no specific activity under this subprogramme during phase IV, besides the publication of the book "Power Sector Reform in Sub-Saharan Africa" in 2000, based on work performed during the previous phase. There are potential links of reform issues with activities on policy instruments and implementation barriers to renewable energy technologies that can be explored. Various requests related with this issue were also channelled through the sustainable energy advisory facility (SEAF). SEAF is a new project started in 2000 to establish a sustainable energy advisory facility providing information and technical support for sustainable energy activities in developing countries with a focus on policy changes that provide a framework for sustainable energy approaches.

70. Energy efficiency, integrated resource planning and renewable energy technologies - The area of renewable energy technologies was substantially strengthened in this period with a number of new activities and innovative approaches. The new SEAF initiative has opened additional significant perspectives in this area, including support to project assessment, feasibility studies and advice on plans and strategies.

71. Sustainable transport - The initial activity of the centre in this field with the World Bank has been completed successfully but could be followed up with selected case studies as a small start-up activity on transportation in UNEP. The centre could facilitate studies and convene a seminar to discuss results and experiences.

72. The broader activities have brought an expansion of the functions of the centre, thanks to cooperation with the new UNEP energy unit based on the mutual agreement to build on the comparative advantages of both institutions. The UNEP energy unit is based in the Paris office tradition for private sector collaboration linking with business associations, financial institutions, while the centre is based in a research setting and has traditionally worked with other research institutions, non-governmental organizations or governmental institutions. The GEF and United Nations Fund projects are direct examples of this interaction, allowing the centre to launch innovative activities with financial institutions and rural energy enterprises.

73. The broader scope of the centre's work programme activities in the period 1998-1999 was not yet as comprehensive as stated in UNEP energy programme and the centre's objectives and strategy. The crucial issues related to energy and environment faced by decision-makers in developing countries are essentially short-term, concerning local environmental impact and risks of oil, gas, coal, firewood and power supply (production, conversion and transportation) and the use of fuels. Given the number of national and international institutions already dealing with such issues, the centre's comparative advantages in new areas of activity deserves careful examination. The main challenge is to find a reasonable compromise between the relevance and extension of the issues covered in the centre's work programme and its limited capacity in terms of staff, resources and expertise to make a significant contribution in new areas.

74. The Scientific Advisory Panel (SAP) has been discussing the strategic orientation of the centre's work programme and feels that a more detailed assessment of the needs, possible activities and expertise available is required. Meanwhile, the SAP has recommended that the centre move towards more emphasis on sustainable energy development from the viewpoint of developing countries on national priorities but through incremental additions to existing activities and expertise rather than big jumps into completely new areas.

75. Along these lines, the subprogramme on national and international policy instruments deserves the utmost priority. Given the potential of the Clean Development Mechanism to foster sustainable development in developing countries, allowing for the convergence of global climate protection and national development objectives, this area is a good niche for increased activity. The accumulated experience on climate change mitigation analysis can be channelled to support national sustainable development priorities.

76. Another priority is the promotion, wide dissemination, strengthening and extension of initiatives such as the Sustainable Energy Advisory Facility (SEAF), allowing for a more needs-oriented approach to meet requests from energy and environment policy makers in developing countries. The centre is in a unique position to play the role of a clearing house, helping decision-makers in developing countries to find the

most up-to- information on energy and environment issues, not only related to climate change but also to various national priorities, such as power sector reform, oil spills, large dams, indoor pollution due to use of firewood, air pollution standards and regulations, protection and pricing of water resources, energy and environmental audits and energy efficiency benchmarks.

77. The impressive progress made by the centre's activities in the field of renewable energy technologies should be continued and further expanded, as there is a clear institutional gap to be filled by the centre and the UNEP energy unit in this area. A similar move should be taken in the area of energy efficiency. The work started by the UNEP energy unit to promote the establishment of energy services companies and cleaner production approaches could be extended by the centre. Experience with overcoming barriers to the work of financial institutions and private enterprises in areas such as renewable energy technologies and energy efficiency can be most valuable in other areas of the centre's activities.

78. The sustainable transportation subprogramme well illustrates the effort of the centre to address an area of undeniable priority, following the orientation provided by the SAP. A possible strengthening of the centre's activities in this field would be to merge the activities on environmental and development economics into one subprogramme. There is an important synergy between the two subprogrammes to be explored in the quantification of costs of health hazards due to air pollution. Meanwhile, other tools for dealing with negative environmental factors, such as environmental strategic assessments and impact studies, need to be explored in the decision-making framework applicable to other areas such as the Clean Development Mechanism and national energy planning. An effort in this direction would change the current imbalance that favours monetizing environmental impacts in the work programme.

79. It seems important to avoid further discontinuity in the centre's work on reform of the power sector. The previous experience accumulated in the African and Argentine case studies can be enhanced with enlightening comparative analysis on this issue between several regions (e.g. the recent power shortages in California and Brazil, environmental standards enforced by different power regulatory agencies). The building of capacity in climate change and other energy-environment issues is an important contribution of the centre.

## V. INSTITUTIONAL ARRANGEMENTS

80. In general, the current institutional arrangements were found to be working well, but there is a need for minor adjustments due to the increased level of the centre's activities.

### A. Management Policy Committee and Scientific Advisory Panel

81. The core donors to the centre, Danida, UNEP and RNL are directly involved in the executive management of UCCEE. The Management Policy Committee (MPC) is made up of representatives of the three founding institutions and acts as an executive board for the centre. MPC was established on 5 October 1990 and has been meeting almost twice a year. In the early phases of the centre's operation, the frequency was higher, reaching 11 meetings up to 1994. In the period 1995-1999, 10 meetings were held (three meetings in 1995, two in 1996, three in 1997, one in 1998 and one in 1999) at different locations (Nairobi, Roskilde, Copenhagen, Buenos Aires during the fourth meeting of the Conference of the Parties and Paris). These meetings have reviewed past activities, examining the status of each subprogramme of the centre's work plan, discussing new projects and proposals and approving future work programmes of core projects, besides reviewing the centre's staff recruitment and travel plans. Since 1996, the MPC has taken note of the recommendations made by the Scientific Advisory Panel (SAP), established in 1995 and meeting regularly once a year. The head of the centre is a member and acts as secretary of the MPC and SAP meetings. The head of SYS at RNL also takes part at both groups. Since 1998, with the new UNEP structure, the head of the UNEP energy unit has joined both MPC and SAP meetings.

82. The MPC has been able to provide effective guidance to the centre's activities and has strongly benefited from the inputs supplied by the SAP, which has been playing a valuable role helping to think strategically about the centre's orientation. The MPC meetings have allowed for building and consolidating a relationship of trust among the participants. Given the centre's increased level of activities, it is advisable to hold a minimum of two MPC meetings per year, avoiding intervals of more than six months between

meetings as occurred in 1998 and in 1999 (in 2000, two MPC meetings were held). The frequency of the SAP meetings seems appropriate, and the effectiveness of those meetings would be enhanced if they were followed by a MPC meeting.

#### B. Head of the Centre

83. The head of the centre is directly responsible to the MPC on all the centre's policy matters and programme activities. He is administratively responsible to the head of SYS at RNL. In addition to his responsibility for the overall direction of the centre and coordination with the three founding institutions, the head is responsible for preparing management reports and fully participates in the research and other activities. This function has been performed with remarkable efficiency, but there is a clear risk of overburdening the head of the centre, given the growth of the demands put on him by the recent expansion of the centre's activities. The effectiveness of his performance is partly due to his unique background as a researcher at SYS and programme officer at UNEP headquarters and by the experience accumulated from having been in that position since the beginning of the centre. The strengthening of the UNEP energy unit in Paris has helped spread the work of developing new projects and funding, but a considerable additional amount of follow-up work has been required from the head of the centre in the execution of the new activities. Therefore, it is felt that the appointment of an assistant manager under the head of the centre to help with the daily management functions would improve the effectiveness of the centre's work. It is suggested that an assistant would be more appropriate than a deputy, and a clear-cut division of labour should be established. The assistant manager would focus on management, communication and public information activities.

#### C. Staff

84. The professional staff of the centre is composed of 15 researchers with backgrounds in science or management, with a good balance (50/50) between the two areas. They are employed under terms and conditions governing all RNL employees. Professional staff members are required to fill out time sheets indicating the time spent on projects and to publish scientific papers at least once a year. The staff is efficiently complemented by the centre's secretary, who has been performing this function since the start of UCCEE, and by the administrative officer of SYS, who handles all the accounting of the centre's contracts. The centre has regularly hosted guest researchers and Ph.D. students, resulting in a very positive synergy with its activities. This effort can be further expanded, trying to attract more good candidates, particularly from developing countries. The centre's initiative to develop a Ph.D. programme involving the University of Bath (United Kingdom), RNL, the University of Copenhagen and a similar association with the University of Cape Town seem to be a good steps in that direction.

85. The staff is well qualified and its professional competence is well balanced between disciplines of economics, energy planning and the physical sciences. The research framework of RNL has stimulated scientific productivity, as illustrated by the number and quality of publications, as was recommended in the first evaluation report (Davidson, 1994). The professional staff has grown from two when the centre started to seven at the end of phase II and 15 after phases III and IV. The recent trend shows an average increase of one staff member every two years. This increase has naturally led to minor problems of communication, decision-making and conflict resolution, as detected in RNL questionnaires regularly filled out for monitoring purposes. A good response to the need for better communication among the professional staff has been the establishment of a weekly meeting. A two-day retreat of all staff members was planned for March 2001, allowing for an intensive discussion of the centre's daily activities. It might be useful to hold retreat meetings regularly in a different setting (out of the office).

86. The centre's increased level of activities demands not only an increase of staff members but also adjustments in its structure and minor changes in the functions of the staff members. Increase of the staff should be limited, as it would be unadvisable to go beyond the level of 20 people within the current structure. In fact, core funding of the centre within phases III, IV and V has been covering only six professional staff besides the head of the centre. Even if a large number of contracts allowing for the bulk of the staff growth is seen as a positive development, it would not be prudent to rely too much on short-term assignments to pay for additional staff, which could prejudice general staff security. On the other hand, the senior professional staff could well be called to take increased responsibility in the general management of

activities. Coordination of projects and, in some cases, management of a subprogramme of the work plan is already being done by the professional staff. The positive results of such development suggest that it might well be extended and formalized in the centre's structure. Given the increased activities of the centre, it seems crucial to allow for decentralized management of its subprogrammes by senior professional staff, going beyond the decentralized management of single projects. Together with the hiring of an assistant manager, this would reduce the current overburden on the head of the centre.

#### D. Facilities

87. The centre is located on the RNL campus, and since 1999, in new specially designed premises. The centre also benefits from the library, computing and catering facilities of RNL. The vicinity of the centre to SYS allows for a fruitful exchange between the centre and RNL. Besides the joint activities with SYS and other RNL departments, some key senior professional staff members of the centre came from SYS. The present arrangement is appropriate and satisfactory to meet the centre's needs, especially after the construction of the new premises, which allowed for substantial improvement of its physical setting. Communications between the centre and the UNEP energy unit work very well, allowing for close cooperation. This flexibility is well illustrated by the remote operation of an UCCEE project by staff located at the Paris office.

#### E. Finances

88. Core funding for the centre is provided by Danida, UNEP and RNL in the shares illustrated in table 1. The financial management of the centre is carried out by UNEP headquarters, through the Budget and Funds Management Service (BFMS) of the United Nations Office at Nairobi (UNON). Danida's contribution is paid into the UNEP Trust Fund as provided for in the project document. RNL retains their contribution as the implementing agency. Cash advances are made to the centre through RNL according to provisions stated in the project document. After an initial cash advance, quarterly financial reports are required by UNON/BFMS from RNL in accordance with UNEP rules and regulations. Yearly financial reports are also required, and they must be certified by a firm of public accountants with supporting accounts, records and expenditures.

89. RNL provides the final project accounts, which are certified by a public accounting firm. The centre's projects are subject to the same auditing by the state auditors as all other RNL projects. At the discretion of UNEP, RNL will facilitate the auditing of the final accounts. All records for non-expendable equipment purchased by the project are maintained at RNL, and yearly reports are submitted to UNEP through UNON/BFMS. The equipment remains the property of UNEP until disposal as stipulated by the project document.

90. The same UNEP rules and regulations are followed by the centre's projects with external funding. The present financial management of the centre by UNON/BFMS is working effectively, and this arrangement seems appropriate to the funding institutions. The administrative officer from RNL's System Analysis Department (SYS) ensures an efficient liaison with UNON/BFMS. Some problems and delays affecting the start of the GEF project on the economics of greenhouse gas limitations, AREED and SEAF projects have arisen in the past due to frequent changes of fund programme management officers at UNON/BFMS, but the new staff appointed has been working efficiently. Other difficulties stem from the fact that several UNON programme officers deal with the centre's externally funded projects, such as those supported by GEF.

91. For effective remittance of funds from donors and financial management of the centre, some improvements are needed. Well-defined responsibilities and deadlines should be clearly stated and available to all line managers for the remittance of funds in due time. UCCEE needs to strengthen its management staff. As noted in the evaluation report of the UNEP energy subprogramme (Jenny, 1999), there is a lack of clarity in shared administrative functions between Nairobi, Paris and RNL offices, resulting in unsystematic project reporting. It is recommended that the administration be streamlined through the involvement of programme and administrative officers at RNL, UNEP/DTIE and UNON.

## VI. QUALITY, RELEVANCE AND IMPACT OF ACTIVITIES

### A. Publications

92. The publications by the centre's projects and staff are summarized in table 2 on a yearly basis for the period 1995-2000. The total number of publications has continuously increased from 31 publications in 1995 to 84 in 1999. The drop in 1997-98 can be explained by the large number of workshops organized by the centre in these two years, and the delay involved in preparing the corresponding publications. The quality, relevance and impact of the publications under subtotal 1 in the table are expected to be the highest, as they include articles in international journals, books and reports; articles in Danish journals, books and reports; RNL reports; Danish books and reports; and international books and reports. The progress achieved in this category is satisfactory with the doubling of this kind of publications from 14 in 1995 to 28 in 1999.

93. Highlights of the centre's scientific achievements in this period include the work performed for the second and third IPCC assessment reports, the IPCC special reports on emissions scenarios and technology transfer and the methodological guidelines for assessing the economics of GHG emissions limitation. Although generally considered of lower scientific relevance, the number of published and unpublished lectures given at Danish and international conferences and seminars (including published abstracts), as well as other publications for a broader readership, illustrates the impact of the centre's activities. The number of this kind of publications, subtotal 2 in the table, has shown an impressive increase in the period covered by this evaluation; from 31 publications in 1995 to 84 in 1999.

94. The setting of the centre in the framework of a scientific institution like RNL with general requirements for its professional staff to publish research results frequently is considered appropriate and has met the recommendations of the first evaluation report (Davidson, 1994).

### B. Studies and workshops

95. During the period covered by this evaluation, most international and national studies and workshops promoted by the centre were related to the main project on the economics of greenhouse gas limitations implemented by the centre from 1996 to 1999. This project expanded the work done during phases I and II on abatement costs of greenhouse gas emissions, which made the centre known and respected by the climate-change community.

96. In terms of relevance, the results of the studies and workshops have become more relevant than they were at the outset. The framework convention on climate change process had not drafted requirements for countries to report on mitigation analysis and needs for a methodology. After the Kyoto protocol was established, the situation changed, drawing attention to the need for all countries to carry out some degree of mitigation analysis. Accordingly, there was growing acknowledgment of the need for consistent methodological frameworks in all areas of national climate-change analysis. The idea of baselines is particularly relevant now that the Clean Development Mechanism has been established as one of the important elements of the Kyoto Protocol.

97. The studies and workshops promoted by the project have contributed to the identification of cost-effective mitigation options at the national level. In some countries (e.g. Estonia and Hungary) selected policies and measures were also identified (e.g. energy tax and energy conservation options) and taken into account in the formulation of national energy policies. In the case of Argentina, the methodological framework established through the project has helped to establish and select means to meet a mitigation target. However, the project can still make an important contribution to the identification of a portfolio of mitigation projects, barriers to their implementation and policies and measures. The uneven quality of the national studies can be explained by the composition of the national teams. National teams constituted by research institutions and non-governmental organizations have generally provided better results than ministerial teams, reflecting the difficulty of availability.

### C. Institutional arrangements

98. The main project, the economics of greenhouse gas limitations, followed the approach in which the country studies were implemented through a national climate-change focal point, and the organization of the national teams was decided by the national project coordinator in consultation with UCCEE. This led to a solid national commitment to the project and to the establishment of national teams whose composition reflected specific national circumstances. When a research institution or a non-governmental organization was made responsible for project implementation while overall coordination remained with the government, this arrangement has made it easier to ensure increased stakeholder involvement in implementation of the studies (La Rovere, 1999).

### D. Technical assistance and support

99. According to most of the national teams consulted, the technical assistance provided in the project on the economics of greenhouse gas limitations was very valuable. National teams participating in the project had an opportunity to use several consultants and to visit centres of excellence. These activities have been considerably expanded by the very nature of the new projects recently undertaken by the centre, such as the renewable energy technology and sustainable energy advisory facility (SEAF) projects.

### E. Capacity-building

100. Through three meetings of the national teams, the project on the economics of greenhouse gas limitations has contributed to building significant understanding and capacity for doing mitigation analysis in the participating countries. Direct performance indicators on capacity-building are difficult to establish for national teams nominated by governments. The involvement of local centres of excellence (e.g. the Instituto de Economía Energética de la Fundación Bariloche) in project implementation has proven particularly successful, drawing their attention to climate change issues. Similarly, the use of research institutions and non-governmental organizations to implement the project has increased awareness about climate change issues in the scientific and non-governmental communities. The four countries using ministerial teams may face different circumstances due to a lack of resources to maintain full climate change offices. A good indication of the effectiveness of the centre's contribution to capacity-building in this area is the significant number of persons from developing countries participating in this project, other UCCEE projects, IPCC, national communications and the Convention on Climate Change Conference of the Parties meetings.

101. The project's national workshops have disseminated the objectives and findings of the national studies to other institutions beyond the national teams directly involved in project implementation. However, the outreach of this kind of project can be substantially increased through the publication and distribution of the final report of the national studies in national languages.

102. In most countries, the project has contributed to the creation of a minimum critical mass of skilled human resources capable of undertaking climate change mitigation analyses. Project workshops and the involvement of national institutions in project activities have increased exposure to the issue of climate change and have contributed to a growing awareness of the issue in the scientific, industrial, non-governmental and administrative communities. The project has also introduced new methodological approaches, such as the concept of mitigation cost curves.

103. Integration of the climate change mitigation dimension into national policy frameworks will depend upon a variety of factors. For developing countries, the key issue remains the outcome of the Convention on Climate Change negotiations about further commitments to the inclusion of mitigation analysis in national communications. However, the willingness to participate in discussions about the proposed Clean Development Mechanism may increase their interest in developing and using mitigation analysis capacity acquired through the project, once the Kyoto Protocol is ratified and its flexibility mechanisms enter into operation. In some countries (Argentina, Estonia and Hungary), the capacity built through the project has been already used to design concrete policies and measures (mitigation targets, energy taxes, energy efficiency).

## F. Partnerships and linkages

104. The project on the economics of greenhouse gas limitations was closely coordinated with other similar international activities. Close links were maintained with the main bilateral programmes (Germany, the Netherlands United States of America and the Danish capacity-building project implemented by UCCEE) and GEF-funded projects like CC:TRAIN, ALGAS and many other regional and national activities.

105. UCCEE has implemented a number of bilateral capacity-building projects in climate change funded by Danida and has provided support to three UNDP/GEF-enabling activities in Egypt, Jordan and Lebanon. Bilateral and UNDP/GEF teams have participated in workshops under the economics of greenhouse gas limitations project.

106. UCCEE works closely with climate-change coordinators in UNDP and UNEP. This collaboration has been extended through the new UNDP/UNEP-GEF national communications support programme. The centre has been actively involved in inter-agency groups working with other United Nations bodies (United Nations Education, Science and Culture Organization (UNESCO), UNCTAD, UNIDO and UNEP) in the coordination of actions to promote renewable energy, energy efficiency and climate-change mitigation. Collaboration has also been engaged with other intergovernmental agencies, such as the World Bank, the International Energy Agency (IEA) and regional bodies, such as the Latin American Organization for Energy Development (OLADE), the Economic Commission for Latin America and the Caribbean (ECLAC) and the Organisation for Economic Cooperation and Development (OECD).

107. Activities recently undertaken by the centre provide support national governments, even when they do not directly involve partnership relationships with governmental institutions, and allow for a more significant involvement of other stakeholders. Particularly relevant is the establishment of a network of regional centres collaborating with UCCEE through a joint programme, besides specific activities. The extent of the centre's partnerships with non-governmental organizations, national research centres and governmental institutions is well illustrated by the significant amount of resources channelled to these institutions for contract activities under joint projects, which now represents 40 per cent of the annual contract income for UCCEE.

## G. Institutional sustainability

108. Even without formal coordination, the project on the economics of greenhouse gas limitations has contributed to the success of similar initiatives, such as country studies by the United States and the ALGAS project. Some members of national teams participated in other projects and in the preparation of national communications. Some joint activities and mitigation measures were formulated and discussed after being identified as promising options through the project. Local Agenda 21 initiatives have also benefited from a growing awareness of global common concerns promoted by the project. In some cases, the project was able to play a catalytic role in bringing together governmental agencies to discuss the adoption of new policies and energy-efficiency strategies.

109. However, there has been a lack of sustainability in the national and regional teams. Many of the most capable people in institutions in developing countries often take other assignments (e.g. the Convention on Climate Change secretariat), and continuity in the centre's efforts suffers from the difficulty of recruiting skilled human resources for national teams. Most often, public bodies in developing countries are fragile, and significant institutional building would be required to ensure stable activities in the area of renewable fuels and energy efficiency. The centre's contribution to this goal can be improved if more continuity in the international partnership is ensured after specific projects finish. An international network of centres of excellence collaborating in the centre's subprogrammes could be an important tool.

## H. Contributions to Governments, cooperating agencies and development banks

110. The main link of the project with the Convention on Climate Change was the contribution of the report on guidelines to the Subsidiary Body for Scientific and Technological Advice (SBSTA) methodological programme. Many staff members on the project's national teams also prepared national

communications to UNFCCC. The project results will be valuable to the new UNDP/UNEP National Communications Support Programme, also a GEF project.

111. Links with the Intergovernmental Panel on Climate Change (IPCC) are worth mentioning. UCCEE and the Berkeley Lawrence National Laboratory organized a writing team on mitigation and adaptation concepts at the request of the Second Assessment Report, Working Group III (SAR WG III), and a UCCEE/UNEP/IPCC workshop was held in 1997, sponsored largely by Danida, to discuss the report prepared by the team. The report was reviewed by IPCC, published as a UNEP report in 1998 and presented to SBSTA during the fourth Conference of the Parties to Convention on Climate Change as part of the methodological work programme.

112. Due to a delay in approving the project, GEF's development of a methodology was already completed when the project finally started. By then, the GEF operational strategy had been launched. The focus of GEF activity has shifted towards implementation of mitigation options, policies and measures. Priorities have shifted from the calculation of mitigation costs to identification of barriers to implementation and appropriate policies and measures to overcome them. The contribution of the project to GEF strategies, policies and project implementation has been limited to consolidation of previous efforts in the field of mitigation analysis (UCCEE, 1994; Sathaye and Meyers, 1995; the PRINCE project; UCCEE, 1998). This explains why the proposals for enabling activities from the eight participating countries have not yet been effective. There is interest in a second phase of the project for detailed identification of possible mitigation projects, barriers to their implementation and measures to overcome those barriers, with a focus on market transformation. Projects under the Clean Development Mechanism will directly benefit from results already obtained.

#### I. Contributions to other activities

113. New projects undertaken by the centre have allowed the expansion of its influence on governments and regional development banks in the area of sustainable energy policies. At the national level, the Africa Rural Energy Enterprise Development (AREED) project and capacity building for the Clean Development Mechanism have contributed to the development of renewable energy and energy efficiency projects in many developing countries. The SEAF project has started to work in the same direction, although results are not yet known. The centre's influence is limited because of national autonomy.

114. The centre's activities with regional development banks have been with the Asian Development Bank (ADB), also supported by Danida, in implementation of the Buenos Aires Plan of Action. ADB is managing a \$10 million fund for project in renewable energy and energy efficiency in Asia. There are good prospects of similar activities in Latin America. The Inter-American Development Bank (IDB) has shown interest in replicating the renewable energy technology project, working with OLADE. In Africa, progress in this area has been slower because the African Development Bank has not given a high priority to environmental projects.

#### J. Monitoring and management systems

115. The general administration of projects has usually been efficiently handled by UCCEE, and an institution such as UCCEE seems to be essential to the organization of this kind of projects. An illustrative example is the handling of contracts directly with executing institutions, which has helped speed up implementation of projects in countries using research institutes or non-governmental organizations for national studies. Another positive aspect is flexibility in the use of project funds for technical assistance to national teams. It was sometimes felt appropriate to use the technical assistance funds to hire domestic consultants and regional centres of excellence as support to national teams.

116. Follow-up of studies has been ensured by UCCEE staff members assigned to specific countries and regions. Monitoring of the centre's activities has followed standard RNL procedures and seems appropriate to the nature of UCCEE projects. Given the expansion of the centre's activities, it seems appropriate to carry out more frequent evaluations than once every seven years (the first evaluation of the centre's activities covering phases I and II was done between January and July 1994). A regular schedule for evaluation of the centre's activities should be organized between the evaluations of the activities of the UNEP energy unit and

general RNL evaluations every five years. Ideally, the UCCEE project should be for five years, as two years is a very short period, as noted by the previous evaluation report. In order to avoid delays, preparation for the evaluation should start well in advance and allow for two to three man-months of work spread over six months. In addition to the centre's staff, MPC and SAP should be involved in early drafts and review the basic assumptions made in developing the project.

117. There is a need to review two factors that have affected the basic assumptions of phases III and IV of UCCEE:

(a) "the present oil and coal market prices are the lowest in many years and evidently makes these sources competitive in comparison to more environmentally benign renewable energy resources";

(b) "many developing countries and countries with economies in transition are gradually moving from highly regulated and subsidized national energy markets towards more competitive markets. This will make efficiency and conservation activities more attractive since in many cases they are the cheapest options for improving energy services".

118. The first factor is no longer valid, because the price of oil on the international market has increased from an average of \$17.80/barrel in 1999 to \$28.40/barrel in 2000 and a projected \$28/barrel in 2001 (Brent crude). With these prices, there are areas in which renewable energies are competitive (e.g. remote rural areas), and efforts should be made to remove non-economic barriers the use of renewable energies. The second factor is still a consideration, but has not necessarily led to wide adoption of energy efficiency measures. In some cases (e.g. California and south-eastern Brazil), increased competition in the power sector has not successfully attracted the additional investment required for expansion of the system and energy conservation. Increased regulation by regulatory agencies has fostered investment in energy efficiency in some cases (e.g. Brazil). Existing non-economic barriers to the promotion of energy conservation are still very important factors.

119. On the other hand, the international energy scenario has recently evolved in a direction that constitutes a major challenge for the short-term goal of the UCCEE project, "integration of environmental concerns into national energy policy and planning". In fact, the acute power shortages in industrialized and developing countries (e.g. California, south-eastern Brazil) have led to a dangerous interpretation by national administrations that blames environmental constraints for insufficient power supply expansion. Acceptance of this interpretation risks setting back the integration of environmental concerns in energy planning. It is recommended that the next UCCEE project addresses this threat to UNEP objectives in the energy field, including activities to collect evidence that environmental concerns and energy planning objectives can be harmonized.

120. The need to review the basic assumptions made in developing the UCCEE projects does not call for review of the mission, approach and strategy of the centre, which remain appropriate. On the other hand, the preparation of a project document consistent with the latest analysis of the international energy context can be very helpful to focus future activities on updated short-term targets, more in tune with the real needs perceived by MPC, SAP and the centre.

#### K. Publications and information channels

121. The first evaluation of the centre recommended the publication of the centre's findings in scientific journals in order to enhance the contribution of the centre to scientific debate. The number of scientific publications by the centre's staff has been quite satisfactory, and in the area of climate-change mitigation, the centre has made a significant contribution to the work of IPCC. Overall, the dissemination of project results and follow-up activities is quite successful, reaching the most pertinent audiences. For example, key outputs of the project on the economics of greenhouse gas limitations, such as the methodological guidelines, were submitted to the SBSTA of the Climate on Climate Change and widely distributed through the UNDP/UNEP national communications support programme and other channels: national enabling activities project teams, national Convention on Climate Change delegations and a broad range of experts. A total of 2,000 copies of the guidelines were distributed. National and regional studies were also published in English and distributed (50 copies of each).

122. The main task ahead to maximize dissemination of projects results is to ensure as a routine procedure the translation into national languages and wide distribution within each participating country of national studies. The centre's visibility can thus go far beyond the collaborating team and workshops audiences directly involved in the activities, spreading much more widely within each participating country. This could be partially achieved in the case of the project on the economics of greenhouse gas limitations, following a recommendation of the 1999 evaluation report. All the centre's reports published so far are available from the UCCEE web site. However, much remains to be done in order to make the centre better known and increase the number of hits to the UCCEE Web site leading to effective contacts and activities.

123. The centre regularly publishes a newsletter that provides information on its activities to a larger target audience. According to the phase III project document, the C<sub>2</sub>E<sub>2</sub> newsletter is to be published semi-annually, as in the previous phases. The content of the newsletter has increased from four pages in its first issue to 16 pages in the fourth issue, in 1993. The periodicity was roughly respected until 1995, with a six-month delay until publication of issue 8 in April, 1996. The issue scheduled for late 1996 was delayed due to the heavy workload from the GEF project on the economics of greenhouse gas limitations and the need to clarify the newsletter's format. It was decided to make the newsletter thematic, and the first issue focusing on enabling activities was published in May 1997 with contributions from UNEP, UNDP, the Convention on Climate Change secretariat and the United States, Dutch, Danish and German climate programmes. Another thematic issue with external contributions focused on power-sector restructuring. In the phase IV project document, the periodicity of the newsletter was left open, according to this new orientation. In 1998, a shorter format of the newsletter was prepared that focused exclusively on the centre's activities and not on a specific theme. Finally in 1999, a new format of the newsletter was established under the name "UCCEE News", limited to four pages and focusing on short summaries of the centre's activities. The mailing list has been updated. Between October 1999 and November 2000, three issues in the new format were published, which are available on the UCCEE web site.

124. Complementary to the newsletter, a joint presentation folder for the UNEP energy unit and the centre was prepared and disseminated in 1999. A UNEP booklet on renewable energy technology and policy was also prepared with the energy unit and published in 2000.

125. There is a clear need for a plan for information and publication dissemination linked with the UNEP energy unit that should include preparation of material for broader audiences. An article published at least once a year in an influential newspaper would help a lot to make the centre more visible to public opinion. Permanent press contacts should be established, and better liaison with the UNEP press office could be organized for help on this issue. An assistant manager to the head of the centre could take on these duties and ensure permanent contact with UNEP headquarters and regional information officers. Hiring journalists with experience in scientific dissemination for preparing specific materials (articles for the newsletter, summaries of project findings, etc.) should be done on a regular basis.

## VII. PROBLEMS AND CONSTRAINTS

126. This evaluation confirmed that UCCEE has functioned well, with a need for minor adjustments due to the increased level of the centre's activities. In this chapter, the main problems and constraints that affected the development and implementation of the centre's activities are reviewed. They are discussed together with some recommendations for their resolution.

### A. 1995-1997 Work programme

127. The centre's accomplishments from 1995 to 1997 represented only a modest contribution to the very ambitious long-term results expected in the phase III project document. Achievements during that period have made a limited contribution to the ambitious short-term targets established in the project document. The emphasis on climate-change activities during this period may have provided an entry point but does not match the primary focus of the centre's general objectives, which are "to promote and facilitate the incorporation of environmental aspects into energy policy and planning, especially in developing countries". The difficulty of translating the centre's general objectives and phase III project targets into focused concrete

activities was partly due to the low level of funding and the absence of senior professional staff with the UNEP energy programme during this period.

128. The general objectives and targets stated in the phase III project document were laudable, but difficult to achieve within the project period, at the level of funding and staff of UCCEE. The long-term targets can be achieved only over a long period because national energy policy and planning are time consuming and complex processes. It is recommended that the formulation of objectives and targets of future UCCEE projects carefully adhere to the reality of the centre's activities.

#### B. 1998–1999 Work programme

129. The scope of the centre's work programme activities in 1998–1999 was not as comprehensive as stated in UNEP energy programme and the centre's objectives and strategy. Discontinuity in the centre's work on power sector reform should be avoided. A reasonable compromise should be found between the centre's objectives, strategy and work programme, and its limited staff, resources and expertise.

#### C. Financial arrangements

130. For effective remittance of funds from donors and financial management of the centre, some improvements are needed. Well-defined responsibilities and deadlines should be clearly stated and available to all line managers for the remittance of funds. UCCEE needs to strengthen its management staff. As noted in the evaluation report of the UNEP energy subprogramme (Jenny, 1999), there is lack of clarity in shared administrative functions between Nairobi, Paris and RNL resulting in unsystematic project reporting. It is recommended that the administration be streamlined and that programme and administrative officers at RNL, UNEP/DTIE and UNON be more involved.

#### D. Project implementation

131. In order to avoid completely delays completion of future projects, alternative approaches could be required to overcome time constraints. Strengthening UCCEE staff allocated to the technical supervision of studies through the use of additional domestic or foreign consultants could be useful to allow for stricter monitoring of national studies. The time required for responding to the needs of national teams could also be cut by similar means. The need to anticipate possible time constraints must be met on the management side through the best arrangements to maximize the involvement of domestic institutions. In the design stage, a careful assessment of the reliability of governmental bodies as source of data and general information must be undertaken to provide a realistic time frame for project execution. Similarly, appropriate institutional building for the undertaking of the national studies should follow from a pre-feasibility analysis in the planning stage.

132. In order to overcome operational constraints due to political and institutional problems, it would be useful that the responsibilities of the national focal point and the national study team leader are made clear from the outset through the specification of detailed terms of reference for their tasks related to the project. For example, on the technical side, the primary responsibility for the homogeneity of reports should be ensured by the national team leader. On the management side, there should be clearly defined roles in the establishment of a time schedule for all the institutions involved to perform their assigned tasks.

133. Throughout the project, close monitoring of the schedule is needed to provide for early warning and corrective actions to overcome operational constraints and avoid delays. The flow of financial resources for studies could be more tightly linked to the achievement of progress, in order to enhance the incentive to local institutions to meet schedules. The establishment of these clear rules at the outset would make it easier to overcome the political and institutional problems often found due to different national circumstances.

### VIII. LESSONS LEARNED

134. In this chapter the main lessons learned from the centre's programme activities that are useful for the continued operation of the centre and for relevant programmes in UNEP are summarized.

#### A. Work programme and activities

135. The general support of the centre to UNEP has improved substantially thanks to the new UNEP energy subprogramme with higher level of funding and a stronger UNEP Energy Unit operational in 1999 with senior professional staff appointed at the DTIE office in Paris. An excellent collaboration has started between the energy unit and the centre, with complementary vocations allowing for substantial benefits to both groups from cooperation on many activities. This positive synergy has led to an impressive increase in external funding (contracts besides the UNEP centre project), which has reached a level covering roughly two thirds of the centre's professional staff.

136. The centre has supported UNEP activities in the field of energy in close partnership with the new UNEP Energy Unit. In particular, UCCEE helped UNEP to act as GEF's implementing agency. Besides, UCCEE permitted participation of UNEP in several international forums on energy issues. UCCEE has also helped UNEP to coordinate with other United Nations agencies in areas such as renewable energy technologies and the framework climate change convention.

#### B. Effectiveness of institutional arrangements

137. The 1994 agreement provides for significant flexibility with regard to specific outputs, activities and work plans of the centre, and delegates authority in this respect to the Management and Policy Committee (MPC). This flexibility was found to be an essential asset of the centre. The MPC has been able to provide effective guidance to the centre's activities and has strongly benefited from the inputs supplied by the SAP, which has been playing a valuable role helping to think strategically about the centre's orientations. The MPC meetings have also allowed for building and consolidating a relationship of trust between the participants.

138. The resources allocated to the centre through the UCCEE core projects are appropriate, as they can be complemented by other sources of funding through specific projects. It was found that the continuation of the core funding is essential for the centre to avoid the need to look for additional projects or approach donors. Ideally, the period of core projects and funding should be extended, possibly to four or five year, in order to provide more stability.

#### C. Project implementation and organization

139. The experience of the centre with the GEF project has shown that national teams constituted by research/non-governmental organization institutions have generally obtained better results than those composed by ministerial teams, reflecting the difficulties of ensuring the appropriate time availability for the study of staff from governmental bodies. When a research institution or an NGO was made responsible for the project implementation while overall coordination has remained with the government, this arrangement has made it easier to ensure an increased stakeholder involvement in the implementation of the studies.

140. The technical assistance provided through the centre has been very valuable. National teams participating in the project have had an opportunity to use foreign consultants and visit centres of excellence for short stays. The involvement of local centres of excellence in project implementation has proved particularly successful.

141. The new activities recently undertaken by the centre, such as the renewable energy technologies and SEAF projects provide useful inputs to national governments even when they do not directly involve partnerships with governmental institutions. They also allow for a more significant involvement of other stakeholders. The extent of the centre's partnerships with non-governmental organizations, national research centres and governmental institutions is well illustrated by the significant amount of resources channelled to these institutions for contract activities under joint projects, which has reached 40 per cent of the UCCEE annual contract income.

142. Some activities implemented jointly and mitigation measures were formulated and discussed after being identified as promising options through the project Economics of Greenhouse Gas Limitations. They can now evolve into JI or CDM project proposals. Local Agenda 21 initiatives have also benefited from the

growing awareness of global commons concerns promoted by the project materials, meetings and workshops. In some cases the project was even able to play a catalyst role in gathering different governmental bodies to discuss the adoption of new policies, such as energy efficiency strategies.

143. In terms of general administrative arrangements, projects have usually been efficiently handled at UCCEE. The existence of an institution such as the UCCEE seems to be essential to an appropriate organization of this kind of projects, allowing for the flexibility required by different national circumstances in the participating countries.

## IX. CONCLUSIONS AND RECOMMENDATIONS

144. In the period 1995–1997 (phase III), UCCEE consolidated its position as the leading institution on mitigation methodology development. The GEF project on the economics of greenhouse gas limitations (phase I) was undoubtedly the most important achievement of the centre during that phase, with the resulting methodological guidelines providing a relevant contribution to the UNFCCC process. Most activities during phase III were concentrated on climate change mitigation, as a natural unfolding of the competence accumulated in this field. The development of methodologies and analytical tools has led to training courses, workshops and the publications. Guest researchers have been trained at the centre and policy makers and planners sensitised. However, during phase III, most of the centre's activities directly addressed the global impact of energy projects, and in only a few cases were they linked with integrating local environmental concerns in national energy policy and planning.

145. The emphasis on climate change activities in this period was partly a natural reflection of the growing relevance of this emerging issue and of the Convention on Climate Change process, which gained momentum in the preparation of the Kyoto Protocol. It also resulted from the follow-up of important research efforts in greenhouse gas abatement studies during the initial phases of the centre, which led to international recognition of the centre as the leading institution on mitigation methodology development.

146. The difficulty of translating the centre's general objectives and the phase III project targets into concrete activities was partly due to the low level of funding and to the absence of senior professional staff at the UNEP energy programme during this period. The centre's contribution was most valuable to other UNEP objectives, such as contributing to the progress made in the UNFCCC process. The capability and efficiency of the UNEP energy programme has substantially increased since a senior programme officer was appointed in October 1998 and permanent staff were appointed in 1999 (four people now working on energy issues). This has led to the development of a new energy policy and a new draft energy strategy.

147. A number of new initiatives were undertaken to implement this strategy helped by an increase of core funding for the period 1998 to 2000. Moreover, the Danish Royal Ministry for Foreign Affairs, through the Danish International Development Agency (Danida), as well as GEF, provided substantial funding to the energy subprogramme. This has enabled UCCEE to undertake many projects for the energy subprogramme.

148. The broader activities have also brought an expansion of the functions of the centre, thanks to the collaboration with the new UNEP energy unit, based on the mutual agreement to build on the comparative advantages of both groups. The GEF and UNFIP projects are direct examples of this interaction, allowing the centre to launch innovative activities with financial institutions and rural energy enterprises.

149. It is recommended that the centre move towards more emphasis on sustainable energy development for the needs of developing countries through incremental additions to existing activities and expertise rather than through a shift into completely new areas. Along these lines, the subprogramme on national and international policy instruments deserves priority. Given the potential of the Clean Development Mechanism to foster sustainable development in developing countries, allowing for the convergence between global climate protection and national development objectives, this area is a good niche for increased activity of the centre. The accumulated experience on climate change mitigation analysis can be channelled to support national sustainable development priorities.

150. Another priority would be the promotion, strengthening and extension of initiatives such as the Sustainable Energy Advisory Facility (SEAF), allowing for a more needs-oriented approach to meet requests

from energy and environment policy makers in developing countries. The centre is in a unique position to support a UNEP role of clearing house helping decision-makers in developing countries to find the most up-to-date international state-of-the-art information on energy-environment issues, not only related to climate change but also to various national priorities in this field (such as power sector reform, oil spills, large dams, indoor pollution due to fuel wood use, air pollution standards and regulations, protection and pricing of water resources, energy and environmental audits and energy efficiency benchmarks).

151. The impressive progress made by the centre's activities in the field of renewable energy technologies should be continued and further expanded, as there is a clear "institutional gap" to be filled by the centre jointly with the UNEP energy unit in this area. A similar move should be taken in the area of energy efficiency. The work started by UNEP energy unit to promote the establishment of energy services companies in a manner consistent with cleaner production approaches could be extended with the involvement of the centre. This kind of experience with overcoming barriers to the work of financial institutions and private enterprises in areas such as renewable energy technologies and energy efficiency can also be most valuable to other areas of the centre's activities.

152. The sustainable transport subprogramme illustrates well the centre's effort to address an area of undeniable priority, following the orientation provided by the SAP. A possibility to strengthen the centre's activities in this field would be to merge the activities on environmental and development economics in a single subprogramme. Currently, there is important synergy between the two subprogrammes to be explored in the quantification of costs of health hazards due to air pollution. Meanwhile, other tools for dealing with negative environmental external factors, such as environmental strategic assessments and impact studies, need to be explored in the decision-making framework applicable to other areas such as the clean development mechanism and national energy planning. An effort of the centre in this direction would allow compensation for the imbalance in favour of monetizing environmental impacts found in the current work programme structure.

153. Given the increased activities of the centre, it is advisable to stick to a minimum of two MPC meetings per year, avoiding intervals of more than six months between two meetings as occurred in 1998 and 1999 (in 2000, two MPC meetings were held). The annual frequency of the SAP meetings seems appropriate and its effectiveness would be enhanced if it were followed by a MPC meeting.

154. The increased level of activities of the centre demands not only growth of the staff but also adjustments in its structure and minor changes in the functions performed by the staff. The growth of the staff should be limited, as it would not be advisable to go beyond the level of 20 persons within the current structure. It can be complemented with an increased number of guest researchers and Ph.D. students, particularly from developing countries. On the other hand, the senior professional staff of the centre could take increased responsibility in the general management of activities. The coordination of projects and the management of a subprogramme are already being carried out by the professional staff. The positive results of this coordination suggest that it might well be extended and formalized in the centre's structure. Given the increased activities of the centre, it seems crucial to allow for decentralized management of its subprogrammes by senior professional staff, going beyond the decentralized management of single projects. Together with the hiring of an assistant manager, this would reduce the burden on the head of the centre.

155. Particularly relevant to help the centre to shift from a project focus to a subprogramme focus would be the establishment of a network of regional centres collaborating with UCCEE through a long-term programme, in addition to specific short-term activities. Working closely and strengthening the linkages with the UNEP energy unit, the centre should play a catalytic role in networking with existing energy and environment centres of excellence in industrialized and developing countries. The positive experience of the centre with this approach in the field of mitigation analyses, coupled with UNEP experience with the establishment of the cleaner production centres around the world, could be effectively combined to promote sustainable energy approaches through such a network. It is also recommended that more integration among the different UNEP services involved in the field of climate change be promoted through the establishment of an UNEP climate change task force. The centre could be a catalyst in this initiative.

156. The number of publications is seen to have continuously increased from 31 publications in 1995 to 84 in 1999. The articles, technical reports, books, booklets and the newsletter are of a good standard. The

setting of the centre in a scientific institution like RNL, with general requirements for its professional staff to publishing research results is considered appropriate and has met the recommendations in this direction formulated by the first evaluation report (Davidson, 1994).

157. Generally, the implementation of the centre's projects through national teams has allowed for building significant understanding and capacity for mitigation analysis in the participating countries. National teams were able to make substantial progress after exposure to the centre's materials and workshops. Similarly, the use of research and non-governmental organizations to implement the project has allowed for growing awareness of climate change issues in the scientific and non-governmental organizations communities. In many countries, the centre has contributed to a minimum critical mass of skilled human resources capable of undertaking climate change mitigation analyses. Integration of the climate change mitigation dimension in national policy decision-making frameworks will depend upon a variety of factors. For developing countries, the key issue remains the outcome of the Convention on Climate Change negotiations on further commitments to the inclusion of mitigation analysis in their national communications. However, the willingness to participate in the Clean Development Mechanism may well foster their interest in developing and using the mitigation analysis capacity acquired through the project, when the Kyoto protocol is ratified and its flexibility mechanisms enter into operation. In some countries, the capacity built has been already used to design concrete policies and measures (mitigation targets, energy taxes, energy efficiency). More generally, the capacity of participating countries to undertake climate change mitigation will depend upon follow-up activities after the contribution provided by the centre's projects, as in most cases the institutional sustainability of this analysis has not yet been reached (La Rovere, 1999).

158. UCCEE has forged effective partnerships and links with governments, United Nations bodies, international development banks and non-governmental organizations and has started activities with the private sector. The centre has been implementing a number of bilateral climate change capacity-building projects and has provided support to UNDP/GEF enabling activities. UCCEE works closely with the climate change coordinators in UNEP and UNDP. This collaboration has been extended through the new UNDP/UNEP GEF national communications support programme. The centre has been actively involved in inter-agency groups (UNCTAD, UNIDO, UNESCO and other UNEP branches) to coordinate actions in the promoting renewable energy and energy efficiency as well as climate change mitigation. With the regional development banks, the highlight of the centre's activities has been work with the Asian Development Bank (ADB), also supported by Danida, towards the management of a \$10 million fund to implement renewable energy and energy efficiency projects in Asia.

159. At the national level, the AREED project and the activities in capacity-building for the Clean Development Mechanism have contributed the development of renewable energies and energy efficiency projects in many developing countries. The SEAF project has also started to work in the same direction, although it is too early for its evaluation.

160. There is a need to review the two factors affecting achievement of results in the basic assumptions of UCCEE phases III and IV. A new project document should offer an opportunity to monitor periodically the centre's accomplishments and to discuss adjustments in its orientation. Besides the centre's staff, both the MPC and SAP should be involved in the discussion of drafts and review the basic assumptions made in developing the project in light of the research results obtained by the centre and of a strategic analysis of the international energy context.

161. The need to review the basic assumptions made in developing the UCCEE projects does not call for review of the mission, approach and strategy of the centre, which remain appropriate. On the other hand, the preparation of a project document consistent with the latest analysis of the international energy context can be very helpful to focus the future activities of the centre on updated short-term targets, more adherent to a strategy in tune with the real needs perceived by the MPC, the SAP and the centre's head and staff. It also supplies the opportunity for an exercise of monitoring the effectiveness of the centre's activities.

162. The international energy scenario has recently evolved in a direction that constitutes a major challenge for achievement of the short-term goal of the UCCEE project, "integration of environmental concerns in national energy policy and planning". In fact, the acute power shortage crises occurring in industrialized and developing countries have led to a dangerous interpretation by national administrations blaming

environmental constraints for insufficient power supply expansion. Generalization of the acceptance of this interpretation presents a major risk of an important step backward in the integration of environmental concerns into energy planning that should not be underestimated. It is recommended that the next UCCEE project strategy address this consideration, including activities designed to collect abundant evidence that environmental concerns and energy planning objectives can be harmonized.

## Annex I

### Terms of reference

#### I. BACKGROUND

The UNEP Collaborating Centre on Energy and Environment was established in October 1990 by a tripartite agreement between UNEP, the Danish Royal Ministry of Foreign Affairs and the Risø National Laboratory, Denmark.

The first phase (UNEP project FP/CP/2103-90-01) covered the period from the start of the centre until September 1992, and the second phase (UNEP project FP/CP/2103-92-01) began in October 1992 and was completed at the end of 1994. As part of the second phase, an evaluation was undertaken and recommendations were made for strengthening the centre. A new agreement was signed between the Danish Royal Ministry of Foreign Affairs, Danida, the Risø National Laboratory (RNL) and UNEP in December 1994, which requires independent evaluation at regular intervals and provides general guidelines concerning the management and activities of the centre and provides for continuation of the established tripartite Management and Policy Committee (MPC) that oversees the centre. The MPC meets semi-annually to discuss implementation of the centre's work programme, future activities and sub-contracted projects. Creation of a Scientific Advisory Panel (SAP) for the centre was one of the recommendations of the 1994 evaluation and was implemented in 1995. The SAP meets annually to discuss and recommend strategic priorities for the centre's work programme.

The objective of this evaluation is to assess the overall performance of the centre since the previous evaluation. The centre's core activities in this period have been supported through two UNEP projects—phase III (1995–1997) and phase IV (1998–1999). The centre has significantly expanded its work programme and funding base through additional projects with UNEP/Danida or other international or national funding institutions. The evaluation covers the centre's full work programme.

#### II. LEGISLATIVE MANDATE

The mandate for the objects and activities of the project emanate from the following UNEP Governing Council decisions and related United Nations resolutions: UNEP GC 16/15, 17/32, UNEP GC (Report to the Governing Council on plans to implement Agenda 21) paragraph 30 and UNEP GC 1922.

#### III. ACTIVITIES

The evaluator is to:

- (a) Assess the overall appropriateness of the centre's work programme and activities in relation to priorities and plans of UNEP, particularly concerning the subprogramme on energy;
- (b) Assess the effectiveness of the institutional arrangements (organization, staffing, support structure, and relationship with the three founding institutions) in achieving the centre's established objectives;
- (c) Assess the quality, relevance and impact of activities and outputs, including:
  - (i) Published books, technical reports, methodological guidelines, planning tools and environment data, national plans and strategies;
  - (ii) National and regional studies, including workshops and seminars at national and regional levels through desk reviews and comparison with similar studies conducted under other programmes;
  - (iii) Appropriateness of the institutional arrangements in terms of overall project implementation and organization of studies at the national level, including level of stakeholder involvement in the design and implementation of projects and other activities;

- (iv) The appropriateness of technical assistance and support provided to the collaborating national and regional teams and institutions;
- (v) The centre's contribution to building or enhancing capacity to undertake energy environment and climate change mitigation analysis.
- (d) Assess the extent to which the project has forged effective partnership and linkages with governments, the private sector, United Nations agencies and non-governmental organizations and other stakeholders to enhance the appropriateness and relevance of its activities and outputs.
- (e) Assess the degree of institutional sustainability achieved by collaborating national and regional teams and institutions in development and implementation of sustainable energy policies.
- (f) Review the monitoring and management systems developed to implement internal and external activities.
- (g) Assess the appropriateness and effectiveness of publication and information channels used in communicating the results to a larger target group.
- (h) Make recommendations for future activities and structure, taking into consideration UNEP's role and mandate in relation to energy and environment, including climate change mitigation and adaptation and economics.
- (i) In the context of the catalytic function of UNEP, identify and determine how the project activities have influenced governments, cooperating agencies, international and regional development banks and other partners to adopt and enhance their capacities to implement appropriate policies and strategies in the area of developing and implementing sustainable energy.
- (j) Identify problems encountered in the process of subprogramme and project development, implementation and monitoring and evaluation; and present practical recommendations for the improvement of programme delivery in the future.

## REPORT OUTLINE

### EXECUTIVE SUMMARY

#### I. INTRODUCTION

##### A. Background

##### Purpose and Methodology of Evaluation

#### II. PROGRAMME DESIGN AND ACCOMPLISHMENTS

- A. Appropriateness of the centre's work programme and activities in relation to emerging energy, environment and development issues and specifically to UNEP's priorities and plans concerning the subprogramme on energy.
- B. Effectiveness of the institutional arrangements (organization, staffing, support structure and relationship with the three founding institutions) in achieving the centre's established objectives.
- C. Quality, relevance and impact of activities in relation to target groups and the relevant UNEP programmes.
- D. Monitoring and management systems developed to implement internal and external activities.

E. Publication and information channels used and their appropriateness and effectiveness in communicating the results to a target group.

### III. PROBLEMS AND CONSTRAINTS

A. Discussion of problems and constraints that affected the implementation of the centre's programme and recommendations for their resolution.

### IV. LESSONS LEARNED

A. Lessons learned from the centre's programme activities that are useful for the continued operation of the centre and for relevant UNEP programmes.

### V. CONCLUSIONS AND RECOMMENDATIONS

General conclusions on the main aspects of the evaluation and realistic recommendations for changes and improvements in the scope, organization or quality of the centre's work programme and outputs. The evaluator shall provide a concise summary (maximum of five pages) covering the main items of the evaluation. The detailed report shall not exceed 50 pages. The evaluator shall visit the centre and the energy subprogramme and hold meetings with MPC members and other relevant staff of all the founding organizations. Members of the SAP and representatives of collaborating and sponsoring institutions shall be consulted. The evaluation shall be conducted during January and February 2001, and a draft report shall be available for comments by 28 February 2001. The evaluator will be contracted for a total of six weeks spread over two months and will be provided with a return ticket to Paris and Copenhagen plus DSA in accordance with United Nations rules.

## Annex II

### List of persons interviewed

UNEP Division of Technology, Industry and Economics, Paris (22–23 January 2001)

Jacqueline Aloisi de Larderel, Head of Division of Technology, Industry and Economics, member of UCCEE Management and Policy Committee (MPC)  
Mark Radka, Energy Programme Coordinator, Energy and OzonAction Unit, member of the Scientific Advisory Panel (SAP) of UCCEE  
Lawrence Agbemabiese, Energy Programme Officer, Energy and OzonAction Unit  
Eric Usher, Consultant, Energy and OzonAction Unit  
Martina Otto, Energy Programme Officer, Energy and OzonAction Unit  
Barnaby Jones, Fund Programme Management Officer, UNEP headquarters

International Centre on Environment and Development (CIRED), Paris (23 January 2001)

Jean-Charles Hourcade, Head of CIRED, member of SAP

UCCEE, Roskilde (Denmark) (24–26 January 2001)

Hans Larsen, Head of the Systems Analysis Department, RISO, chairman of MPC  
John M. Christensen, Head of the centre, member of MPC and secretary of SAP  
Kirsten Halnaes, senior economist  
Arturo Villavicencio, senior energy scientist

Royal Ministry of Foreign Affairs, Copenhagen (26 January 2001)

T. Mailand Christensen, Ambassador (Environment and Sustainable Development), member of UCCEE Management and Policy Committee (MPC)  
Thure Christiansen, Head of Section  
Jakob Vinding Madsen, Head of Section, Secretariat of Environment and Sustainable Development

## Annex III

### Members of the UCCEE Scientific Advisory Panel

#### 1. First term (1995–1997)

Mr. Stephen Karekezi (Tanzania)  
Mr. Youba Sokona (Senegal)  
Mr. Giap van Dang (Thailand)  
Mr. R.K. Pachauri (India)  
Mr. Mariano Bauer (Mexico)  
Mr. Carlos Suarez (Argentina)  
Mr. Lars Kristofersen (Sweden)  
Mr. Janos Pastor (Hungary, UNFCCC Secretariat)  
Mr. Hans Larsen (RNL observer), chairman of SAP  
Mr. John M. Christensen (Head of UCCEE, secretary of SAP)

#### 2. Second term (1998–2000)

Mr. Stephen Karekezi (Kenya)  
Mr. Youba Sokona (Senegal)  
Mr. Kirit Parikh (India)  
Mr. Ye Ruqui (China)  
Mr. Mariano Bauer (Mexico)  
Mr. Carlos Suarez (Argentina)  
Mr. Jean-Charles Hourcade (France)  
Mr. Thomas Johansson (Sweden, UNDP)  
Mr. Dennis Tirpak (USA, UNFCCC Secretariat)  
Mr. Mark Radka (UNEP observer)  
Mr. Hans Larsen (RNL observer), chairman of SAP  
Mr. John M. Christensen (Head of UCCEE), secretary of SAP

Annex IV

UCCEE staff (2001)

Name/country	Expertise (Qualification)	Position	Period of Stay
John M. Christensen Denmark	Engineering (Ph.D)	Head/Senior Energy Scientist	Start to present
Jorgen Fenhann Denmark	Physics (M.Sc.)	Senior Energy Scientist	1993 to present (60%)
Gordon A. Mackenzie Britain	Physics (Ph.D)	Senior Energy Scientist	Start to March 1999 (on leave)
Arturo Villavicencio Ecuador	Energy Planning (M.Sc.)	Senior Energy Planner	May 1991 to 1997 1999 to present
Kirsten Halsnaes Denmark	Economics (Ph.D)	Senior research Specialist	Mid 1992 to present
Henrik J. Meyer Denmark	Economics (M.Sc.)	Economist	December 1993 to present
Lasse Ringius Denmark	Political science (Ph.D)	Senior Economist	1999 to present
John M. Callaway USA	Agriculture and economics (Ph.D)	Senior Economist	1996 to present
Juan Zak Ecuador	Mech. Eng. (M.Sc.)	Senior Energy Scientist	1998 to present
Fanny Missfeldt Germany	Economics (Ph.D)	Environmental Economist	1998 to present
Jyoti P. Painuly India	Economics (Ph.D)	Senior Energy Economist	1997 to present
Myung-Kyoon Lee Korea	Economics (Ph.D)	Senior Economist	2000 to present
Jorge Rogat Chile/Sweden	Economics (Ph.D)	Economist	2000 to present
Njeri Wamokonya Kenya	Environmental science (Ph.D)	Energy planner	2000 to present
Anton Louis Olivier South Africa	Environmental science (M.Sc.)	Energy Planner	2000 to present
Cassandra Brooke Australia	Environ. Plan. (MA)	Ph.D. student	1997 to present
Anne Olhoff Denmark	Economics (M. Econ.)	Ph.D. student	1997 to 1/5 2001 (res. assist from 1/5)
Kim R. Olsen Denmark	Economics(M. Econ.)	Ph.D. student	1999 to present
Jesper Kuhl Denmark	Economics (M. Sc.)	Ph.D. student	Starting September 2001
Ivan Nygaard Denmark	Engineering (M. Sc.)	Ph.D. Student	Starting September 2001
Maria Andreasen Denmark		Secretary	1995 to present

A new post of administrative assistant is being advertised in August.

Other Staff Members during Phases III and IV

Name/Country	Expertise (Qualification)	Position	Period of Stay
Joel N. Swisher USA	Engineering (Ph.D)	Senior energy scientist	July 1993 to December 1995
Pramod Deo India	Physics/Economics (Ph.D)	Senior energy economist	July 1993 to September 1998
Steffen R. Nielsen Denmark	Techn. Soc. (M.Sc.)	Ph.D. student	February 1995 to 1997 (finished Ph.D)
Robert Y. Redlinger USA	Environ. Eng. (M.Sc.)	Senior energy scientist	1996 to 1998
Ian Rowlands Canada	Chemical Eng./Inter'l. relations (Ph.D)	Energy planner	October 1996 to November 1997
John K. Turkson Ghana	Economics (Ph.D)	Economist	February 1996 to January 2000 (died)
Maria J. Figueroa Venezuela	Env. Energy (M.Sc.)	Energy scientist	1997 to April 2000
Christopher Saarnak Denmark	Geo. (M.)	Ph.D. student	1997-2000 (finished Ph.D)
Norbert Wohlgemuth Austria	Economics (Ph.D)	Senior economist	1998 to March 2000

## Annex V

### UCCEE work programme activities – Phase III (1995–1997)

1. Execution of the project on the economics of greenhouse gas limitations–Phase I: Establishment of a Methodological Framework for Climate Change Mitigation Assessment”, with financial support from the Global Environment Facility–Project implementation has started in 1996 and completed at the end of 1999. The project has aimed to assist developing and transitional countries with economic analysis of climate change mitigation strategies by establishing, applying and testing a consistent methodological framework. The project activities have included:

(a) Establishment of a common methodological framework for calculating the cost of climate change mitigation activities at national level;

(b) Testing and applying this framework in 8 national studies through assessments of their mitigation costs as an input to their national mitigation strategies and national communications under UNFCCC;

(c) Establishment of an initial framework for assessment of mitigations options and strategies at the regional level through the implementation of studies for the Southern Africa Development Conference (SADC) and the Andean Pact;

(d) Establishment and/or enhancing the national capacity in the participating countries to comply with the requirements of the UNFCCC, specifically the capabilities of relevant institutions to fully participate in the project activities and be able to undertake future mitigation assessments.

The following countries participated in the project: Argentina, Ecuador, Estonia, Hungary, Indonesia, Mauritius, Senegal and Viet Nam. Except for Mauritius and Senegal, the final reports of the national studies were published. The report on methodological guidelines and the two regional studies were published as well. The closing national workshops were organized in all the countries with the exception of Ecuador, Mauritius and Senegal.

2. Elaboration of the study “Greenhouse Gas Mitigation for Peru”, within a project involving institutional support, capacity building and training, with financial support from Danida–This activity has followed the general mitigation analysis approach established in the methodological framework of the previous project (a) above, but also focusing on the use of different tools for strategic planning. As part of the project, a special seminar on Strategic Planning was held in Lima in November 1997.

3. Execution of the project “Climate Change Mitigation in Southern Africa–Country Programmes, Regional Analysis and Collaboration”, with financial support from Danida–UCCEE has acted as coordinator of a study on regional opportunities for mitigation of GHG emissions, responsible for the synthesis of the studies carried out by regional centres in Botswana, Tanzania, Zambia and Zimbabwe. A regional baseline was established and a number of mitigation options for the SADC area were assessed. In addition to looking at cooperation in the power sector, this study has also considered regional transport arrangements. The results of the SADC study (see project (a) above) along with deliberations on regional cooperation in Southern Africa were subsequently published in book form.

4. Execution of the project “Enabling Activities for Egypt, Jordan and Lebanon–Capacity building for GHG Inventory and Action Plans”, with financial support from UNDP/GEF–This project has allowed for the involvement of these three countries in the network of GHG emissions mitigation national studies supported by UCCEE (see projects above) and in somewhat broader activities.

5. Collaboration with the Intergovernmental Panel on Climate Change (IPCC) and Elaboration of a Report on Mitigation and Adaptation Cost Assessment–UCCEE staff have participated as lead authors of some chapters related to mitigation analysis in the Second Assessment Report (SAR) of the IPCC, Working Group III. This assessment concluded that there was a need for further clarification and coordination of the economic concepts applied in relation to different dimensions of climate change studies and policy

development. The UCCEE was therefore together with LBNL–Berkeley Lawrence National Laboratory asked by the IPCC to organize a workshop and develop a concept paper on Mitigation and Adaptation Cost Assessment. A joint UCCEE/UNEP/IPCC workshop was held in 1997 sponsored largely by Danida to discuss the report prepared by the writing team convened by UCCEE and LBNL. The report has subsequently been through a full IPCC technical review and published as a UNEP report late in 1998 and presented to SBSTA during the fourth Conference of the Parties to UNFCCC as part of the methodological work programme.

6. Execution of the project “Capacity-Building for Climate Change Related Activities in Burkina Faso”, with financial support from Danida–UCCEE has supported through training activities the building of capacity to establish the initial reporting to the UNFCCC (GHG inventories and policies that could mitigate climate change) by the inter-ministerial climate change unit set up by the Government.
7. Support to Capacity Building in Energy Planning in Burkina Faso, with financial support from the Danish Energy Agency–The centre was involved in building capacity in the new Energy Agency in Burkina Faso. The main focus was in general capacity building, establishment of an energy database, construction of an electricity planning model, and development of an electrification plan for the country, involving both urban and rural areas.
8. Elaboration of a Report on Wind Energy for the United Nations Committee on New and Renewable Sources of Energy and on Energy for Development (UNCNRSEED), with financial support from Danida, UNEP and the United Nations Department for Policy Co-ordination and Sustainable Development (DPCSD subsequently changed to DESA)–The report has provided the most up-to-date summary of wind energy information available and was co-written by UCCEE and Riso staff from the Energy Systems Group in the System Analysis Department and in Wind Energy and Atmospheric Physics Department. A short version of the report was delivered to the UN and published as a report of the UN Secretary-General in 1998, while a longer full version was prepared in collaboration with UNEP Energy Unit to be published as the book “Wind Energy in the 21<sup>st</sup> Century: Economics, Policy, Technology and the Changing Electricity Industry” in 2000.
9. Publication of a Training Manual on Integrated Resource Planning–Integrated resource planning is a planning methodology which allows equal consideration of a wide variety of means to meet energy service demand, including end-use energy efficiency, cogeneration, and renewable energy. As the lack of training materials is a particular impediment to integrated resource planning in developing countries, UCCEE has produced jointly with the University of Campinas, Brazil, a textbook on the subject. Following the publication of the training manual on integrated resource planning, several training courses have been undertaken in Latin America and Africa. The manual has also been used for training of task managers in the World Bank, and as input to regional seminars.
10. Study of the Environmental and Social Implications of Power Sector Restructuring–A case study was developed in Ghana in collaboration with national institutions. A regional workshop was jointly organized with the African Energy Policy Research Network (AFREPREN) to share experiences from six sub-Saharan African countries (Côte d’Ivoire, Ghana, Kenya, Mauritius, Uganda and Zimbabwe). The report summarizing the main findings of the study and the conclusions of the workshop was published in 1999 followed by commercial publication of the book “Power Sector Reform in Sub-Saharan Africa” in 2000. In Argentina, UCCEE has worked with the Instituto de Economía Energética (IDEE) to identify how measures to reduce GHG emissions could be implemented through appropriate incentive schemes that are compatible with a highly competitive restructured electricity market.
11. Support to the UNEP Project on “Incorporation of Environmental Considerations in Energy Planning in the People’s Republic of China”–UCCEE has supported the substantive work undertaken by the involved Chinese institutions. In addition, UCCEE supported the general UNEP monitoring and supervision of the project. A similar study was implemented in India by the Tata Energy Research Institute (TERI), also funded by the UNEP Energy Programme, and initiated and supported by the centre.
12. Enhancement of the LEAP/EDB Computer Analysis Tool–In collaboration with the Stockholm Environment Institute’s Boston centre (SEI-B), UCCEE has extended the model termed Long-range Energy Alternatives Planning and its Environmental Data Base developed by SEI-B. The work was carried out in

close collaboration with counterparts in Venezuela and Sri Lanka where the tool was tested through case studies of important fuel chains.

13. General Support to UNEP Energy Programme–The centre has provided direct and indirect support to UNEP in the field of Energy through a number of activities in this period. In particular, UCCEE was operational to help UNEP to play its role of GEF’s implementing agency. Besides, UCCEE ensured an appropriate participation of UNEP in different international forums on energy issues. For example, UCCEE staff have acted as the secretariat of a working group on environmental issues related to energy, established by the World Energy Council. Another case was the World Solar Summit Process leading to the Harare Declaration on Solar Energy and Sustainable Development and to the World Solar Programme 1996-2005 prepared by UNESCO with an inter-agency consultation process where UNEP had been involved through the centre.

## Annex VI

### UCCEE work programme activities – Phase IV (1998-1999)

1. Finalisation of the project “Economics of Greenhouse Gas Limitations–Phase I: Establishment of a Methodological Framework for Climate Change Mitigation Assessment”, with financial support from UNEP and the Global Environment Facility.
2. Creation of a Renewable Energy Technology/Energy Efficiency (RET/EE) Investment Advisory Facility, with financial support from GEF and UNEP–This GEF-funded project implemented jointly with the UNEP Energy Unit was a new initiative aimed to facilitate investments in renewable energy and energy efficiency technologies in developing countries and countries with economies in transition. It provides expert advice to financial institutions on specific investments and helps bank loan officers develop the skills to evaluate such projects independently. Provision of seven different advisory services were approved in this period, including those for a wind power project in Ghana, a coffee-processing-waste-recovery project in Costa Rica, a co-generation/fuel switch project at a district heating system in the Slovak Republic, among others.
3. Establishment of the Africa Rural Energy Enterprise Development (AREED), with financial support from the UN Foundation and private investment–This joint initiative with UNEP Energy Unit, E&Co (a US-based non-profit venture-finance), and a number of African non-governmental organizations, is aimed at increasing the capacity of the private sector in selected African countries to offer energy services using clean, efficient and renewable energy technologies. The project couples enterprise development services with modest amounts of start-up financing. A renewable energy technology company start-up tool-kit is being prepared to help local entrepreneurs and project developers create rural energy companies. Workshops and meetings to launch the project were held in five selected countries: Botswana, Ghana, Mali, Senegal and Zambia.
4. Undertaking of the project “Implementation of Renewable Energy Projects–Opportunities and Barriers”, with financial support from Danida and UNEP–UCCEE and UNEP Energy Unit have with national teams in Egypt, Ghana and Zimbabwe conducted three pilot studies in promoting implementation of renewable energy technologies. The project aims at providing concrete recommendations for removing various types of barriers to renewable energy technologies based on analysis of specific projects. Preliminary findings were presented at national workshops.
5. Upgrade of the RETScreen Model–An agreement was signed between UNEP and CANMET Energy Diversification Research Laboratory (CEDRL) in Canada. CEDRL has developed the RETScreen model as an aid in RET project evaluation and to help the user prepare pre-feasibility studies for RET investment. UCCEE has helped to develop a GHG emission indicator module to be introduced in the model, allowing for an estimate of the GHG emissions avoided by the RET project.
6. Execution of the project “Capacity building on renewable energy technologies in the Pacific region”, with financial support from Danida and UNEP–UCCEE and UNEP Energy Unit have collaborated with the South Pacific Applied Geoscience Commission and the University of the South Pacific in a study on technological and economic integration of wind energy and other renewable energy technologies into the electricity systems of Pacific Island countries.
7. Signing of a general collaboration agreement with the Latin American Energy Organization (OLADE) on “Sustainable Energy Development”–The first joint project was part of the Caribbean Energy Action Programme, a long-term energy strategy promoted by OLADE together with the Association of Caribbean States, the Caribbean Community, and the Caribbean Energy Information System. The joint project focused on national case studies for the Dominican Republic and Jamaica, and training seminars.
8. Undertaking of a project on “Capacity Building for the Clean Development Mechanism (CDM)” in Gambia, Ghana, Uganda and Zimbabwe, with financial support from Danida and UNEP–In support of the UNFCCC, UCCEE has started pilot studies with four African countries co-ordinated by the national

UNFCCC focal point and involving relevant public and private sector entities. The project is aimed at building capacity in developing countries to tap the opportunities to foster sustainable development through CDM, the flexibility mechanism embedded in the Kyoto Protocol.

9. Involvement in the “National Communications Support Programme”, implemented by UNDP in collaboration with UNEP funded by the GEF and several bilateral donors–UCCEE worked closely with UNDP and UNEP on the implementation of this programme, aimed at supporting developing countries to meet their commitments to UNFCCC. The centre staff participated by providing lectures and resource persons in a number of regional training workshops on inventory assessment and abatement analysis. The programme continues with an increased focus on direct assistance to selected countries, training and experience exchange.

10. Starting of a programme on “Sustainable Development and Climate Change Finance”, with financial support from Danida and UNEP–This programme aims at the promotion of awareness growing and information dissemination related to CDM in Africa. Two regional workshops were organized at UNEP headquarters in Nairobi, involving key UNFCCC negotiators from African countries and individual regional experts. The focus was on building methodological guidance and national capacity for CDM activities. UCCEE also organized a UNEP side event at the Fifth Conference of the Parties to the UNFCCC (COP5) presenting the regional African programme on “Sustainable development and climate change finance”.

11. Preparation of World Bank Guidelines on Climate Change Mitigation and the Transport Sector, with financial support from GEF–UCCEE in collaboration with the World Bank has prepared a set of internal World Bank guidelines for what is termed global overlays. This essentially provided a framework for ways to integrate climate change externalities into the preparation of transport sector projects.

12. Organization of a Workshop on “Sustainable Transport Initiatives in Developing Countries”–In the area of transport the UCCEE also hosted a workshop convened in El Salvador in collaboration with the national centre on appropriate technology–CESTA and the Ministry of Environment.

13. Collaboration with the Intergovernmental Panel on Climate Change (IPCC)–The involvement of the centre in the work of the IPCC was expanded and remained very significant with four UCCEE staff members participating as lead authors of the Third Assessment Report, one as coordinating lead author, and two staff members being lead authors of special reports on scenarios and technology transfer.

14. Participation in the study “Options for Emissions Trading”, with financial support from the European Commission–The centre has played an advisory role in this project examining the options for emissions trading within the European Union. A number of research papers were prepared on both joint implementation and emissions trading.

15. General Support to UNEP Energy Programme–In this period, UCCEE has strengthened its support to UNEP activities in the field of energy, working in close partnership with the new UNEP energy unit. They have prepared a new joint folder presenting the programme and the various centre activities. As during 1999 the UNEP Energy Programme expanded its activities significantly through projects funded from bilateral sources and the GEF, this had led to new activities as well as new functions for the centre. In particular, UCCEE has helped UNEP in the effort of co-ordination with other UN agencies in areas such as renewable energy technologies and UNFCCC (national communications).

## Annex VII

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Annex VIII

Cost of the EUCCEE project (Phases I to V)

	Phase I 10/90–09/92	Phase II 10/92–12/94	Phase III 01/95–12/97	Phase IV 01/98–12/99	Phase V 01/00–12/01
Cost to UNEP Environment Fund (thousands of US\$)	202.5	302	525	340	300
Percentage of total cost to Danida (Cash contribution)	15 %	15 %	16 %	13 %	11 %
thousands of US\$	904.5	1,360	2,220	1,776	1,835
percentage of total	67 %	67.5 %	66 %	69 %	70 %
in-kind cost to Riso	-				
thousands of US\$	243	353	624	474	489
percentage of total	18 %	17.5 %	18 %	18.5 %	19 %
Total cost of project (thousand of US\$)	1,350	2,015	3,369	2,590	2,624

## Annex IX

### UCCEE publications (1995–2000)

	1995	1996	1997	1998	1999	2000
Articles in international journals, books and reports	2	13	6	20	9	12
Articles in Danish journals, books and reports	2	2	-	-	-	-
RISO-R-reports	2	2	-	-	1	1
Danish books and reports	7	1	1	-	-	2
International books and reports	1	1	4	8	18	9
Subtotal 1	14	19	11	28	28	24
Published conference lectures	7	4	6	8	12	7
Publications for a broader readership	1	3	1	-	1	2
Unpublished lectures from Danish conferences and seminars (including published abstracts)	1	5	-	7	1	7
Unpublished lectures from international conferences and seminars (including published abstracts)	8	46	29	24	42	18
Subtotal 2	17	59	36	39	56	34
Total	31	77	47	67	84	58

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