Sida Evaluation 98/12

# The Asian Regional Research Programme in Energy, Environment and Climate

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# Executive Summary

## 1. Objectives, scope and structure of ARRPEEC

The Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC) was conceived in 1993 and the first three-year programme was carried out from 1994 to 1997. The programme aims at improving the understanding of energy, environment and climate (EEC) issues among researchers and policy makers in Asian developing countries through a centrally coordinated, regional effort to build policy-oriented research capacity, with involvement of researchers and institutions in the region.

The programme is managed by the Energy Programme of the School of Environment, Resources and Development at the Asian Institute of Technology in Bangkok, Thailand. Phase I activities were arranged in four research projects (or "themes") and an associated research-training programme:

(a) Development of Energy Efficient and Environmentally Sound Industrial Technologies in Asia
(b) Assessment of Energy Efficiency Options for Mitigating Emissions of Greenhouse Gases from the Electricity Sector
(c) Emission Factor of Polycyclic Aromatic Hydrocarbon (PAH) from Energy Related Sources in Asia
(d) Study of Biomass as Energy Source and Technical Option for GHG Emission Reduction

## 2. Research activities

All project research themes were judged to be highly relevant for the countries in the region. The originality of the approaches taken in each of the research themes was mainly in applying the techniques in the specific settings of the Asian countries.

The outputs of the project, with few exceptions, tend to focus on traditional academic research reports and publications. A large number of publications in scientific journals have been accepted or are planned. This is admirable, and indeed the existence of peer-reviewed publications confirms the general impression of the high professional standard of the research work

A spot check of the large amount of output has found several errors and inconsistencies, which could have been eliminated through internal review. Our major critique of the outputs, however, is their form (lack of summary and overview) and lack of critical discussion.

## 3. Strengthening capacity

The high quality of scientific output from the programme appears to have been achieved to some extent at the expense of two other important aspects, capacity building and impact on policy makers. Continued support to the programme in Phase II and possible subsequent phases must require a gradual, but significant increase in the focus on the capacity building and policy impact aspects.
The capacity building process also requires a systematic choice of collaborating institutions (National Research Institutes – NRIs) and training through research fellowships. It is not clear

from the project outputs how the selection of NRIs in Phase I was carried out and which criteria were employed for selection.

The programme component with most direct capacity-building focus is the research-training programme. In Phase I the programme sponsored 16 researchers and provided two grants to research at national institutions. The use of the fellowships was related to the four research themes, but varied significantly between the research projects. A more permanent and targeted establishment of research capacity in the NRIs in Phase I would have been obtained if there had been a consistent linking of research fellowships to the research themes through the participation of the NRIs.

## 4. Policy orientation and applicability of results

The third objective of Sida's support to the programme was "to promote a multi-disciplinary and policy oriented approach to energy-environment-climate issues in Asia, which takes due account of technological, economic and institutional factors". There is considerable variation between the four research projects in the extent to which this objective was fulfilled.

Only theme (a), the industrial project, devoted significant attention to influencing policy makers, through targeted outputs and workshops. The other projects tended to follow the normal pattern of traditional scientific research, aiming primarily at publication in scientific journals. Policy-oriented research requires, in addition, close contacts to the world of policy makers, frequent discussion to promote interest and "ownership" of the work, and publication and dissemination in easily accessible form, possibly also with a popular component aimed at the general public.

An important shortcoming in the outputs from the four research projects is the lack of a brief programme document presenting an overview of the scope of the programme, its activities, members and a summary of the main research findings. This appears to be related to the lack of a clear perception of the target audience of publications. It is thus unlikely that senior level staff in government or private sector will ever be reached by the existing publications. Even the more popular publications of the industry project require considerable time and detailed insight in order be fully appreciated.

## 5. Programme location, management and support

AIT is well suited to be the regional coordinating centre and location of the core research activity for this programme. It is a unique institution with contacts to all countries of the region, in particular through its network of alumni. AIT is also the centre of considerable expertise in the areas treated by the programme: energy, environment and climate, and the performance of research within the programme has confirmed this

It is evident from the discussions with AIT researchers both within the ARRPEEC team and outside that there is room for significant improvement concerning the issues of integration and collaboration between programmes and faculty members. An example is the apparent poor links between the ARRPEEC activities and the Energy Programme's involvement in other major regional projects.

The emphasis within ARRPEEC Phase I on producing technical reports, and the impressive number of international articles and presentations reflects the current evaluation criteria to establish merit and funding. The proposed change in focus for AIT under the programme to

strengthen the capacity building activities and policy outreach may conflict with these criteria and this should evidently be considered as a real barrier. However the proposed change of emphasis should not lead to less quality research, but should provide an opportunity for the AIT team to shift focus towards the regional aspects, comparative analysis, etc.

The proposed focus on regional aspects, capacity building and policy impact is consistent with visions of AIT top management. It is therefore important to convey the message to management that efforts on issues like capacity building, and policy analysis and outreach should be ranked highly in the internal evaluation of efforts and performance.

## 6. Cost-effectiveness of the programme

The programme budget reflects the concentration on AIT-centred research. We believe that more effort should have been put into capacity building in the NRIs and that therefore more of the budget should have been directed there. The budget also reflects lack of clear dissemination strategy.

There are few similar programmes to compare with ARRPEEC, but at least within the region, the Asian and Pacific Energy Planning Network (Apenplan) and the Asian Energy Institute (AEI) network represent programmes with a similar scope. These two networks have had somewhat similar focus in terms of examining regionally relevant EEC issues. However, although both networks are probably still in existence, they have not been very active over the past few years.

## 7. Conclusions and recommendations

The overall conclusions of the evaluation are therefore that:

- The programme activities focused on issues of high relevance to EEC issues in the region, but lacked integration with other national and regional activities and a clear strategy for communication with and impacting policy makers.

- The programme generally fulfilled its objectives, but these have been poorly defined and a continuation of the programme will have to be based on a revised set of objectives.

- The programme produced a significant amount of results of generally high scientific quality. The outputs in the form of reports and articles are generally very large and poorly targeted with a distinct lack of overviews, summaries and comparative assessment.

- The capacity building aspects of the programme were weak both in terms of involvement of the NRIs and in terms of interaction between the research projects and the fellowship programme.

- The programme was generally funded at an appropriate level in comparison with other regional programmes and networks.

The recommendations from the evaluation team are therefore:

- to continue the programme with a Phase II provided it is based on a set of objectives and activities which reflect a more equal focus on the three aspects of quality research, capacity building and policy impact

- to prepare a new programme of the same duration as Phase I, but with expanded funding in order to achieve the proposed more ambitious objectives

- to involve the NRIs to a greater extent in programme formulation and implementation, and to base the selection of NRIs on transparent criteria which are related to the three key objectives

- to ensure that the AIT team focuses on more regional-level research rather than performing repeated national applications of an analytical approach

- to integrate the research-training programme with the research themes and to define how the individual capacity building efforts link with the institutional ones

- to integrate the PAH type activity into one of the fuel- or sector-related sub-programmes

- to consider examining regional EEC issues as one of the sub-programme activities rather than choosing only topics whose regional importance stems from the compounded national relevance

- to involve more systematic peer review of all major publications

- to establish a general publication strategy defining appropriate outputs different potential target groups (not only for the policy makers)

# Contents

# 1. Presentation of ARRPEEC - Objectives, scope and structure

## 1.1 Programme rationale and organisational structure

The Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC) was conceived in 1993 and the grant for the first three-year programme (1994 - 97) was approved in early 1994 on the basis of the revised project proposal [1] dated March 14, 1994.

The rationale for the programme is briefly presented in the same document and provides arguments at different levels:

- Understanding of Energy-Environment-Climate (EEC) issues is incomplete in many countries and the programme will enhance the expertise of selected researchers

- EEC problems cannot be solved by individual countries in isolation and the programme will provide an opportunity for institutions in the region to work together

- The programme will give younger researchers a possibility to focus their research on key EEC issues in the region

- The equipment grant part will enhance facilities at AIT, providing opportunity for fellows to improve their research work.

The rationale for the programme from the point of view of the sponsoring agency, Sida, is presented briefly in the Terms of Reference (ToR) [2] for the present evaluation and can be summarised as:

- The dynamic economies of Asia have become major global actors in the EEC nexus and with their heavy dependence on fossil fuels there is a growing concern about the local and global environmental consequences.

- ARRPEEC will make a contribution to mitigating these consequences through research on environmentally sound strategies and options which are of relevance both to the Asian and the broader global contexts

The rationales expressed by the executing agency (AIT) and the funder (Sida) may be seen as complementary. The difference in formulation can be understood in terms of level of aggregation. Thus, AIT perceives the problem and its solution from the point of view of the researcher and the institution, while Sida takes a regional and global perspective. The fundamental objective is the same.

The Programme Management is located in the Energy Programme of the School of Environment. Resources and Development at the Asian Institute of Technology in Bangkok, Thailand. In the first three-year programme activities have been organised in four research projects and an associated research-training programme. National Research Institutions from

9 countries in the region were involved in various parts of the programme and in addition a number of individual researchers have benefited from the training programme.

The four research projects are all organised with core teams co-ordinating or undertaking the research at AIT and a number of national institutions participating in different ways, as will be described in more detail in Section. 3.2 *NRIs - Selection, Involvement and Permanence.*

The four projects are:

(a) Development of Energy Efficient and Environmentally Sound Industrial Technologies in Asia

(b) Assessment of Energy Efficiency Options for Mitigating Emissions of Greenhouse Gases from the Electricity Sector

(c) Emission Factor of Polycyclic Aromatic Hydrocarbon (PAH) from Energy Related Sources in Asia

(d) Study of Biomass as Energy Source and Technical Option for GHG Emission Reduction

## 1.2 Goals and objectives (Sida, AIT, Programme)

The programme is organised in two components with formal objectives stated in the revised proposal document [3]:

(i) four research programmes with the objective of carrying out research on important and specific problems related to EEC issues
(ii) research training with the objective of enhancing the quality and technical ability of researchers in national institutions that are currently, or are likely to be, involved in addressing EEC issues in their respective countries

Similarly Sida's main objectives in supporting the Programme are stated in the ToR for the evaluation:

(i) to promote the production and dissemination of research studies in the area of energy-environment-climate of relevance and importance to Asia and at the global level
(ii) to strengthen research and analytical capacities in the area of energy-environment-climate in selected institutions in selected countries of East, Southeast and South Asia
(iii) to promote a multi-disciplinary and policy oriented approach to Energy-Environment-Climate issues in Asia, which takes due account of technological, economic and institutional factors

The thrust of the two sets of objectives is largely identical. However, Sida emphasises the capacity building and the multi-disciplinary and policy-oriented approach explicitly, while the project proposal separates the research programmes from the training part and does not explicitly state that the research programmes should address capacity building. It is not clear to what extent the Sida objectives have been made explicitly clear to the ARRPEEC team, as they are presented in the ToR for this evaluation, and no other available documents present the donor view on the objectives. The close interaction between the programme and the

donor co-ordinator does indicate that the views have been communicated in the project establishment phase and during the implementation. This was confirmed through the individual discussions.

The preparations included, in addition to the consultations, a regional seminar early in 1994 at which the idea of a programme was discussed. This workshop also helped to establish the importance of the research topics, both at regional and global level. There is, however, no clear discussion of how the results would be linked with policy making either in terms of deciding on the selected topics or in terms of presentation and dissemination of the results. The focus of this first phase has therefore evidently been put on doing research and building research capacity, and not on impacting decisions and policy making. This is compounded by the fact that neither the programme nor the NRI activities are linked with other national and regional climate change activities at a time when many countries are heavily involved in climate change mitigation analysis, in the context of the United Nations Framework Convention on Climate Change. Relevant AIT faculty members were invited for the initial workshop and to take part in the programme. This has naturally ensured a broad involvement, but there still appears to be insufficient interaction with other AIT programmes working on related activities.

It may be justified in a first phase to put most emphasis on the capacity building aspects and producing results, but communicating the results of a programme of this type should go beyond the research community. Therefore one of the recommendations of the evaluators, made already at the Review Workshop in November 1997, is that a component be added to ensure that the results and findings of the research projects in the first phase are properly communicated to policy makers in the involved countries. These immediate actions are discussed in Section 4.4 *Need for immediate action*.

## 1.3 Choice of Research Themes in Phase I

The four research themes listed in Section 1.1 *Programme rationale and organisational structure* generally represent, as required in the objectives, areas of significant importance for EEC issues in the region. Energy-efficiency improvements, especially in the supply and use of electricity, are crucial for the future development in this sub-sector and similarly end-use efficiency in industry represents a vast potential in most countries in the region. Biomass is still a dominant energy source for household energy supply in many countries in the region. A better understanding of present emissions, future abatement possibilities and perspectives for sustainable biomass as a substitute for fossil fuel in other sectors are all important issues for future environmental implications of energy sector development. The three themes also combine local and global environmental aspects, which are crucial for later implementation, as it is unlikely that countries in the region will make major project decisions based only on climate change concerns in the foreseeable future. Environmental problems like urban air pollution, acid rain, etc., on the other hand, are already part of the decision basis in many cases.

There are, however, some differences in the coverage of the different themes. Thus, while themes (a), (b) and (d) are broad sector- or fuel-oriented, while theme (c) stands out as very narrowly oriented towards pollution monitoring for a specific group of pollutants, polycyclic aromatic hydrocarbons (PAHs).

Without pre-empting the discussion of the performance of the different projects, it might have been placed more appropriate to include theme (c) as a subset of one of the broader themes. As it was designed to build capacity to measure and monitor PAHs, the policy relevance of the work will mainly lie in the use of the measurements for specific fuels or technologies and an assessment of how different policies or technologies would affect the specific emissions.

It not clear from the programme documents to what extent the themes and specific activities were developed from a "bottom-up" or a "top-down" approach. In other words, whether decisions on programme priorities were made by the AIT co-ordinators or if the structure was been built on input from the NRIs. Although the final programme structure may be the same, in terms of involvement and ownership the approach can be crucial.

## 1.4 Selection and involvement of National Research Institutions

The issue of the decision process for the programme priorities is part of the broader question of how the overall programme was conceived in terms of division of responsibilities between the central AIT team and the involved NRIs.

The impression from the programme documents and from the presentations and discussion between the evaluators and the national and AIT project participants at the Review Workshop is that collaboration formats differ among all four projects. It is, however, evident that the whole programme was determined largely by AIT. The workshop convened in November 1994 did discuss the initial proposal and provided formally input to the final programme document, but given resources and level of involvement it is realistic to assume that most of the national institutions had limited influence on the scope of the projects. In significant parts of the programme, the NRIs acted more as data "inlet" and result "outlet" for the analytical work being done at AIT.

The extent to which the programme has acted to build institutional capacity in the participating countries is questionable. Discussions with the participants indicate that the collaboration and the project and programme level workshops contributed significantly to raising awareness and understanding in the national institutions of the issues being researched. However, it is uncertain whether the national institutions would be able to undertake similar analytical work using the developed analytical approaches at the end of the first phase activities. The research-training component has naturally had a direct capacity building impact. However, the use of the fellowships focused only to a limited extent on the involved national institutions. It must be questioned therefore how many of the trained fellows will contribute to the future work of the network.

The selection of the NRIs is not discussed in the revised proposal for Phase I. It is therefore difficult to evaluate any criteria that may have been applied for the choice, apart from a geographical spread and a mix of research and policy institutions. It is not clear whether the latter mix was deliberately chosen to ensure a combination of research and policy interests in the work. However, information obtained from interviews of NRI participants at the Review Workshop indicates there was little systematic utilisation of the mix of institutions. Not all the listed institutions ended up being involved while others joined later. No explanation is provided for this, but it is assumed that not all invited institutions decided to join and substitutes had to be found.

The selection seems to have been based to a large extent on personal contacts and links with AIT alumni. This will evidently ease the initiation and collaboration on such a programme, but will not necessarily lead to involvement of the most relevant institutions. For a possible second phase the AIT co-ordinator and team wish to re-examine the NRI selection and basically the present institutions have not been promised participation in the future programme. The discussions suggest that this approach is mainly due to poor performance by some NRIs and instead of directly excluding any participant it has been decided to revisit the whole selection and then invite the best NRIs from Phase I to continue and be joined by new partners.

This approach can be justified given the lack of explicit criteria for the initial selection. Nevertheless, serious concerns remain regarding the initial selection process, underlining the need to specify the selection criteria and process for the Phase II. Secondly the selection of new NRIs again leads to a top-down approach to the selection of the new research themes. Even with the proposed initiation workshop at which new NRIs can influence the programmes, it would be naive to expect that the NRIs could change the directions of the programmes to any significant degree.

The participation, capacity building and networking aspects are in our view crucial for the future justification and success of the programme and will therefore be discussed in more detail in Chapter 3.

## 2. Research activities

The ARRPEEC programme comprised four research themes or "projects", co-ordinated by AIT and with involvement of national institutions to a degree that varied among the projects, as mentioned in the previous chapter. Moreover the research areas utilised the research scholarship programme to varying degrees. In this chapter we discuss mainly the substantive content of the research. In particular we focus on the relevance of the projects from the point of view of the physical, economic, social, environmental and developmental context of the countries in the region, their originality and the quality of research. As evidence for these aspects we draw on the project reports and the presentations by project teams at the Review Workshop in November 1997. In addition, supplementary information was obtained in interviews with the project participants.

Three of the four themes, (a), (b) and (d), chosen for research activities within the programme relate directly to important issues in the context of Energy, Environment and Climate. As mentioned in the previous chapter, theme (c) on emission factors of PAHs, is primarily concerned with the impacts on human health, i.e. the immediate local environment. The discussion below, focusing on relevance, originality, quality, project outputs and general research achievements, concentrates on the four themes in turn.

## 2.1 Relevance of selected themes

The criteria involved in selecting research themes for a regional programme of this kind should involve the following:

- importance (relative contribution) of the polluting activity at present or in the future in the individual country and/or in the region as a whole
- necessity to build or enhance research capacity in AIT and national research institutes
- need for policy related research to support possible action to reduce pollution
- absence of comparable activity in the selected country or region as a whole
- interest on the part of involved institutions and national governments

The selected research themes are discussed below on the basis of these and other criteria. At the same time the following questions are raised: Why was the theme selected according to the proposal? Did this perception change in any way through the project?

(a) Development of Energy Efficient and Environmentally Sound Industrial Technologies in Asia

The project focused on potential technological improvements in the industrial sector in the region, concentrating on three industries (iron and steel, pulp and paper, and cement) in four countries (China, India, the Philippines and Sri Lanka). The overall objective of the project was to enhance synergy among developing countries in the region in the adoption and propagation of energy-efficient and environmentally sound industrial technologies. The rationale behind the project is the recognition that the industrial activity in the fast growing Asian developing countries is responsible for increasing energy consumption and environmental pollution. The state of technology in the industrial sub-sectors appears to be the main factor determining unnecessarily high energy use and pollution levels compared with similar industries in the OECD countries.

While single studies on energy efficiency and pollution have been carried out in the region, a literature review indicated that no study had taken an integrated approach to efficiency improvement and pollution reduction through technological development.

The focus on three energy-intensive and highly polluting major industries is well justified in utilising the resources of the project most effectively. Since these industries are also found in many other countries of the region the results can be applied regionally. The choice of four countries with a spread of institutional, geographical and economic settings from China to Sri Lanka also enhances the representative nature of the study.

(b) Assessment of Energy Efficiency Options for Mitigating Emissions of Greenhouse Gases from the Electricity Sector

Electricity has been responsible for a growing share of total commercial energy consumption in the developing countries of the region, rising on average from 9% in 1973 to 37% in 1990 of total primary energy. Electricity production from thermal plants using fossil fuels also

increased during this period. This situation leads to the recognition that electricity production from thermal power plants is one of the major sources of $CO_2$ in the region. At the same time the efficiency of both generation and consumption is substantially lower than in the OECD countries. Thus there would seem to exist considerable scope for reducing $CO_2$ (and other emissions) by implementing efficiency-increasing measures.

While there has been some effort in some countries of the region to carry out such improvements this is often restricted to the supply side through traditional utility methods. Demand-side Management (DSM) and Integrated Resource Planning (IRP) are, with a few exceptions, not applied in the region. Moreover there exist considerable barriers to implementing efficiency improvements and these barriers have not been adequately researched.

The relevance of the effort is thus high with a potential, if the methods and measures could be implemented, and barriers overcome, to make a considerable contribution to reducing local, regional and global environmental impacts, as well as reducing the costs of providing electricity services to the consumer.

Such introduction requires the existence of expertise within the countries, with appropriate tools and access to reliable data. It also requires the support of utilities, industries, consumers and decision-makers. Therefore a research effort, grounded in up-to-date analysis methods, illustrating clear advantages of the approach and with an awareness component aimed at the appropriate stakeholders would be able to contribute considerably to the overall objectives outlined in the first chapter.

The project comprised three sub-areas:

(i) technical-economic potential of energy-efficiency options in the electrical sector
(ii) integrated resource planning analysis
(iii) analysis of barriers to implementation of energy efficient electrical appliances

While research into these areas is certainly relevant, the project reports do not indicate clearly the present status of these subjects in the involved countries, for example with reference to published or on-going work, or in terms of the national institutions involved in possible parallel efforts. Neither does the project address a fundamental barrier in the adoption of DSM and IRP in certain countries, namely the lack of incentive on the part of the utilities. This is particularly true for India, while for Thailand, institutional arrangements have been such that a successful DSM programme has already been initiated.

It may be noted that objective (i) as described in the revised proposal originally included both supply and demand side options. It was restricted in the actual project to demand side only, presumably due to lack of resources, although no explanation is given in the project report.

(c) Emission Factor of Polycyclic Aromatic Hydrocarbon (PAH) from Energy Related Sources in Asia

Polycyclic hydrocarbons (PAH) are a group of organic compounds known to have serious health impacts, in particular carcinogenic effects. These compounds are emitted in the combustion of fossil fuels, waste coal gasification, petroleum cracking as well as in the burning of biomass fuels, used extensively in households, particularly in rural areas in many countries of the region, for cooking.

The emissions of pollutants from fuel combustion such as $CO_2$, $NO_x$, $SO_2$, Pb are relatively easily estimated. PAH emissions, on the other hand, are extremely dependent on local conditions since these compounds are generally associated with incomplete combustion of fuels. Moreover, little work has been done to clarify the amounts of the different PAHs that arise from the energy technologies used in the Asian developing countries. Indeed, the main source of PAH emission data seems to be the US EPA: specific country data on PAH is seriously lacking. Nevertheless it is important to be able to estimate PAH emissions and concentrations in order to recommend appropriate and emission control measures and concentration levels

The research project comprised the development of methods for determining PAH emission levels from various sources. Although the research is not directly related to climate change, the determination of appropriate atmospheric concentrations is an important issue in energy-environment. Moreover, better quantification of the health hazards of urban air pollution from fossil fuel consumption, and from household biomass consumption lends important arguments in the effort towards sustainable energy use that minimises pollution at all levels.

Thus, a strong case can be made for developing techniques and capacity for measuring and monitoring PAHs within the region in the context of energy-environment research. However, as mentioned above in Section 1.3, it may be questioned whether the PAH project should have been singled out within the programme as it was, rather than being an integrated part of one of the other projects, such as that on biomass described below.

(d) Study of Biomass as Energy Source and Technical Option for GHG Emission Reduction

Biomass accounts for a large proportion of energy use in the developing countries of Asia. At present the consumption of biomass is characterised by low efficiency and high levels of pollutant emissions, often with serious health impacts. There is considerable potential for improvement in the use of biomass fuel, both to reduce fuel consumption and to minimise environmental effects. Moreover, efficient modern use of biomass offers a potential for greenhouse gas reduction through the substitution of fossil fuels.

On this basis, and recognising the lack of comprehensive information on current biomass energy technologies and emissions, this project sought:

(i) to investigate and document systematically the use of biomass fuel in selected developing countries in the region,
(ii) to characterise their emission of pollutants, and
(iii) to investigate and describe appropriate state-of-the-art technologies for biomass combustion

This information would be made available to actors in the countries of the region, facilitating the choice of new technologies to improve the utilisation of biomass fuel, reduce pollution and possibly reduce GHG emissions by fossil fuel substitution.

The aim of the project is thus highly relevant to the energy, environment and climate objectives of the programme as a whole. However the experimental work on spouted-bed combustion [4] seems quite separate from the other sub-components and its relevance as part of ARRPEEC can be questioned.

## 2.2 Originality of approach and research

(a) Development of Energy Efficient and Environmentally Sound Industrial Technologies in Asia

The project was justified largely because there have been few integrated studies of industrial energy-efficiency and pollution reduction potentials in the region. The approach taken, in which teams from the national collaborating institutions were involved from an early stage in defining the problem, contacting the industries and carrying out the research, is to be commended for its appropriate use of project resources. Also the close involvement of scholarship fellows in the work, the consultations with national stakeholders through workshops as an integrated part of the project represent in our view a positive aspect of the activity. In this sense the originality of the approach, at least within the region, must be said to be high.

(b) Assessment of Energy Efficiency Options for Mitigating Emissions of Greenhouse Gases from the Electricity Sector

The project applied a general approach that has been followed in a number of countries to assessing demand and supply side efficiency improvements. The analysis of barriers to implementation of efficiency options, including conducting a questionnaire survey, represented an application of proven methodology in, for the most part, a new setting.

(c) Emission Factor of Polycyclic Aromatic Hydrocarbon (PAH) from Energy Related Sources in Asia

The detailed study of PAH emission factors and atmospheric concentrations in various situations in countries of the region is an important effort and one which deserves support. As mentioned in the previous section, there is little nationally specific information on PAHs outside of the USA, particular for developing countries. Part of the originality of the research lies in associating the effort with a programme like ARRPEEC which is primarily focused on more conventional energy-sector analysis connected with GHG abatement. Local air pollutants like PAH, their monitoring and potential abatement, represent central problems within the field of energy and environment which should not be completely overshadowed by topical concerns about climate change mitigation.

(d) Study of Biomass as Energy Source and Technical Option for GHG Emission Reduction

A comprehensive and systematic study and documentation of current biomass energy use and emissions, and the details of appropriate modern biomass technologies has not been carried out previously in the Asian developing countries. The approach taken in assessing emissions was a well-proven one of relating energy use and emissions to specific technologies through emission factors. For example, the quantities of fuel used were obtained from local investigators and institutions in the involved countries. Emission factors specific to appliances and fuels were obtained through experimental measurement.
The originality of the project lies in applying these techniques in a comprehensive and integrated manner, involving national teams, with the view to making the information available for decision-makers in the countries.

## 2.3 Quantity, scope and format of outputs

The outputs of the project, with few exceptions, tend to focus on traditional academic research reports and publications. A large number of publications in scientific journals have been accepted or are planned. This is admirable, and indeed the existence of peer-reviewed publications confirms the general impression of the high professional standard of the research work.

However, one of the main objectives of the programme, at least from the funder's (Sida's) point of view was to enhance understanding of the issues among the decision making and policy community. In other words, after generating or gathering information, the aim should have been to increase awareness of such information within the region. In this case, the importance of properly targeted and well prepared reporting cannot be over-emphasised. To secure the dissemination of programme results and findings there is an urgent need for outputs in addition to the traditional scientific report and article. It is vital that the research results, their applicability, limitations and potential be communicated to the relevant quarters so that appropriate measures can be implemented. This can be done in several ways, two of which are through workshops and popular publications. Only the "industrial" project, theme (a), seems to have followed this path.

In general the projects produced extremely voluminous reports, with a distinct lack of summary chapters or volumes. The format of the reports is for the most part in somewhat terse, factual language. These factors make the results of the programme less accessible to the "uninitiated" than would perhaps otherwise be the case. (The notable exception is the industrial project.) The project reports tend to lack transparency, overview of the activities, clarity of purpose in the reporting exercise, and often a critical attitude towards the results. Brief specific comments on the outputs, project by project, are presented below.

(a) Development of Energy Efficient and Environmentally Sound Industrial Technologies in Asia

- The project outputs are generally of high quality and accessible, providing an overview of project objectives and achievements, especially the cross-country comparison.
- Some errors have been found in the "textbook" material, due to lack of quality control.
- Workshops have been held for stakeholders.

(b) Assessment of Energy Efficiency Options for Mitigating Emissions of Greenhouse Gases from the Electricity Sector

- It is difficult to obtain an overview from reading project reports.
- The summary volume could have been more detailed and should have discussed the project critically.

(c) Emission Factor of Polycyclic Aromatic Hydrocarbon (PAH) from Energy Related Sources in Asia

- The project output consists of one large volume comprising research report, workshop minutes and copies of articles.

- At first the size of the report appears intimidating, however it does contain a well-written justification and explanation of the work with relevant background documents.
- The report appears assembled in haste and could no doubt have been edited into a more presentable format given more resources.

(d) Study of Biomass as Energy Source and Technical Option for GHG Emission Reduction

- Project outputs comprise separate reports on each of the many components (12 reports in all plus summary report)
- The summary volume is very brief and inadequate, making it difficult to obtain an overview of the project as a whole.
- A popular summary volume (similar to that for the industrial project) would have been highly desirable, especially since the aim was to provide information to stakeholders in the countries
- Many scientific publications have been accepted or are planned, though apparently with predominantly AIT authorship, which leads to questions on the extent of national involvement at the analytical and publishing stage
- It is difficult to ascertain from the project reports the involvement of the national institutions, or indeed the capacity-building effect that the project has caused.

## 2.4 Quality and review of outputs

The large number of reports and the high degree of numerical content make it extremely difficult for the evaluators to carry out anything but a spot check for errors and inconsistencies. A few instances of less than perfect quality control have been found and this leads to the question of whether a more systematic, quality-checking procedure could have been built into the reporting activity, for example an internal peer-review carried out at AIT, or more systematic involvement of international peer reviews.

On the other hand, the large number of peer-reviewed journal articles which the programme has produced lend credence to the fact that the basic research quality is sound. Thus our major critique of the outputs is their form (lack of summary and overview), lack of critical discussion and the presence of errors. Some specific comments on the individual projects are included below. As a spot check, however, we have investigated the reports of Theme 2 more thoroughly, with assistance from a colleague experienced in Demand Side Management and Integrated Resource Planning. These comments are summarised below in (b).

It must be emphasised that not all the reviewed reports were fully finalised at the time of evaluation. Minor errors may therefore be corrected in the finalisation process

(a) Development of Energy Efficient and Environmentally Sound Industrial Technologies in Asia

The project produced professional documents on the three target sub-sectors (iron and steel, pulp and paper, cement) together with a summary "cross-country comparison" volume. All four documents are well written and produced, are easy to read and accessible and provide a good overview of the work done and the problems addressed. A spot check on the iron and

steel volume did however reveal some lack of quality control with regard to the description of standard steel making technology. This was discussed with one of the lead authors who agreed that there were some errors and confirmed that the sections on standard technologies (generally textbook material) had not been subjected to rigorous checking. The existence of errors in the introductory sections can however not be excused since their presence leads one to doubt the reliability of subsequent chapters. The case supports the call for more stringent review and quality control of outputs.

(b) Assessment of Energy Efficiency Options for Mitigating Emissions of Greenhouse Gases from the Electricity Sector

- **Model and methodology:** A considerable part of the project was devoted to constructing an optimisation model for integrated resource planning, or more correctly, programming software to establish the input for a commercial integer programming software. The optimisation model was used to select appropriate supply options to meet electricity demand. Demand-side options were initially analysed exogenously to the model using "screening curves" as described in Vol. IV p.4. Ideally the demand-side options should have been fully integrated in the optimisation framework. Little explanation for this approach is given. Moreover, no explanation is given for why the project did not utilise commercially available IRP software, although this was assumed to be on cost grounds. It was stated in the Review Workshop that the optimisation model required several days (or weeks) to solve the problem. Modern commercially available software is capable of solving large IRP problems in times measured hours. The reports provide little explanation of these considerations.

- **Non-standard terminology:** The introduction of quantities like "COMPIC ($CO_2$ mitigation per unit of incremental cost)" vol. III, p.5 is unnecessary and merely serves to confuse the reader. A standard measurement like abatement cost (essentially the reciprocal of COMPIC) combined with the potential abatement of an option is more useful as a metric for assessing the relative attractiveness of mitigation options. Instead of presenting results in the form of table 4.8 (Volume III, p. 28), listing COMPIC for 8 different mitigation options, it would be more instructive to present the corresponding abatement costs accompanied by the mitigation potentials. This would essentially define the abatement cost curve. Following the standard UNEP Mitigation Methodology [5], the abatement potential and (incremental) abatement cost should be expressed as $CO_2$ reduction in a specific year and the annualised cost of the option.

- **Limited options:** The portfolio of DSM options is extremely limited and not entirely justified. For example "slim tubelights" have not been considered in the residential sector of any country but Thailand. This is one of the important options for all countries, considering the low up-front costs compared with CFLs. In fact replacing incandescent lamps with fluorescent lamps is a continuing process in several countries. One consequence of the small number of options selected may be that the potential of the selected options is over-estimated.

- **Inconsistency of assumptions:** There appears to be some inconsistency across the selected countries with regard to the menu of efficient technologies and those they are expected to replace. Examples are:

- A 13W CFL replaces a 40W incandescent bulb in all case studies (vol. III) whereas in the IRP study (vol. IV, p. 13 and 50) a 7W CFL replaces a 40W incandescent bulb in Sri Lanka and Nepal. This change is not explained.
- In the case study of Pakistan, a 150 W inefficient refrigerator is replaced by a 90 W efficient one, while in India a 150W efficient refrigerator is assumed. (Vol. III, p. 9 and 31).

- **Data reliability:** Gas-fired power stations are generally considered cheaper than coal-fired plants. However in the case of India (Vol. IV, p. 85) the per kW capital costs as well as the operating costs of new gas power plants are assumed higher than coal power plants.

- **Sparse explanation:** In general the reports lack sufficient explanation of assumptions and data. For example, in Vol. 4 the data on many efficient options is not given. In addition there is no explanation why the IRP analysis was not carried out for Thailand, although the evaluators have been informed that this was due to time constraints and the analysis has since been completed.

(c) Emission Factor of Polycyclic Aromatic Hydrocarbon (PAH) from Energy Related Sources in Asia

The report exhibits a high level of competence in the extremely difficult are of research involved in measuring PAH levels. The methodology appears to be in order, with appropriate checking procedures and standards following internationally approved recommendations. The main criticism of the output is that the report could be edited into a more professional and compact form, with appendices as appropriate. This would facilitate dissemination and accessibility.

(d) Study of Biomass as Energy Source and Technical Option for GHG Emission Reduction

There is evidence of poor quality control, leading to doubt as to the credibility of the numbers and the analysis. For example, in the volume "Emissions form biomass energy in some selected Asian countries" page 3, regarding Technology-wise use of biomass in China, the figure for animal wastes used for biogas is quoted as "only 60 kt". This number is a gross underestimate of the material used in China's many millions of biogas plants. Indeed in Table 17 a much larger figure 7.33 Mt is quoted. This latter figure may be closer to the truth, however comparison with the corresponding figure for India (24 Mt) leads to some doubt since other sources indicate that biogas in China is about 3 times that in India. No comment or explanation of these anomalies is given.

Some comment is made regarding the uncertainties in the emission figures. However if the study is to be of real use, the extent and nature of uncertainty should be described critically and in more detail. It is merely pointed out that the estimates of fuel use were approximate, and that there are uncertainties in the emission factors. The tables and accompanying text seem to be presented with little reflection on consistency.

## 2.5 Assessment of project and programme research achievements

As discussed in 2.1 and 2.2 above, the programme embarked on a set of research topics which are highly relevant for the countries in the region, and indeed the region as a whole. The four component projects have each produced a wealth of results and documentation, albeit difficult to access and gain a complete overview in some cases. Moreover, each of the projects has produced an impressive selection of peer-reviewed articles in reputable scientific journals. On this basis, the research aspirations of the programme have been fulfilled, subject to some criticism with regard to quality control in a few cases.

Nevertheless, policy-oriented applied research of this kind must also be judged in terms of how it addresses the real needs of the target group. In this instance the target group in question is the policy and decision-makers in the member developing countries of the region. Success of the research depends to a great extent on fulfilling the communication and awareness-enhancement ambitions stated in the programme objectives. Moreover, it is impossible to separate completely the research performance from the capacity building component, whereby persons and institutions within the region gain experience and capability through performing the research and communicating the results. The extent to which the capacity building aspirations have been achieved is discussed in the next chapter.

# 3. Strengthening Capacity

## 3.1 Levels of capacity building in a regional programme

The discussion in Section 1.2 *Goals and objectives (Sida, AIT, Programme)* notes that the objective for the research project, as stated in the project document, does not explicitly mention capacity-building aspects. Nevertheless, since this has been emphasised by the donor, both in the ToR and in statements at the review workshop, we assume that capacity building is an important part of the programme.

If the objective was "only" to produce quality research of regional importance, the programme structure and networking arrangements are a very expensive way of achieving such aim.

The justification for the programme is in our view the combination of the ability to produce high quality research, build capacity and impact policy. Since this is an ambitious set of aims, it must be acknowledged that there is a development process in which the programme becomes gradually more mature. For the sake of simplicity the process can be divided into three stages:

(i) prove research ability i.e. operate and complete the agreed tasks with quality results
(ii) build sustained capacity at both national and regional level
(iii) impact national and regional policy on EEC

The three stages represent to some extent the short, medium and long-term aspects of such a programme, but it is important to emphasise that all three aspects have to be addressed

throughout the lifetime of the programme, with the emphasis gradually shifting as the basic credibility becomes established.

The first phase of the programme seems to have been conceived mainly to address the first stage, with some relatively structured focus on the second stage. The third stage has been almost entirely left out, and as mentioned in Section 1.2 and presented in Section 4.5, the evaluation team proposed adding a final Phase I component focusing on these aspects before a possible Phase II is initiated.

As discussed in Chapter 2 our view is that the quantity and technical quality of the research outputs show that Phase I has established the programme as a credible activity, which is able to produce scientific output at an international state-of-the-art standard. Nevertheless, these results have been achieved to some extent at the expense of the other two aspects. Continued support to the programme in Phase II and possible subsequent phases must require a gradual, but significant shift, or broadening of focus towards capacity building and policy impact.

In order to qualify the capacity-building discussion it must be emphasised that capacity building should not only be seen as happening at the national level. For the AIT team, at least three capacity-building aspects exist:

- Ability to manage and implement regional capacity-building programmes
- Ability to undertake regional-level research e.g. comparative assessment of national level activities, analysis of joint or common regional action in EEC, etc.
- Ability to combine high quality research with capacity building and policy impact

There is naturally already some capacity in all these areas with the AIT project team. However, in Phase I the AIT conducted a disproportionate amount of the national-level research. Following the capacity building aim, such research activity ought to be transferred to the NRIs in the future. The AIT team must therefore also shift emphasis to the aspects mentioned above and perceive this as a worthy and equal challenge.

## 3.2 NRIs - Selection, Involvement and Permanence

In Section 1.4 it was mentioned that the initial selection of NRIs seemed to have been carried out without clear and well-defined criteria. Basically the selection appear to have been based on an assessment of the possible NRI's expertise by the AIT management team, combined with general Sida national preferences. The discussions at the Review Workshop confirmed this impression, both from the AIT and the NRI side. This recognition, together with the apparent lack of systematic approach to the capacity building and policy impact aspects, raises several questions:

(i) What are the common agreed objectives for the donor, AIT and the NRIs?
(ii) What would relevant criteria for selecting NRIs be and how should NRIs link with other national policy and research institutes?
(iii) How should the research and the fellowship programmes interact?

Before answering the questions it may be relevant to discuss the issue of impacting policy in the context of a research programme. This is evidently not an easy task and basically it is very difficult to reach the attention of policy makers with research results. This is not specific for

the region, but a universal experience. In addition it must be recognised that there is a very diverse set of EEC policy-making levels and bodies to target like national governments, regional co-operation organisations, industries, NGOs and public opinion makers in general.

A research programme which aims to impact policy must focus both narrowly on targeted briefings for key decision makers e.g. through seminars, issue briefings, media, etc. and work broadly on enhancing the awareness of senior administrators and researchers through targeted publications and other types of information and seminars. The relevant approach may differ between countries, sectors and issues but a strategy, or at least a systematic approach for this area, needs to be developed.

It must be emphasised that with these indirect links between research and policy it is inherently difficult to measure the impacts and the effectiveness of the established efforts. Should efforts be directed towards a single policy or broadly aiming at views on EEC priorities? How can effects of this programme be separated from other sources of impacts? In spite of these general problems the ARRPEEC programme presents a rather unique opportunity for influencing decision making, if the different activity components are integrated in the right way.

The answer to the first question can be therefore to a large extent be extracted from the discussion in the previous section.

If the balance between the three stages is to be achieved then Sida's three main objectives, as presented in Section 1.2 *Goals and objectives (Sida, AIT, Programme),* need to be established as the agreed common basis for the programme. In addition, these objectives need to be further refined in terms of capacity building and the policy impact. At present there is no clear definition of what type of capacity needs to be built and the links between the institutional (NRI) and the individual (fellowship) capacity building is unclear. Similarly the present formulation about policy orientation needs to be expanded to address the need for a systematic approach to policy impacting.

The selection of NRIs will naturally need to reflect the objectives and, using the suggested three-stage approach as the example, some of the issues to consider in the selection would be:

- Should the programme cover as many countries as possible or would the impacts be larger if efforts were concentrated in fewer key countries?
- Would it be relevant to have national networks with the NRIs as focal point and link to the regional network?
- Should NRIs represent a mix of institutions in order to address both research quality and policy impact?

The answers to the issues raised may differ between countries, research themes and over time, but two scenarios could be outlined for further examination:

(i) Concentration on a limited number of countries, say five to seven, with all research themes having NRIs in these countries and the NRIs being linked together in national ARRPEEC networks

(ii) Continuation along the lines of Phase I, with each research theme having a number of NRI partners spread over different countries in the region and with no deliberate linkages between the NRIs that happen to be in the same countries

In both cases the selection of NRIs should probably aim at a mix of research and policy institutions, recognising that both aspects are equally important and it is difficult in many countries to find institutions that combine both aspects.

In terms of the two scenarios there are pros and cons of both approaches. The first is likely to be more effective on capacity building and policy impact, but has the obvious drawback that many countries will be left out unless funding is increased significantly. The second approach has almost the reverse virtues. The selection of approach would also most likely affect the collaboration patterns since a national set-up with several NRIs networking would want more influence on the research themes, and would present themselves as a stronger partner for the AIT team. The AIT team has maintained control of the activities in Phase I. Therefore this may not sound immediately attractive to AIT. It would, however, be consistent with the suggestion made in Section 3.1 *Levels of capacity building in a regional programme* that the role of the AIT team moves towards *regional* research, co-ordination and facilitation.

With almost no discussion or documentation available on the initial selection of NRIs it is difficult to judge decisions and rationale. Nevertheless, we recommend a move towards the proposed Scenario I starting with the possible Phase II selection. The process need not necessarily be carried out completely, as there is obviously a need to include some of the Phase I institutions that have performed well and are interested in continuing the collaboration. Such continuation may not combine fully with the aim of concentrating on specific NRIs and therefore some flexibility may be desirable.

## 3.3 The Research Training Programme

The capacity-building discussion has so far mainly focused on the NRIs and the integration of capacity-building concerns into the design of the research projects. However, the programme component with most direct capacity-building focus is naturally the research-training programme.

In Phase I the programme sponsored 16 researchers and provided two grants to research at national institutions.

The use of the fellowships was related to the four research themes, but the use of the fellowships differed significantly between the research projects. The industry theme integrated the NRIs in the selection of the researchers and they were mainly used to do a combination of national data collection and analysis at AIT. The programme management endorsed this use of the research trainees after the initial phase documented the need for extensive data collection. The PAH programme used NRI staff as fellows and integrated their work at AIT in the programme. The electricity and biomass programmes made more generic announcement of the fellowships and selected candidates mainly on the basis of suggested research and qualifications. Activities were to some extent integrated in the programmes. The evaluation team did not have the possibility to meet with the researchers under the programme, as most of them had returned to their national institutions and the ones that had

remained at AIT on a longer term basis could not be considered representative of short-term fellows.

The general impression is that the fellowships have contributed positively to the research activities and that the training programme is an important component of the overall ARRPEEC. The initial proposal for Phase II was to increase this programme component significantly, but with the present structure of the utilisation of the fellowships such expansion cannot immediately be recommended.
This view links back to the issue of building institutional or personal capacity. The research fellows may have made positive contributions and some of them may also return to institutions where the enhanced personal capabilities will be utilised to further the objectives of the programme. However, this is uncertain and in order to justify a possible expansion of the programme it has to be considered how the training programme can be integrated more with the research projects and support the proposed increased focus on capacity building.

Some of the ways this can take place is by aiming the training at NRI staff, involve the NRIs in the selection of candidates outside of their institutions, focusing on the further contribution to the network objectives and maybe also on involvement of candidates from policy institutions.

In order to follow these recommendations the training programme will need to be seen as an integrated component of each research project. Likewise the utilisation of the grants will need to be planned in collaboration with the involved partner institutions.

# 4. Policy orientation and applicability of results

The third objective of Sida's support to the programme was "to promote a multi-disciplinary and policy oriented approach to energy-environment-climate issues in Asia, which takes due account of technological, economic and institutional factors." In this chapter we attempt to assess the extent to which the projects, and the programme as a whole, achieved this objective.

Again, as in the assessment of research and capacity building aspects discussed in the previous two chapters, there is considerable variation between the four research projects. The general tendency is towards conventional academic research, with little account of institutional and other "soft" factors, a concentration on publication in the scientific literature and in traditional scientific research format, and limited interplay with, and targeting towards, the policy-making world. There are exceptions to this tendency, which are brought out in a closer examination of the four projects.

## 4.1 Linking national and regional issues in prioritising research

A number of important issues in Energy, Environment and Climate at the national level in the Asian developing countries can be identified and summarised as follows:

- The need to identify and implement sustainable energy paths which are consistent with national development plans and, in particular, satisfy growing energy service demands without placing increased load on the environment. This leads to:
- The need for capacity building in energy-environment-climate (EEC) issues, and
- The need to enhance the technical backup for policy making in EEC.
- More specifically, through countries' obligations as parties to the UNFCCC, there is a need to identify GHG reduction options compatible with national development.

At the regional level, the major relevant issues that can support the above national issues are:

- To utilise the regional resources to the maximum benefit of member countries, including
- To exploit synergies through common and collaborative research programmes, sharing of data and information, etc.

These issues appear to have played an important role in the design and conduct of the research in the present programme, and in particular, the choice of research themes. The extent to which the choice of National Research Institutions was influenced by regional considerations is, however, unclear, as discussed in Chapter 3.

Regional issues also exist at a level of implementation and collaboration, such as in utilising common energy resources, or resources which depend for their utilisation on the collaboration of two or more countries. Examples could be offshore oil and gas fields, shared river systems for hydropower exploitation, or even trade and tariff agreements to stimulate and support markets for new technologies.
The existence of a regional technological centre of excellence such as AIT, with links to national institutions and a broad network of "alumni" throughout the region certainly facilitates a regional approach to research. The topics of research, while regionally co-ordinated, have not been "regional" as such - e.g. exploring regional co-operation within the energy sector to reduce emissions. The main aspect has been in "networking" to share information, for example on state of the art technologies, measuring methods for pollutants, etc.

## 4.2 Choice of issues and research approach

The issues chosen exhibit, in general, a good assessment of the needs at the present time. Within the overall context of reducing GHG emissions (apart from the PAH study which focused on serious local pollutants) the areas chosen were electrical power efficiency improvements (through DSM and IRP methods), savings in industrial processes (in selected industries), and improvement of biomass technologies. This choice of research topics appears well justified, matching the immediate needs within the region, with the limitation of available resources. For example, the choice of three major energy intensive and highly polluting industries, present in most countries was a good choice for a first study of industrial energy efficiency improvements.

The research approach varied somewhat among the projects. One of the major differences was the extent to which researchers (including scholarship fellows) and institutions from the participating countries were involved at the various stages of the projects. This is discussed in the next section.

Apart from, and taking account of the disciplinary differences in the projects, the general research approach was to define methodologies, collect data, analyse, produce results and publish. In some cases the research objectives and results were discussed in workshops involving relevant parties (policy makers, industry representatives, etc.) outside of the immediate research effort, for example in the project on industrial technologies.

In general the research in the other projects tended to follow the normal pattern of traditional scientific research, aiming primarily at publication in scientific journals. While this process is undoubtedly to be recommended, policy-oriented research requires in addition, close contacts to the world of policy makers, frequent discussion to promote interest and "ownership" of the work among policy and decision makers, and publication and dissemination in a form which is easily accessible to these groups, possibly also with a popular component aimed at the general public.

## 4.3 Presentation and dissemination of results

When being presented with the voluminous set of reports from the four research projects the immediate reaction is a wish for a short programme document presenting an overview of the scope of the programme, its activities, members and a summary of the main research findings. The industry project has to a large extent done this for its own activities and must be commended for its publication strategy. However, the other projects and the programme as a whole distinctly lack this type of document and it links with the apparent absence of a clear identification of the target group for the publications.

The technical project reports will have a very limited audience and while it is commendable that parts of the large volumes have been presented in journal articles and in this way reached a more targeted international research audience, it is no substitute for a more targeted approach.

The lack of focus on the level of policy makers has been mentioned repeatedly and is naturally most evident on the publication side where it seems unlikely that senior level staff in government or private sector will ever be reached by the existing publications. Even the industry programme's publications, which provide a clearer overview, still require time and detailed insight in order to be accessible.

Changing format of the outputs is naturally not enough. This needs to be combined with decisions on the issues of what type of NRIs should be involved, how can the individual projects and the programme in general better reach the different possible target audiences (scientific community, policy makers, general public, etc.)

The use of and experience with the national and regional workshops under the Phase I could be closer examined to see how they can be improved and identify other possible workshop formats. A clear distinction will have to be made between network meetings with a capacity building and experience exchange purpose and meetings where the focus is on interaction or presentation of results to e.g. a policy audience.

Most of the present critique is intended to provide recommendations for the possible Phase II. Nevertheless, in view of the many interesting results and research outputs available from

Phase I, the evaluation team strongly recommends an immediate policy impact activity, in parallel with the discussions and preparations for a possible Phase. The next section was therefore prepared and presented to the AIT team and the Sida representative during the review workshop in November 97 and it was generally accepted as basis for an additional activity.

## 4.4 Need for immediate action

In recognition of the considerable amount of relevant and worthwhile work that has been carried out within the programme, it is strongly recommended that every effort should be made to ensure that the results of the activities are communicated to a broader audience. This would include policy and discussion makers in the developing countries in the region, environmental agencies, utilities, and, to some extent, the general public.

Discussions with members of the AIT team and NRIs indicate the following three types of possible action which would need to be undertaken within the next 6 months (before a possible new Phase II commences) depending on the availability of additional financial resources from Sida:

(i) Preparation of a summary report with all the main results and recommendations coming out of the 5 research programmes (including the fellowship programme), preferably presented in an integrated manner and in a less scientific style. Involvement of a science writer is an option, but this needs to be considered carefully.

(ii) Convening of a regional workshop with approx. 3 policy level participants from all the participating countries to present the overall results of the programme and the policy level recommendation coming out of the Phase I activities. Workshop could be at AIT and the main presentations should be made by AIT project principal staff supplemented with a couple of presentations by national teams on selected cases.

(iii) Convening of national workshops in all participating countries to present the results to a broad national policy audience. The national teams supported by a group of AIT principal researchers should make presentations.

It is the view of the evaluation team that the most operational approach, given the limited time and resources, is to focus on a combination of (i) and (ii). The developed document could be prepared and sent out with the invitations to the workshop plus be communicated widely within the region and to relevant international organisations (who should also be invited to the workshop).

A special issue may be to facilitate training and dissemination of the developed IRP software, but this may be taken up under the new programme. The national participants could be selected in consultation with the NRIs and should include senior officials from energy and environment. A rough estimate of the costs would be in the range of SEK 500 to 700,000, depending on the extent of the dissemination programme.

# 5. Programme Location, Management and Support

## 5.1 AIT Programme Management

The rationale for a regional programme was presented in Section 1.1 and generally there is no doubt that there is a need for regional approaches to EEC issues and programmes in addition to what is taking place at national and local levels. Many of the energy-environment issues cannot be solved by individual nations but will have to be based on broader regional or global collaboration. For example, the possibility of regional co-operation is mentioned specifically in the FCCC and the recent Kyoto Protocol discusses joint or regional implementation of commitments.

Co-operation at the convention level naturally requires formal government involvement while collaboration with a research and capacity building focus can take place in more informal context.

In the previous chapters we have discussed the three objectives that should be the foundation for ARRPEEC: quality research, capacity building and policy impact. On all three aspects it is our view that AIT is well suited as the regional co-ordinating institution for such a programme given its regional mandate, renowned research and education capacity and quality and experience in handling larger regional collaboration activities. So AIT is a logical choice as the co-ordinating institution and in fact unique, if the situation in Asia is compared with Africa and Latin America where no such regional institute exists.

The fact that the Energy Program, the managing unit for ARRPEEC, is part of the School of Environment, Resources and Development within AIT does provide a very interesting framework with possibilities for integrating energy, environment and development issues. With a couple of the researchers coming from the Environmental Engineering Programme this has already taken place on a limited scale.

The evaluators have not had any opportunity to examine the programme management in any detail with regard to financial transactions, procedures, organisation of interaction with NRIs under the four projects, etc. The impression from participating in the review workshop, however, was positive as both the substantive and logistical issues were handled competently. The discussions with the AIT researchers and the NRI representatives did not reveal any complaints, which would have been expected in case of any significant problems, so our impression is that the programme generally is managed in a satisfactory manner.

## 5.2 ARRPEEC in a changing AIT

The AIT was founded in 1959 and in 1967 became an autonomous international institution with the ability to award degrees and diplomas. At present enrolment in degree programmes is over 1200 with a Faculty staff of around 180. The original rationale for AIT was largely to meet the growing need for advanced engineering education in Asia at an institution within the region. This rationale is still valid, but with many of the Asian countries having developed significantly both economically and socially the operating conditions for AIT is evidently also changing.

From interviews with Prof. Downer, President of AIT, and Prof. Polprasert, Dean of the School for Environment, Resources and Development it is clear that competition from national universities within the region is increasing. At the same time the major universities in Europe and North America are increasingly attracting students from the region. The economic development in many countries in the region also means that donor based scholarships are being reduced and increasingly focus on the less developed countries in the region. This is countered by an increasing number of private or corporate scholarships, but the change may impact selection criteria.

In this situation the strategy of AIT will be to focus on establishing priority areas where AIT will be recognised as both a regional and potentially a global centre of excellence. This will mean concentrating efforts in general and probably gradually reducing the number of programmes. The successful implementation of the AIT management visions will require adjusting to the new external conditions and among other things ensure better collaboration and integration between programmes and disciplines.

It is evident from the discussions with AIT researchers both within the ARRPEEC team and outside that there is room for significant improvement concerning the issues of integration and collaboration between programmes and faculty members. The ARRPEEC management has made a commendable effort to involve a large number of AIT faculty members in the programme, both from the Energy and the Environmental Engineering programmes. However, within the Energy Programme it seems that some of the senior faculty members have created their own small teams or centres and junior staff associate themselves with one or the other group. This situation has not been caused by the ARRPEEC team, but can lead to a lack of co-operation within the Energy Programme. A specific example is the apparent poor links between the ARRPEEC activities and the Energy Programme's involvement in other major regional projects such as the regional GEF climate change enabling activity "Asia Least Cost GHG Abatement Strategy Project (ALGAS)", the UNDP/ESCAP "Programme for Asian Co-operation on Energy and the Environment (PACE-E) and the ADB/WB funded project "Acid Rain and Emissions Reduction in Asia (RAINS-Asia)". It is therefore recommended that better internal co-ordination takes place within the Energy Programme, and, with ARRPEEC Phase II specifically in mind, that the AIT team should be open to including new members and aiming at maximum synergy with other AIT activities.

These problems are quite common in many academic institutions and reflect the common evaluation criteria used for research activities - like publication rate, external programme funding, etc. and it is clear that involvement in a programme like ARRPEEC is attractive for many of the participating researchers. From a donor point of view it must, however, be a demand that the implementation of the programme is building on the best available resources and is not hampered by internal competition.

It could finally be noted that the programme focus on producing technical reports and the impressive number of international articles and presentations probably reflects the scientific evaluation criteria to establish merit and funding. The proposed change in focus for AIT under the programme to strengthen the capacity building activities and policy outreach may conflict with these criteria and this should evidently be considered as a real barrier. As suggested in the Section 3.1 the proposed changes should not lead to less quality research but for the AIT team to shift focus towards the regional aspects, comparative analysis, etc.

The proposed focus on regional aspects, capacity building and policy impact does seem consistent with the AIT top management's visions. It is therefore important to convey the message back to management that efforts on issues like capacity building, and policy analysis and outreach should be ranked highly in the internal evaluation of efforts and performance.

# 6. Cost-effectiveness of the programme

## 6.1 Allocation of funds between programme elements

The grant from Sarec/Sida to AIT for ARRPEEC Phase I amounted to SEK 9 million disbursed as SEK 3 million in each of the three budget years.

The actual expenditure on different components has not been available to the evaluators, but it is assumed that the results match the initial budget allocations in the revised proposal.

An overall assessment of the total allocation versus the produced results and activities is naturally not possible within the limited scope of the evaluation. From experience with management of a number of multi-country programmes and knowledge of cost levels in the region, the judgement of the evaluation team is that the level of programme funding has been appropriate for a first phase. There is always an element of risk in establishing larger regional programmes and networks and several initiatives in recent years have failed. The initiators at Sida and AIT therefore deserve credit for ensuring that the programme has in general completed the proposed activities within the allocated resources.

Nevertheless, it is our view that the proposal document and the budget are poorly developed and reflect an unfortunate focus on the four individual research programmes, rather than on the integrated regional programme itself.

An examination of the budget figures reveals the intention from the outset that the major part of the activities was to be undertaken at AIT. Only about 15% of the total budget was allocated directly to NRI activities while the remaining funds were divided between AIT staff (45%), AIT travel (5%), AIT equipment & consumables (15%), workshops (10%) and the fellowship grants (10%). This division of activities has already been criticised on substantive grounds and is therefore not seen as a specific budget problem, since the budget only reflects the actual and intended division of responsibilities.

The recommended increased focus on capacity building and increased involvement of the NRIs will naturally have to lead to a different budget structure where there is much more balance between the funding going to AIT and to the NRIs. It must be emphasised that this should not only be done by shifting e.g. workshop costs or similar to the national level, but by truly assigning more funds to staff time at the NRIs. It is naturally crucial that these concerns are met in the new proposal in order to recommend the continuation of the activity. It is recognised that cost levels of scientific staff differ significantly between countries in the region and AIT staff will generally be more expensive than staff at NRIs. The issue is therefore not only the SEK allocations but also the actual staff involvement.

At the Review Workshop the option of significantly increasing fellowship part in Phase II was discussed informally. This, in our view, would not necessarily be the best way of meeting the proposed focus of the programme, but the final view on this would depend on the way the fellowship programme is integrated in the new programme activities (see discussion in Section 3.3).

The budget also reflects the lack of a clear dissemination strategy for the results of the programme, but in Section 4.5 an immediate addition to the Phase I budget has been proposed
to address this aspect. This concern would naturally be even more valid for a possible Phase II if the recommendations are followed in terms of increasing the focus on policy impacting.

In terms of the detailed allocations it is our view that the approx. 8% set aside for programme co-ordination and management is reasonable and the percentage is comparable to what is being allocated in similar programmes funded by other multi- and bilateral agencies.

A specific question relates to the lack of allocation for NRIs or workshops under the PAH programme. It seems that the NRI involvement must have been paid and maybe a revision of this programme has been done later, but it does not appear in the documents available.

The equipment grant under the fellowship programme is quite significant (6%) and there is no specification of its potential use in the document and justification is limited. If larger equipment grants are to be included in a Phase II programme it would certainly require some more justification and indications of the specific needs. This links back to the discussion of AIT as an appropriate programme host and co-ordinator and part of the argument is naturally that AIT has the facilities and equipment, which the programme can utilise. New investments of this magnitude ought therefore to be justified directly by specific programme needs.

## 6.2 Cost-effectiveness compared with other regional programmes

There are few similar programmes to compare with ARRPEEC, but at least within the region, the Asian and Pacific Energy Planning Network (Apenplan) and the Asian Energy Institute network represent programmes with a similar scope. These two networks have had somewhat similar focus in terms of examining regionally relevant EEC issues. However, although both networks are probably still in existence, the impression is that they have not been very active the last couple of years.

The two networks are co-ordinated by the Asia and Pacific Development Centre (APDC) located in Kuala Lumpur, Malaysia and the Tata Energy Research Institute in India, respectively. Both networks have traditionally had a more direct focus on policy relevance and impact than ARRPEEC, while the institutional networking and capacity building aspects, at least for AEI, have been rather weak and similar to the structure for ARRPEEC in Phase I. This may be one of the reasons for the apparent declining level of activities.

No detailed cost figures are available for these two networks in order to compare cost-effectiveness of the different undertakings, but as one of the evaluators earlier was on the advisory group for the AEI and has indirect knowledge of the funding situation, it can be broadly stated that the cost levels are comparable. The AEI, however, never experienced the

benefit of receiving one large long-term grant for the network, which may be another reason for its decline.

# 7. General conclusions and recommendations

## 7.1 Assessment of the programme performance

The overall impression is that the ARRPEEC programme has been conceived based on a sound and relevant rationale and the choice of themes for Phase I have been appropriate in view of what is perceived as some of the key EEC issues for the Asian region at present.

The programme does, however, not seem to be sufficiently integrated with related activities both at the national and regional levels. This varies between countries, but it is evident that the activities in Phase I have had little link for example with the on-going national climate convention related programmes. Similarly it seems that within AIT, the programme has not fully utilised the possibilities for interaction with other related programmes undertaken by other researchers or teams.

The objectives set up in the project document and discussed in Section 1.2 have generally been met. However, the programme document and the established objectives are, in our view poorly formulated and provided too loose a framework for a programme of this magnitude. It must be added that the programme collaboration has been dynamic in that Sida and AIT have interacted closely and gradually provided more focus on the activities

It should be noted that the Sida objectives listed in the ToR for the evaluation are close to the recommendations of this evaluation. In that sense the main issue should be to further develop these objectives with regard to capacity building, and to clarify the extent of policy impact to be aimed at. It is also vital to ensure that these new objectives are understood by all involved parties as the common basis for the continuation of the programme.

The capacity building and policy impact aspects of the programme have in our view received insufficient attention in Phase I and immediate actions have been proposed to provide a strengthening of the policy impact side. The capacity building aspects will then need to be built into Phase II. Important requirements are clear decisions on the expanded involvement of the NRIs, and the establishment of clear criteria for NRI selection and modes of collaboration.

With regard to research output, the productivity of Phase I has been impressive. The quantity of reports is overwhelming and this in itself makes it difficult for the reader to achieve an overview. We believe that an overall summary and comparative analysis which would have made the reports more valuable and accessible to a larger audience. The number of articles submitted and accepted for international publication after peer review is significant and illustrates the general quality of the produced research. Our internal review did, however, find some errors in the reports and raised questions about part of the scope, so it would be relevant to include more systematic peer review of all the key publications and not only rely on journals for this purpose.

As already mentioned there has been no direct focus on the policy impact aspects and the reports illustrate this, as they have predominantly been written for a technical audience. The only exception to this is the industry programme, theme (a), which produced more structured popular reports and in many ways set an example to be followed.

The general impression on the originality of the research is that the projects focused on adapting and applying known approaches to new problems. This is a logical approach for a network that has capacity building as one of its aims. However, in view of the actual division of tasks where the major part of the actual research work was done at AIT rather than by the NRIs, this logic is not really justified. In this regard, the PAH project, theme (c), although limited in scope, was more novel in its approach while still managing to establish capacity at the NRIs.

The total cost of the three-year programme is quite reasonable in view of the activities undertaken and the output produced. Similarly a very general comparison with other similar networking activities indicates that the cost-effectiveness is acceptable and of the same orders of magnitude as other initiatives.

The overall conclusions of the evaluation are therefore that:

- the programme activities focused on issues of high relevance to EEC issues in the region, but lacked integration with other national and regional activities and a clear strategy for communication with and impacting policy makers

- the programme generally fulfilled its objectives, but these have been poorly defined and a continuation of the programme will have to be based on a revised set of objectives

- the programme produced a significant amount of results of generally high scientific quality. The outputs in the form of reports and articles are generally very large and poorly targeted with a distinct lack of overviews, summaries and comparative assessment.

- the capacity building aspects of the programme were weak both in terms of involvement of the NRIs and in terms of interaction between the research projects and the fellowship programme

- the programme was generally funded at an appropriate level in comparison with other regional programmes and networks

The evaluation team is critical of the original programme design and objectives, but within the originally agreed programme scope the performance was generally satisfactory. The individual programme elements were strong on some aspects and weak on others, as has been discussed in the earlier chapters.

## 7.2 Recommendations

It has been emphasised in several parts of this report that the evaluators find a great deal of merit in the concept of a regional programme on EEC issues for Asia. Phase I of ARRPEEC has shown that a structure and experience has been established upon which it is possible to build further.

The weaknesses of the Phase I have been discussed extensively in terms of weak capacity building emphasis and lack of strategy and activities on policy impacting. These have been discussed in Section 3.1 in terms of the necessary process that a new programme has to go through in order to establish itself. Therefore the success of the programme would depend on the combination of ability to produce high quality research results, to build capacity at national and regional level, and to gradually engage in dialogue with and impact policy and decision-makers.

The recommendations from the evaluation team are therefore:

- to continue the programme with a Phase II provided it is based on a set of objectives and activities which reflect a more equal focus on the three aspects of quality research, capacity building and policy impact

- to prepare a new programme of the same duration as Phase I, but with expanded funding in order to achieve the proposed more ambitious objectives

- to involve the NRIs to a greater extent in programme formulation and implementation, and to base the selection of NRIs on transparent criteria which are related to the three key objectives

- to ensure that the AIT team focuses on more regional-level research rather than performing repeated national applications of an analytical approach

- to integrate the research-training programme with the research themes and to define how the individual capacity building efforts link with the institutional ones

- to integrate the PAH type activity into one of the fuel- or sector-related sub-programmes

- to consider examining regional EEC issues as one of the sub-programme activities rather than choosing only topics whose regional importance stems from the compounded national relevance

- to involve more systematic peer review of all major publications

- to establish a general publication strategy defining appropriate outputs different potential target groups (not only for the policy makers)

## References


1. Asian Regional Research Programme in Energy, Environment and Climate: Revised proposal submitted to the Swedish Agency for Research Co-operation with Developing Countries, The School of Environment, Resources and Development, Asian Institute of Technology, date of application: March 1994.
2. Terms of Reference for the Evaluation of the Sida-supported "Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC)" at the Asian Institute of Technology (AIT) in Bangkok, 28 October 1997.
3. op. cit. 1
4. An experimental study on spouted bed, A report of the project "A study of Biomass as Energy Source and Technical Option for Greenhouse Gas Emission Reduction" ARRPEEC. S.C. Bhattacharya, Md. Raisul Islam, P. Abdul Salam, AIT, Bangkok, October 1997.
5. UNEP Greenhouse Gas Abatement Costing Studies. Analysis of abatement costing issues and preparation of a methodology to undertake national greenhouse gas abatement costing studies. Phase Two. Appendix: Guidelines. (UNEP Collaborating Centre on Energy and Environment. Risø National Laboratory, Roskilde, 1994).

Sida

# TERMS OF REFERENCE

Dept for Research Cooperation, SAREC
M R Bhagavan

28 October 1997

Ref. No.

SAREC-1997-0454

**Terms of Reference for the Evaluation of the Sida-supported 'Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC)' at the Asian Institute of Technology (AIT) in Bangkok**

## 1. Background

There is now a worldwide acknowledgement of and rapidly increasing concern about the environmental consequences of heavy dependence on fossil fuels, in particular global climate change brought on by global warming, urban air pollution, oil spills and acid rain. The rapid economic growth witnessed in East, Southeast and South Asia over the last two decades has been driven almost exclusively by fossil fuels. Thus, the more dynamic economies of Asia have become major actors in the energy-environment-climate nexus.

The ARRPEEC Programme of AIT is designed to make a contribution to the demanding task of mitigating the above-mentioned problems through research on energy efficiency, fuel switching, green house gas reduction and environmentally sustainable energy strategies, that is of relevance in both the Asian and the larger global contexts.

## 2. Outline of the ARRPEEC Programme

The Asian Institute of Technology (AIT) in Bangkok submitted a proposal to Sida in March 1994 for support to an Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC) for the three year period 1994/95-1996/97. ARRPEEC (hereafter referred to as the **Programme**) was conceived as a research network involving selected institutions in selected countries from East, Southeast and South Asia, with AIT providing the research leadership, coordination and management, as well as being actively

involved in performing the research work and in conducting the research training. In June 1994, Sida approved a three year grant (1994/95-1996/97) to the Programme amounting to a total of SEK 9 million (3 million per budget year). The Programme was launched early in 1995 on the basis a revised final proposal submitted by AIT in December 1994.

The Programme consists of two principal components: a research component made up of four major research projects, and a research training component based on short-term fellowships. The whole Programme thus comprises the following five projects:

1. Energy-efficient and environmentally sound industrial technologies

2. Energy efficiency options for mitigating green house gas emissions from the electricity sector

3. Emission of polycyclic aromatic hydrocarbons from energy-related sources

4. Biomass as energy source and technical option for reduction of green house gas emissions

5. Research training: post-graduate and post-doctoral fellowships and grants

**3. Sida's main objectives in supporting the Programme are:**

* to promote the production and dissemination of research studies in the area of energy-environment-climate of relevance and importance to Asia and at the global level.

* to strengthen research and analytical capacities in the area of energy-environment-climate in selected institutions in selected countries of East, Southeast and South Asia.

* to promote a multi-disciplinary and policy-oriented approach to energy-environment-climate issues in Asia, which takes due account of technological, economic and institutional factors.

**4. The purpose of the evaluation**

There are two main reasons for the evaluation. First, to assess how far, over the last three years, the Programme has been able to fulfill the research, dissemination and capacity strengthening tasks and objectives set out in its 1994 proposal. Second, in the light of the Programme's performance so far, to assess the new draft application by AIT to Sida for continued support over the next three year period (1998-2001).

## 5. The Assignment

In conducting the evaluation, the evaluators will keep in mind, firstly, the major objectives of the Programme, and secondly, Sida's overall objectives in supporting the Programme, as outlined in the preceding sections. **The evaluators will assess the following aspects.**

*5.1 Relevance and overall performance*

* The relevance and importance of the Programme to the energy-environment-climate issues in the Asian and global contexts.

* The relevance of the Programme to the objectives ennunciated in of the global Climate Convention. Has the Programme made a noticeable contribution to furthering those objectives? Can the Programme be improved and made even more relevant in terms of those objectives, in the next three year phase? (Also see Section 6 below.)

* The degree of success in achieving the Programme's overall objectives and the specific project-wise objectives, as put forward in the Programme's December 1994 ( revised final) proposal to Sida.

*5.2 Research output, research capacity strengthening and dissemination of research results*

* The quantity and quality of the Programme's output, including research reports and published papers and volumes.

* The contribution of the Programme to the strengthening of research and analytical capacities in energy-environment-climate problems in the individual country institutions involved in the Programme network, as well as at AIT.

* The modes of dissemination of research results and their appropriateness, including the relevance and range of targeted recipients.

*5.3 Capacity and competence harnessed to the Programme*

* The competence of the project leadership at AIT and in the individual country institutions, to be assessed in relation to their performance under the programme.

* The magnitude and quality of the back-up service, in terms of energy expertise as well as managerial and coordinating tasks, provided by AIT to the individual country institutions and professionals involved in the Programme network.

*5.4 Regional research programmes vis à vis AIT's philosophy, structure and management*

The appropriateness of AIT's philosophy, structure and management to the execution of regional research programmes of networking character such as ARRPEEC.

*5.5 Cost-effectiveness*

* The structure and purpose of the major components of the Programme budget, and the relative shares that go to AIT and the individual country institutions, and how these have affected the achievement of the stated Programme and project objectives.

* Cost-effectiveness of ARRPEEC in comparison with other comparable regional programmes in Asia and elsewhere.

## 6. The new draft proposal by AIT

The evaluators shall also assess the new draft proposal submitted by AIT to Sida for continued support over the next three year period 1998-2001, paying particular attention to the following aspects: relevance, importance, scientific quality, research capacity strengthening in individual country institutions in the proposed Programme network, Programme design, feasibility and the magnitude and structure of the proposed budget. (See also the second bullet in Section 5.1 above)

## 7. Recommendations by the Evaluators

In addition to their detailed and in-depth assessment of the performance of the Programme over the period 1995-97 and the recommendations ensuing therefrom , the evaluators should also present their recommendations on the changes and improvements required in the approach, the design and the execution of the Programme in the future, in the light of the new draft proposal submitted by AIT to Sida

## 8. Methodology, Evaluation Team and Time Schedule

<u>The Methodology</u>

The evaluators will study the published and unpublished written output produced by the Programme over the period 1995-1997, including the Programme proposal (revised final version) submitted by AIT to Sida in December 1994 and the new draft proposal to be submitted by AIT to Sida in October 1997. In addition, they will read relevant selected material pertaining to AIT's overall philosophy, approach, structure and management.

They will attend the ARRPEEC review meeting scheduled for the week beginning 23 November 1997 in Bangkok at AIT and conduct in-depth interviews with the Programme and project leaders, as well as the individual country energy-professionals and researchers involved in the Programme. Further, they will also interview selected key figures in AIT leadership.

The Evaluation Team

The team comprises two international experts:

Dr John M Christensen
Head
UNEP Collaborating Centre on Energy and Environment
Systems Analysis Department
Risoe National Laboratory
Roskilde
Denmark

Dr Gordon Alexander Mackenzie
Senior Researcher / Senior Energy Planner
UNEP Centre as above at Risoe in Roskilde, Denmark

Dr Christensen will act as the team leader.

The Time Schedule

The evaluation will entail a maximum of 8 person-weeks of work, i. e. a total of 8 weeks for the two evaluators together, spread over the period October 1997 to February 1997. The evaluators will spend one week each at AIT in Bangkok (23-28 November 1997). The remaining six person-weeks will be spent studying the written material and drafting the evaluation report.

The evaluators will submit a single, joint draft report in English to Sida not later than 9 January 1998. The draft report will be sent by Sida to the Programme and project leaders at AIT soliciting their comments. Those comments, together with Sida's, will be sent by Sida to the evaluators by late January 1998. Taking these comments into account, the evaluators will produce the final version of their report and submit it to Sida not later than 20 February 1998.

**8. Reporting and Publication**

The length of the final report will be at least 20 single-spaced typed pages (approximately 8000 words), but should not exceed 40 pages (16,000 words), excluding annexes. It should lead with an Executive Summary of not more than four pages (single-spaced, 1600 words) Further, the evaluators will submit a one page (single-spaced, 400 words) summary of the evaluation for publication in Sida's "Evaluation Newsletter".

The final version of the single joint report shall be submitted in two copies and on disk in Word for Windows or WordPerfect for Windows or a compatible format. It should be presented in a form that enables publication without further editing. Subject to decision by Sida, the report will be published and distributed as a publication within the Sida Evaluation Series.

The final responsibility for submitting the evaluation report according to the criteria and format mentioned above rests with the team leader, Dr John Christensen.

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