Mid-term Evaluation Report

4 May, 2001

FINAL REPORT

Renewable Energy and Energy Capacity Building Project

EG/SRL/96/G32 & DG/SRL/97/019

Sri Lanka

The mid-term evaluation funded by:

United Nations Development Programme (UNDP)
Colombo, Sri Lanka

The mid-term evaluation executed by:

United Nations Industrial Development Organisation (UNIDO)
Vienna, Austria

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EXPLANATORY NOTES

Abbreviations:

CBO	Community Based Organisation
CEB	Ceylon Electricity Board
DFCC	Development Finance Corporation of Ceylon
DSM	Demand Side Management
ECF	Energy Conservation Fund
ERD	External Resources Department (Ministry of Planning)
ESCO	Energy Service Company
ESD	Energy Services Delivery programme (World Bank)
GDP	Gross Domestic Product
GEF	Global Environment Facility
GNP	Gross National Product
GOSL	Government of Sri Lanka
GWh	Giga Watt Hours
HVAC	Heating, Ventilation, Air Conditioning and Cooling
IPP	Independent Power Producer
ITDG	Intermediate Technology Development Group (Sri Lanka)
kW	Kilo Watt
M/P&E	Ministry of Power and Energy
MU	Moratuwa University
MW	Mega Watt
NERDC	National Engineering Research and Development Centre
NEX	National Execution
NGO	Non Governmental Organisation
PAC	Programme Advisory Committee
PEU	Pre-Electrification Unit (at CEB)
PMU	Project Management Unit
SHS	Solar Home System
SLEMA	Sri Lanka Energy Managers Association
TOR	Terms of Reference
TPR	Tri-Partite Review meeting
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organisation
UNISE	UNDP Initiative for Sustainable Energy
WB	World Bank

Currency: Sri Lanka Rupee (LKR)

1 USD = 87.25 LKR (13 April 2001)

ACKNOWLEDGEMENTS

The mid-term evaluation as conducted between 23 March and 27 April, 2001 provided us with the opportunity to monitor and evaluate the implementation of an interesting UNDP/GEF & the GOSL project on - so needed - capacity building for continued development of the sustainable energy sector in Sri Lanka. Since it was not only a reflection of the historical occurrences as is usual the case for an evaluation, we were also in the position to extract from our findings some (practical) recommendations for a more effective and efficient implementation of the remainder of the project. Lessons learned as it concerns the design and implementation of this project will be hopefully considered when future generation GEF projects are being identified, formulated and implemented.

During the evaluation mission to Sri Lanka between 26 March and 6 April, 2001 a large number of people and institutions were visited for secondary, but more importantly primary data collection. Even non-verbal communication has proven to be quite useful as a means of providing information to us. We sincerely appreciate the contributions made by Sri Lanka stakeholders (in)directly involved in this project during the evaluation mission. We would like to thank all of you and we express the hope that the conclusions, findings and recommendations originating from this report will assist you in the continued implementation of the project.

The evaluation team would especially like to thank Dr. V.U. Ratnayake, the national project coordinator for his professional and constructive participation as well as for his humor that made working with him a real pleasure. The evaluation team also wishes to thank Ms. Dorthe Jorgensen, programme officer at UNDP Colombo for her guidance and valuable inputs before, during and after the evaluation mission.

As a closing remark we can only make mention of the fact that a lot of fine work has been carried out that deserves a follow-up - in whatever format. We congratulate all the Sri Lanka stakeholders with that work, which we believe is a very useful contribution to the sustainable energy sector in Sri Lanka. May other countries in the region and beyond learn from the Sri Lanka experience and put it to use in their own context.

Sincerely yours,

The evaluation team:
Mr. Ad Dankers, Evaluation team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

May, 2001

EXECUTIVE SUMMARY

Scope and purpose of the mid-term evaluation

This Report presents the results of a mid-term evaluation of the 'Renewable Energy and Energy Capacity Building Project' funded by UNDP/GEF, and under implementation in Sri Lanka. After initial project formulation in 1995, the Project Document has been signed in January 1998. Physical implementation of the project has started in January 1999 and is currently planned for completion in December 2001. The current evaluation was carried out in March 2001, closely following the Terms of Reference of the evaluation team[1]. This report is structured on the basis of UNIDO guidelines for the preparation of evaluation reports.

The purpose of this evaluation is to enable the GOSL, the donors and UNIDO to take decisions on the future orientation of the project, to introduce, if required, corrective measures to improve the implementation of the project, to verify the need, if any, of extension of the project, and to learn lessons from experience for future planning of new projects. In addition, mainly during the evaluation mission to Sri Lanka, the national stakeholders were kept enlightened about the project implementation process. This is considered important, as it will contribute to a better understanding, reduction of frustration and as such creates a better basis for the remainder of the project implementation, in the light of historical difficulties experienced.

Objectives and the purposes of the project

The project has been designed to address two key barriers hampering the expansion of renewable energy and energy conservation activities. These are:

- Lack of familiarity of the private industrial sector and the financial community with renewable energy projects in general and the resource potential specifically; and
- A need for skilled indigenous capacity in design/implementation for both energy efficiency and renewable energy projects.

Two key objectives are the basis of the project outputs design:

- *Immediate objective 1: To encourage private sector investment in selected small/micro hydro, wind and biomass projects; and*
- *Immediate objective 2: To build professional capacities for renewable energy and energy efficiency in Sri Lanka.*

Each immediate objective is split into 3 activities and in turn each activity has led to specific outputs. The original purpose of the project has been to make a contribution to the introduction of renewable energy and energy efficiency to the country by:

[1] The evaluation team comprised of Messrs. Ad Dankers, UNIDO Consultant (Team Leader); Bandula Tilakasena, National expert, UNIDO Consultant; and Guillermo Jimenez, UNIDO Staff member.

- Identifying resource capabilities and pre-investment issues and options for three important renewable energy sources as well as establishing the capacity to replicate the analysis in other locations;
- Building capacity of the emerging Sri Lanka mini hydro industry in design, manufacture, procurement and maintenance;
- Providing training to working energy management professionals in best-practices;
- Providing training to student professionals in industrial and commercial energy efficiency technologies; and
- Encouraging local economic development by transferring skills and promoting indigenous technological solutions.

This evaluation attempts to determine and discuss -activity by activity- the relevance, efficiency, effectiveness, impact and sustainability of the project. It assesses the achievements of the project against its objectives, including an examination of the relevance of the objectives and of the project design. It also assesses to what degree the assumption/risks as identified in the project document have held true and identifies other factors that have facilitated or impeded the achievement of the objectives.

Project concept and design

A review of the project concept and design has been made, focusing on significant developments during the implementation period, development problems addressed by the project, institutional framework, relevance to UNDP priorities and the degree to which the original purposes of the project remain valid.

It was found that the concept and design of the outputs reasonably takes into account the socio-politic, economic and environmental national contexts, whereas specific local conditions like complex institutional structure and context might have deserved closer attention during the project design phase. No gender-related considerations were found applicable. Such considerations are anyway not a GEF design priority.

Further, it has been observed that the original rationale for the design of the project still remains valid. It is clear that all activities of the project have been designed for capacity building of the counterpart agencies in three renewable energy sources, rather than providing direct support. The proposed measurable performance indicators reasonably assess the outputs. In this report, the evaluation team expresses an informed opinion on the likelihood of achievement and the degree of completion of the outputs themselves.

Implementation

The structure of implementation is rather complex, with one executing agency (Ministry of Power and Energy, formerly, Ministry of Irrigation & Power), and six counterpart agencies (viz: UNIDO, Ceylon Electricity Board, Energy Conservation Fund, NERDC, ITDG and SLEMA). The project is fully Nationally Execute (NEX). This means that the Ministry is responsible and accountable for the entire execution including implementation of the project. UNIDO has signed a Letter of Agreement

with the Ministry and is responsible for rendering very specific agreed services as described in the Attachment 1 of the said Letter of Agreement.

The implementation aspects of project timing, budget, expenditure, delivery of the inputs, assumptions and project management have been reviewed and an assessment of the present status of implementation and the extent in which the planned outputs for each activity are being achieved has been made. Also the likelihood of achieving the performance indicators, as proposed in the project document, has been rated.

Implementation of the project has been in concurrence with the design arrangements as included in the project document. Tripartite meetings have been organized annually and they have been useful for monitoring project implementation. In addition, a Programme Advisory Committee has closely monitored the implementation of the project.

No explicit assumptions have been included in the project document at the design stage. However the sections of the project document, which deal with risks and obligations of the stakeholders, make assumptions on the risk mitigation activities and ability of stakeholders to provide inputs. It can be observed that these assumptions made at the time of project design were realistic, and the project has progressed in line with assumptions made.

Budget and expenditure

The (originally) planned total UNDP/GEF budget is US$ 1,858,470 (including costs for Administrative and Operational Services [AOS] amounting to US$ 29,062). The following table summarises the budget and the disbursement of funds with respect of the executing agency. In the course of implementation, a number of budget revisions have been made to adjust the budget to the changing needs or time schedules for the different activities. The contribution of the GOSL was intended to be in kind, and hence it was difficult to monitor. The evaluation team has not found any recorded information on the expenditures of the in-kind contribution of the GOSL.

Table 0.1: Original and present revised UNDP/GEF budget and disbursement levels*

	Original Budget US$	Latest Revised Budget US$	Disbursements US$	%
UNDP NEX				
EG/SRL/96/G32	674,728			
DG/SRL/97/019	0			
	674,728	632,265	333,370	53%
UNIDO execution				
EG/SRL/96/G32		801,651		
DG/SRL/97/019		322,937		
	1,086,001	1,124,588	735,970	65%
GOSL	142,000	142,000	n.a.	n.a.
Total	1,902,729	1,898,853	1,069,340	61%

** Amounts mentioned are net amounts; i.e. without AOS costs.*

In addition to the above mentioned budgets provided by GEF, UNDP Colombo and the GOSL a so-called 'Support for Technical Services (STS)' has been requested by UNDP Colombo from UNIDO. Under this arrangement UNIDO agrees to provide

technical services for the preparation of work plans for the implementation of the six project components and a consolidated work plan for the project as a whole, including the preparation of TOR's for consultants and sub-contracts to be implemented through UNIDO. This agreement was signed 1 December 1997 and this budget has since been revised upwards from US$ 15,100 to US$ 53,100.

As of 31 March 2001, the actual UNIDO and UNDP expenditures amounted to 65% and 53% respectively of the total budget in relation to the estimate of approximately 75% for the production of outputs.

Findings and conclusions

A summary of findings and conclusions and an interim assessment of production of the outputs for each activity is given below:

Activity 1: Mini and small hydro project preparation

A number of factors adversely affected the timely delivery of the outputs for this activity. It was noticed that the impediments related to procurement of equipment were finally settled, after some initial deficiencies and gaps in communication between the national counterpart and the manufacturer/vendor in delivery of the equipment.

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Installed hydro capacity identified for pre-investment	✓		
Quantity and Quality of prepared procedural documentation and computer models generated			✓
Opportunities provided for financial community and developers to explore project opportunities			✓

Activity 2: Wind assessment and project preparation

Similarly, but to an extent even greater than for the previous activity, the procurement for activity 2 led to a number of impediments that have delayed implementation, and which resulted ultimately in the buying of a new set of equipment, with the old set of data acquisition equipment being left for wind data measurements outside the project area. The evaluation team found that said impediments are attributable to a number of reasons, which are out lined in the body of this report. All this led to delays and insufficiencies, which may compromise the quality and timeliness of some outputs, notably wind mapping.

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Cost-effective wind generated capacity identified for pre-investment			✓
Quantity and Quality of prepared procedural documentation and computer models generated			✓
Opportunities provided for financial community and developers to explore project opportunities			✓

Activity 3: Increasing the effectiveness of applied research

This is also one of the delayed activities in terms of implementation. As a result of the activities of the international consultant this sub-activity is being reformulated. The document prepared by the international consultant is guiding this process. The reformulation as suggested by NERDC will most likely result into the acquisition of a turnkey package for a gasification plant. The evaluation team observes that such an approach, if not properly designed and sufficiently sustained by a comprehensive commercialization background, might well end up at risk of providing only a minor contribution to the corresponding development objective.

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Number of commercial opportunities identified for conversion to biomass combustors			✓
Quantity and Quality of technology transfer materials			✓
Number of new products supported by research funding			✓

Activity 4: Capacity building in the small hydro industry

The evolution of the outputs for this activity was found conforming to the project document and time wise satisfactory. The courses that have been designed and implemented by ITDG have met the objectives as set out in the project document. Furthermore they have been properly documented and provide a good basis for continued activities in this field. Only the study tour has experienced some delay, due to delays in determining its content, programme, terms and conditions for accession. Despite this, it can be estimated that the whole activity should be finished by the third quarter of 2001. ITDG has also initiated on its own design and local manufacturing of 100 kW Pelton turbines, similar to the model turbine designed during the training included in this activity.

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Participation by private sector developers and implementers in workshops/seminars	✓		
Identified innovation as a result of study tour			✓

Activity 5: Strengthening Energy Audit and Management Capabilities in the Commercial, Institutional and Industrial Sectors

The project design and relevance is considered good for this activity. One of the key factors for success was found to be the segmentation of target groups in 3 layers: undergraduate, postgraduate and professionals, with differentiated approaches and goals. The ownership can be rated in an interim basis as very good. The efficiency in implementation (production of outputs as compared with the inputs) can be rated as very good. SLEMA and the University of Moratuwa showed strong commitment and good teamwork abilities, proactively sorting out the difficulties arisen and managing

to produce useful course materials, this in spite of problems experienced in the contracting process of international consultants as well as with the already contracted international consultants.

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Number of professional attendees at courses	✓		
Yearly use of audit equipment by national private and public agencies	✓		
University program subscription			✓
Uptake by industry of a student intern program	✓		

Activity 6: Renewable Energy Equipment Performance Testing

Some of the outputs for this activity, although being relevant for the objective, were perhaps too ambitious in comparison with inputs and budget, notably test procedures and linkage with conformity assessment, testing standards and good practices thereof. At the time of the evaluation, only the output for procurement of test equipment seems to have been fully implemented. The rest of the outputs remain in different status of implementation. The effectiveness of this activity cannot be properly assessed, since the production of the outputs is very much delayed.

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Testing procedures developed and published			✓
Numbers of equipment suppliers taking up the services			✓

Effectiveness and impact

The contribution to the achievement of the corresponding immediate objectives (effectiveness) have been assessed by estimating the possible use and impact of the outputs by the target beneficiaries (actual or realistically expected) or the confidence in the capabilities of the implementing stakeholder to effectively render these immediate objectives upon completion of the outputs. In general, the evaluation team considers that the overall assessment of effectiveness for the whole project is sufficient, except for activities 3 and 6. In activity 3, the delays in the gasification component, the poor ratings of the performance indicators above and the uncertainties regarding commercialization success do not permit positive rating of the effectiveness of the gasification sub-activity. In activity 6, the impasse on the role and functions of the international consultant might compromise its effectiveness too.

Though it is not possible to assess the impact of the project upon the target beneficiaries during this mid-term evaluation, it is likely that impacts of the project will be favorable for the economy and environment, however small they may be.

Sustainability

Three main external factors will potentially have an influence on the sustainability of the project outputs, but to date had limited impact on the implementation of the project:

- World Bank ESD programme that plans to make use of outputs of the programme, notably the solar home system equipment testing facility;
- Power Sector Reform that is currently being planned, especially its impacts on private sector activities in renewable energy and energy efficiency activities. Part of this process will be the tariff setting for IPP's; and
- GOSL's Power Sector Policy Directions, which dilutes the role of the public sector in small renewable power projects, especially in small hydropower development.

It was found that some overlaps with the ESD project existed, but that in general terms the projects could be considered complementary. In the light of Power Sector Reform and GOSL's Power Sector Policy Directions, commercial sustainability of grid-connected projects is not guaranteed, unless the Regulatory Commission intervenes to address the issue of financial viability of such renewable power projects. Therefore effective utilization of new skills acquired by the CEB through this Project in planning small renewable power projects is limited. In summary it can be concluded that it is expected that if attractive tariffs for buying renewable energy generated power will be offered the private sector developers will step forward.

Recommendations

The focus of the recommendations is on improving the remainder of the project implementation, rather than making general remarks of the project under evaluation, which we consider will be of limited value at this stage. They are presented here on project as well as on the individual activity levels:

Activity 1 and 2

- Counterpart agencies and the UNDP to ensure obtaining duly licensed software with maintenance support and, if available in Sri Lanka, technical support for the software acquired under this activity;

Activity 1

- To organise a training seminar under supervision of international consultants to examine understanding of the models by the PEU. This seminar could coincide with the consultants' visit scheduled for June/July 2001;

Activity 2

- As a follow-up to the outputs of this activity, to organize a training seminar by international consultants at a level satisfactory to PEU;
- Undertake a thorough data analysis, based on data collected and prepare pre-investment documents for private sector interested potential investors;

Activity 3

- Continue activities as they are planned for direct biomass combustion and work towards the situation that projects will be prepared at a pre-investment level to attract investors from the three selected sectors;
- NERDC to properly document its activities and disseminates information through appropriate channels directly targeting the potential investors in the three selected sectors;
- To finalise the activities of the biomass gasification component as soon as possible in close consultation with the UNIDO project manager. Given the importance of a proper design for this revised sub-activity is strongly recommended that the possibilities of contracting an international expert. The international expert should be involved in drawing up/reviewing specifications, suggest possible suppliers and to be involved in the bid/selection of the equipment. Besides, the international expert is to involved in the design of the gasification programme, including its commercialisation and implementation requirements (work plan) be addressed during the next TPR in late May 2001;
- To undertake the biomass gasification activities in a commercial environment as to combine the objectives of demonstrating the technology as well as the commercial attractiveness of gasification;

Activity 4

- To finalise as soon as possible (before the end of May 2001) the TOR for the study tour, including the selection of participants and the assistance required from an international consultant;
- To implement the study tour, latest in the third quarter of 2001 to ensure that information resulting from the study tour can be properly compiled and disseminated to a larger audience;
- Initiate activities of the international consultant that has been recruited for the design and local manufacturing activities of a 100 kW Pelton turbine;

Activity 5 and 6

- Communication between UNIDO and SLEMA has to be improved and both parties need to be involved in drafting TORs, specification of equipment, etc. as early and as much as possible;

Activity 5

- Continue activities as planned and strive to maximize the industry acceptance and sense of ownership for the activity;
- Finalise as soon as possible (before the end of May 2001) the contracting process of the international HVAC consultant;
- Subject to availability of project funds, out of savings, it is recommended that the possibility for extending activities such the provision of more equipment for energy audits, organising training seminars with a close industrial orientation and adding on energy efficiency modules to existing curricula the Moratuwa University will be explored during the next TPR;

Activity 6

- Refocus this activity towards a higher demand-orientation and reschedule and implement as soon as possible the remaining tasks;

- Finalise as soon as possible (before the end of May 2001) the contracting process of the international consultant on test procedures;
- Document, publish and disseminate results to an audience (equipment suppliers) as appropriate in order for the testing procedures to be of any effective use. And finally fine tune future hydro activities with CEB and ITDG;

Project level

- To introduce a communication protocol, which will greatly assist in improving communication between the counterparts. It is recommended that this will be discussed and decided upon during the next TPR to be held late May 2002;
- It is recommended that UNIDO is considered a team member, rather than a clearing house for TORs, contracting consultants, procuring equipment, etc., hence include the UNIDO project manager as early as possible in the remaining activities;
- The evaluation team recommends to organise an extra TPR late May 2001, to discuss the outcomes of the mid-term evaluation as outlined in this report, the work plan for the remaining project period and the timing of the project.
- To avoid problems with TOR's for future activities of international consultants it is recommended that in addition to the international consultants commenting on the TOR before accepting the assignment, they will also discuss the TOR upon arrival in Sri Lanka and agree upon the implementation of it with the local counterparts (clients);
- Complementarity of the outputs of activities in the small and mini hydro development to be improved. The evaluation team concludes that ITDG is in an excellent position to fine tune hydro activities 1, 4 and 6. It is recommended that the national project manager, jointly with UNDP and UNIDO discusses this possibility and after agreeing on the concept actively look for funding from the project budget to detail and implement activities;
- A national programme focusing on energy efficiency would be a realistic next step. It is recommended that in addition to the activity level sustainability issues, the PAC and PMU, should initiate and guide the discussions on possible follow-up programmes, taking into account any next phase of the ESD project. It is recommended that during the next TPR, this will be made an agenda point to resolve the issues relating to financial, human and time resources;
- Recommended ending dates of the various sub-activities have been presented in the table below. It is recommended that this will be reviewed and decided upon during the next TPR.

Table 0.2: Recommended ending dates of the (sub) activities

(Sub) Activity	Recommended ending dates of the (sub) activities							
	Dec '01	Jan '02	Feb '02	Mar '02	Apr '02	May '02	Jun '02	Jul '02
Activity 1								
Activity 2								
Activity 3: combustion								
Activity 3: gasification								
Activity 4: study tour								
Activity 4: design & mfg								
Activity 5:		?	?	?	?	?		
Activity 6:								
PAC activities								
PMU activities								

Lessons learned

Lessons learned from this project are summarised below with a practical orientation for future project developers and programme managers:

- The activities that are complementing each other or inter-related need to be assessed in detail during the project design. A lead agency needs to be appointed to coordinate such activities and a budget for it needs to be made available from the start of the project;
- The World Bank is undertaking ESD programmes or similar type of activities under different names in a number of countries. Therefore at the design and implementation stages of sustainable energy programmes it is recommended that frequent communication between the programmes takes place and that the coordination of complementary project activities will be made a specific task of either the World Bank or of the UN/GEF. Also a budget, provided by both organisations jointly should be made available for the implementation stage;
- The recruitment and procurement processes as they are being used by the various UN agencies are often not transparent and difficult to be understood by national project counterparts. It is recommended that at the beginning of the project implementation, a familiarisation session of these processes is organised for the key implementers;
- Minimize, to the extent possible, the number of implementing agencies in a project. If one executing agency has also the capacity and willingness to be the implementing agency it is suggested to opt for one combined executing / implementing agency only;
- Changing project management structures creates delays and difficulties in the project implementation and should be limited to the extent possible. In case this is not possible, one should strive to have an overlap between coming and going project personnel as to enable the effective and efficient transfer of institutional knowledge on details of the project activities;
- To introduce a communication protocol, which will greatly assist in improving communication between the counterparts. Most UN agencies are in the position to organise and implement a list server to be made available for the project duration;
- The involvement of UN staff in projects is often considered quite formal. Given the importance of being part of the process, and not just of the outputs of the

process, it is recommended that UN staff involved in projects establish a working relationship of an appropriate standard for the more effective involvement and contribution of UN experts to the project;

- For projects where equipment has to be procured for usage by international expertise that also has to be contracted under the same project, it is recommended that the international consultants will be tasked with the writing of the specifications and the procurement of the equipment that they will be used in the process of delivering their outputs;
- In cases where equipment is procured separately, it is recommended that installation and commissioning of that equipment is included in the specifications of the equipment order, especially if it concerns with equipment unfamiliar to the national project implementers. Assistance from international experts is recommended to be used for the writing of the equipment specifications, suggest possible suppliers and to evaluate the bid and procurement of the equipment;
- Conditions for payment of equipment procurement and the delivery of international expertise have to be as practical as possible, based on existing procurement rules and regulations at UN agencies. In the case of capacity building, consultancy reports are to be considered only partial outputs as the satisfied participation in training courses of national actors is not reflected in such reports. Therefore, it is recommended that participant evaluation of training workshops, seminars, study tours, etc. is also included in the consultancy reports, and this to be made an integral part to assess the satisfactory delivery of the consultant's inputs; and
- In cases where the level of local knowledge, skills and experience is high, it will be necessary to recruit higher-level international expertise for assisting the project. Since this is not always available to the UN system as a result of limitations of the UN system (fees, flexibility, in general not being able to compete with private sector) one has to be realistic and communicate clearly to the local counterparts what they can, but also cannot expect from the UN system.

1. Introduction

1.1 General

The mid-term evaluation covered the project entitled 'Renewable Energy and Energy Capacity Building' under implementation in Sri Lanka. The title of this project is somewhat confusing as it mentions *'energy capacity building'*, whilst its focus is on *'energy efficiency capacity building'*. Although the term 'mid-term' is used, the project has already for 65-70% been implemented.

The mid-term evaluation has been carried out closely following the Terms of Reference (TOR) as are included in Annex 1. Both at the individual activity and the project level findings, conclusions and recommendations have been made with the aim to a) improve the remainder of the project implementation and b) contribute to the future formulation, development and implementation of similar GEF projects.

Furthermore the evaluation team has tried to be flexible to the extent necessary to ensure that the preparation, implementation and rounding off of the mid-term evaluation would be (cost-) effective, efficient and useful for the remainder of the project implementation.

In addition to the objectives of the mid-term evaluation as mentioned in the TOR the following indirect objective was fulfilled during mainly the evaluation mission to Sri Lanka; i.e. the national counterparts were kept enlightened about the project implementation process. This is considered important, as it will contribute to a better understanding, reduction of frustration and as such creates a better basis for the remainder of the project implementation, in the light of historical difficulties they had experienced.

The evaluation team consisted of the following three members, whose selection has been cleared by UNIDO, UNDP Colombo, the Programme Advisory Committee (PAC) and the national project manager. None of the team members had been involved in any of the project stages (identification, formulation and implementation) before, nor had the international consultants ever worked in Sri Lanka before:

Mr. Ad Dankers, Evaluation team leader, UNIDO consultant;
Mr. Bandula Tilakasena, National expert, UNIDO consultant; and
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member.

The mid-term evaluation activities consisted of the following phases:

1. Briefing at UNIDO Head Quarters in Vienna for both international team members of the evaluation team. This briefing took place on 23 March, 2001;
2. Mission to Sri Lanka during the period 26 March to 6 April, 2001;

The methodology and approach followed during the evaluation mission can be summarised as collecting any secondary data not available at UNIDO HQ such as project correspondence, project budget revisions, project outputs from the various activities, mid-term evaluation report of the World Bank ESD

programme. In addition the collection of primary data through interviews, discussions, wrap-up meeting and informal meetings with project counterparts as well as (international) consultants contributing to the project who were present in Colombo during the evaluation mission. Data analysis was largely done during the mission and prepared for presentation to national counterparts as to get immediate feedback; i.e. the wrap-up meeting.

3. Preparation of the (draft) mid-term evaluation report (9 to 26 April, 2001);
4. Presentation of the (draft) mid-term evaluation report to UNDP, the national project manager and UNIDO and a debriefing at UNIDO HQ on 27 April, 2001;
5. Incorporating feedback from those who received the draft report and from the presentation and discussions at UNIDO HQ (30 April - 3 May, 2001); and
6. Delivery of final report 4 May, 2001.

The mid-term evaluation was foreseen in the project document (page 21, chapter 8, paragraphs 85 through 87) and hence UNDP/GEF funding was allocated in the project budget to undertake the evaluation. UNDP Colombo contracted UNIDO to undertake the mid-term evaluation.

Please refer to Annex 2 for an extensive list of persons and organisations visited/met during the evaluation mission, including a brief summary of main topics covered during the meetings. A wrap-up meeting was held prior to departure (4 April, 2001) to inform the national counterparts on the preliminary results of the evaluation mission as well as to solicit immediate feedback on the main findings, conclusions and recommendations made by the evaluation team. The presentation used at the wrap-up meeting is included in annex 3.

1.2 Structure of the report

The report is structured making use of the 'UNIDO guidelines for the preparation of the evaluation report. These guidelines have not been strictly followed as for example the elements as mentioned in the TOR have been merged as felt most appropriate. The latter is also the case for other issues not explicitly mentioned in the TOR.

Chapter 1 deals with the administrative issues pertaining to the evaluation mission. Chapter 2 focuses on the project relevance and design and summarises in the form of a table the main observations from the evaluation team in this respect. Chapters 3 and 4 address implementation issues, focusing on the efficiency, effectiveness and impact of the activities.

Activity and project level findings and conclusions are presented in chapter 5. Also in chapter 5, the recommendations specific to the six activities as well as at project level are presented. Lessons learned from this project, that are valuable mainly for the future generation projects to be supported by GEF and the multilateral community as a whole, have been presented in chapter 6.

The annexes 1 to 5 provide relevant background information as referred to throughout the mid-term evaluation report.

2. Project concept and design

2.1 Socio-economic context

Sri Lanka's population was estimated at 18.3 million inhabitants in 1996. Approximately 75% of which were estimated to live in the rural areas. For 1996, GNP was approximately $13.8 billion, giving a GNP per capita of approximately $750. In 1993, agriculture has been estimated to account for 18% of GDP. Biomass accounted for the largest fraction of Sri Lanka's primary energy supplies, and it is consumed largely in the domestic sector. Hydropower is the next most significant primary resource with the 1,137 MW of installed capacity generating more than 3,252 GWh per year. The country had imported large volumes of oil and petroleum products primarily for the transport sector.

This picture largely remained the same over the implementation period, where in 2000, GNP was approximately $15.1 billion, and the GNP per capita approximately $829. By 1999, biomass still accounted for the largest fraction of Sri Lanka's primary energy supplies (51.1%), and hydropower remained to be a significant primary resource with the 1,150 MW of installed capacity generating more than 3,194 GWh in the year 2000. The share taken by oil and petroleum products has increased by approximately 5.3%, largely owing to the increased dependence on it for power generation.

2.2 Development problems addressed by the project

The project has been designed to address two key barriers hampering the expansion of renewable energy and energy conservation activities. These are:

- Lack of familiarity of the private industrial sector and the financial community with renewable energy projects in general and the resource potential specifically; and
- A need for skilled indigenous capacity in design/implementation for both energy efficiency and renewable energy projects.

Though the technologies related to the energy efficiency and renewable energy projects remained almost static over this period, an active trend of embracing these technologies by the public and the industry is observed. This is considered as a natural reaction to the rising costs of energy in Sri Lanka.

2.3 Power sector policy in Sri Lanka

Several changes in the Government’s power sector policy, as enunciated in the Power Sector Policy Directions (1997) had stimulated the above trend. In a parallel development, since 1996, the Ceylon Electricity Board (CEB) had commenced purchasing electricity from small power producers under a standardized programme. As the basic policy, the Power Sector Policy Directions aims at sustaining an adequate level investments in the power sector at all times by harnessing the private sector investments into the power generation sector. It also states that the hydro power

generation potential of the country will be developed to its full potential as it is a major indigenous resource for power generation in Sri Lanka. It specifically states that private sector finance will be utilized for mini hydro generation. Furthermore, the power sector planning identified in the Policy Directions focuses on improvement of demand side efficiency and employment of cost-effective decentralised renewable energy sources.

These policies correspond with and complement the objectives of the project.

2.4 Institutional framework

The key organisations, institutions and agencies involved in the project area, their objectives and programmes are outlined in section 2.7 of the UNDP project document. During the implementation period more NGO's and private companies became involved in the project objective areas. Such interest has been accentuated by the rising cost of production of energy by conventional means, resulting from the oil price hikes since 1999.

In general terms it can be stated that the counterpart agencies responsible for each of the activities have assumed ownership of their respective project activities. No areas of common ownership or of disputed ownership were found by the evaluation team.

This project is expected to complement and enhance the World Bank/GEF Energy Services Delivery (ESD) project. The areas of complementarities have been identified in item 29 of the project document and repeated here:

- Support the objectives of the ESD project;
- Not overlap with any technical assistance provided by the ESD project; and
- Be independent activities so that outcomes will neither be dependent on the ESD nor cause dependency within the ESD.

Some small overlaps between the two projects existed, but that in general terms the projects can be considered complementary.

2.5 Relevance

According to item 14 of the project document, at its conclusion, the project is expected to have made a contribution to the introduction of renewable energy and energy efficiency to the country by:

- Identifying resource capabilities and pre-investment issues and options for three important renewable energy sources as well as establishing the capacity to replicate the analysis in other locations;
- Building capacity of the emerging Sri Lanka mini hydro industry in design, manufacture, procurement and maintenance;
- Providing training to working energy management professionals in best-practices;
- Providing training to student professionals in industrial and commercial energy efficiency technologies; and

- Encouraging local economic development by transferring skills and promoting indigenous technological solutions.

The target beneficiaries of the project have been identified in item 15 of the project document:

- The general population including the rural poor who will benefit from sustainable environmentally beneficial energy production and from enhanced local industry and economic development;
- The private hydro-development sector in isolated locations such as tea estates or larger grid connected sites;
- Private renewable energy developers who will benefit from sound project-ready investment information;
- Renewable energy traders such as equipment importers, suppliers and at possibly in the future local assemblers and/or manufacturers;
- The public sector planning energy projects who benefit from new skills and access to resources; and
- Sri Lanka commercial and industrial sectors, benefiting from skilled manpower.

The project still remains valid considering the above. However, the role of the public sector in the small hydropower development has been diluted by the Power Sector Policy Directions, and therefore effective utilization of new skills acquired by the CEB in planning small hydropower projects and wind assessment and wind power project preparation cannot be guaranteed.

Relevance to UNDP priorities

In 1996, the UNDP Initiative for Sustainable Energy (UNISE) was created, which is based on the fact that traditional approaches to energy will make energy a barrier to socio-economic development, and are not sustainable. UNISE emphasises a more efficient use of energy and increased utilisation of renewable energy sources, building commercial linkage with the private sector and international capital markets, supporting sustainable energy policy development and promoting energy efficient and energy saving technologies. Through UNISE, energy can become an important instrument for poverty elimination, regenerating the environment, employment creation and the promotion of sustainable livelihoods (with increasing labour productivity), and the advancement of women, in short, UNDP's primary objectives in stimulating sustainable human development. The project under evaluation assists in the implementation of UNISE and as such is considered relevant for UNDP.

2.6 Project design

It is clear that all activities of the project have been designed for capacity building of the counterpart agencies in three renewable energy sources, rather than providing direct support. In the following table an overview is presented of the project's main activities, their purpose, main output, performance indicator and observations of the evaluation team as they relate to issues on project relevance and design. More detailed information on the latter issues is also included in chapter 5 where the findings and conclusions are presented on the individual activities as well as at project level activities.

	Activity	Purpose	Outputs	Performance Indicators	Evaluation Mission Observations
1	Mini and Small Hydro Project Preparation	Identifying resource capabilities and pre-investment issues and options for small hydro power sources as well as establishing the capacity to replicate the analysis in other locations	Resource assessment of one hydrologic basin in the country; Pre-investment documentation for grid-connected and off-grid hydro projects within the said basin; Methodological documentation and software for further basin analysis of hydro potential. One training and promotion seminar	Installed hydro capacity identified for pre-investment; Quantity and quality of prepared procedural documentation and computer models generated; Opportunities provided for financial community and developers to explore project opportunities	The Purposes, Outputs and the Performance Indicators correspond with each other, and are found to be realistic, with the exception of the second Performance Indicator, which is very subjective and difficult to assess. Had Integrated Basin Management been included as a purpose, it could have been an asset. CEB (through the consultants) is responsible for the production of the outputs. It has also assumed ownership of this activity. Owing to the continued upward trend of developing the small hydro potential in Sri Lanka, the outputs developed by this activity are foreseen to have a definite demand in the future. However, due to the dilution of the role of the public sector in small hydropower development brought about by the Power Sector Policy Directions, PEU will have a less significant planning and implementation role in future small hydropower projects.
2	Wind Assessment and Project Preparation	Identifying resource capabilities and pre-investment issues and options for wind power sources as well as establishing the capacity to replicate the analysis in other locations	Wind resource data for two promising regions of the country; Pre-investment documentation for two promising wind farm schemes; Wind data-logging equipment	Cost effective wind generated capacity identified for pre-investment; Quantity and quality of prepared procedural documentation and computer models generated; Opportunities provided for financial community and developers to explore project opportunities	The Purposes, Outputs and the Performance Indicators correspond with each other, and are found to be realistic, with the exception of the second Performance Indicator, which is very subjective and difficult to assess. CEB (through the consultants) is responsible for the production of the outputs. It has also assumed ownership of this activity. Owing to the interest expressed by the private sector in developing the Sri Lanka wind power potential, the outputs developed by this activity are foreseen to have a future demand. However, due to the dilution of the role

					of the public sector in the plant capacity additions brought about by the Power Sector Policy Directions, PEU will have a less significant planning and implementation role in future wind power projects.
3	Increasing the Effectiveness of Applied Research	Identifying resource capabilities and pre-investment issues and options for biomass conversion as well as establishing the capacity to replicate the analysis in other locations	Market research report for selected NERDC-sponsored biomass conversion technology Trade shows, demonstrations or equivalent commercialization events and activities Technology transfer materials for in-house commercialisation training Increased research activity	The number of commercial opportunities identified for conversion to biomass combustors; The quality and quantity of technology transfer materials; The number of new products supported by research funding	The Purposes, Outputs and the Performance Indicators correspond with each other, and are found to be realistic. However the design required amendment during the implementation as it concerns shifting funds from international expertise to purchasing equipment (i.e. a turn-key biomass gasification package). NERDC (through the consultants) is responsible for the production of the outputs. It has also assumed ownership of this activity. Sustainability of NERDC's services as it related to direct combustion processes is expected, but highly questionable for gasification processes.
4	Capacity Building in the Small Hydro Industry	Building capacity of the emerging Sri Lanka mini hydro industry in design, manufacture, procurement and maintenance Encouraging local economic development by transferring skills and promoting indigenous technological solutions	Two comprehensive two-week courses - with course material Three specialized two day courses - with course material One Asia region study tour for three weeks - with evaluation report	Participation by private sector developers and implementers in workshops/ seminars Identified innovation as a result of study tour	The Purposes, Outputs and the Performance Indicators correspond with each other, and are found to be realistic. ITDG (through the consultants) is responsible for the production of the outputs. It has also assumed ownership of this activity. Sustainability of ITDG's services is expected as a result of capacity built, which will be a key input to increased interest in small hydro development.

5	Strengthening energy Audit and Management Capabilities in the Commercial, Institutional and Industrial Sectors	Providing training to working energy management professionals in best-practices Providing training to student professionals in industrial and commercial energy efficiency technologies	Course material Two Energy Audit and management workshops Energy audit equipment - to be specified University certification programme Student/Industry awards programme	Numbers of professional attendees at courses; Yearly use of audit equipment by national private and public agencies University program subscription; Uptake by industry of a student intern programme	The Purposes, Outputs and the Performance Indicators correspond with each other, and are found to be realistic. SLEMA and the Moratuwa University (through the consultants) are responsible for the production of the outputs. They have also assumed ownership for this activity. Sustainability of SLEMA's and MU's services appears promising as a result of capacity built, equipment for energy efficiency services available in combination with increased awareness with the industrial sectors.
6	Performance Testing of Micro hydro and Solar Home Energy equipment	Building capacity of the emerging Sri Lanka mini hydro industry in design, manufacture, procurement and maintenance	Test procedures to verify performance specification for critical micro hydro and solar home equipment Trained manpower in a Sri Lanka Research Center to competently and efficiently conduct the specified tests Supplementary test equipment to provide a comprehensive, yet appropriate level of, testing programme.	Testing procedures developed and published Numbers of equipment suppliers taking up the service	This activity looks as if it was last-minute included in the project design and is found to be insufficiently integrated with the overall project objectives. NERDC (through the consultants) is responsible for the production of the outputs. It has also assumed ownership of this activity. The sustainability is questionable, particularly in the absence of insight about the existence of potential external equipment suppliers taking up the service to be offered by NERDC.

3 Implementation

3.1 Project timing, budget and expenditures

Formulation of the project started back in 1995. The project document was signed in February 1998 and the authorisation for financial obligations was given in June 1998. Actual implementation of the project started in January 1999 and December 2001 is the planned completion date.

The (originally) planned total UNDP/GEF budget is US$ 1,902,729 including the GOSL inputs (in kind), in the amount of US$ 142,000. The budget for implementation by UNIDO is US$ 801,651 for SRL/96/G32 and US$ 322,937 for SRL/97/019, of which US$ 735,970 has been spent as of 31 March 2001 (see table 3.a below). The NEX budget lines are US$ 632,265 for SRL/96/G32 and US$ 0 for SRL/97/019, of which US$ 333,370 has been spent as of 31 March 2001 (see table 3,c below).

In addition to the above mentioned budgets provided by GEF, UNDP Colombo and the GOSL a so-called 'Support for Technical Services (STS)' has been requested by UNDP Colombo from UNIDO. Under this arrangement UNIDO agrees to provide technical services for the preparation of work plans for the implementation of the six project components and a consolidated work plan for the project as a whole, including the preparation of TOR's for consultants and sub-contracts to be implemented through UNIDO. This agreement was signed 1 December 1997 and the budget has been revised upwards from US$ 15,100 to US$ 53,100. See annex 4b for more details.

In the course of implementation, a number of budget revisions were made to adjust the budget to the changing needs or time schedules for the different activities. In Annexes 4a, 4b and 4c tables are included that show the original budgets and budget revisions made during the course of implementation. The information recorded in the annexes is on record in UNIDO, Vienna and UNDP, Colombo and is updated till 31 March 2001. In Tables 3.a and 3.b the UNIDO expenditures till 31 March 2001 have been recorded. Similar is the case for UNDP expenditures till 31 March 2001 as recorded in tables 3.c and 3.d.

The contribution of the GOSL was in-kind and hence it is difficult to monitor. The evaluation team has found limited recorded information on the expenditures of the in-kind contribution of the GOSL; i.e. a total of US$ 8,600 has been spend on communication, import duties, payment of attendance allowances for PAC members, project office support.

Table 3.a: Original and present revised UNIDO budgets and expenditures by budget lines.

Budget line		**Original Budget**	**Latest Revised Budget [2]**	**Total expenditures[3]**	**% of total expenditure as of 31/3/2001**
11-99	Project Personnel	472,001	470,902	227,887	48.4 %
16-99	Other Personnel Costs	71,000	70,686	37,285	52,7 %
29-99	Contracts	513,000	513,000	417,856	81,4 %

[2] Budget revision G (SRL/96/G32) and budget revision E (SRL/97/019)
[3] Expenditures as of 31-03-2001

39-99	Study Tours - Training	30,000	30,000		
49-99	Equipment		40,000	53,467	133,6 %
59-99	Miscellaneous			*-(525)*	
	UNIDO execution project Total:	**1,086,011**	**1,124,588**	**735,970**	**65.5 %**

Table 3.b: Original and present revised UNIDO budgets and expenditures by activities.

Activities	**Original Budget**	**Latest Revised Budget [4]**	**Total expenditures[5]**	**% of total expenditure as of 31/3/2001**
1	307,833	301,781	271,875	90 %
2	229,833	274,781	211,877	77 %
3	144,833	131,031	42,964	33 %
4	133,833	133,781	35,864	27 %
5	202,776	215,473	144,401	67 %
6	67,794	67,741	29,514	44 %
Misc.			*-(525)*	
	1,086,001	**1,124,588**	**735,970**	**65.5**

Table 3.c: Original and present revised NEX budgets and expenditures by budget lines.

Budget line		**Original Budget**	**Latest Revised Budget [6]**	**Total expenditures[7]**	**% of total expenditure as of 31/3/2001**
13-01	Admin. Support Personnel	15,000	6,886	3,372	49 %
15-01	Duty Travel	12,000	12,000	3,319	28 %
17-99	National Consultants	151,000	109,114	41,631	38 %
29-99	Contracts	135,000	185,000	86,765	47 %
39-99	Study Tours - Training	81,800	81,800	56,886	70 %
49-99	Equipment	243,000	199,000	137,325	69 %
59-99	Miscellaneous	36,928	38,465	4,071	11 %
	NEX project Total:	**674,728**	**632,265**	**333,370**	**53 %**

Table 3.d: Original and present revised NEX budgets and expenditures by activities.

Activities	**Original Budget**	**Latest Revised Budget [8]**	**Total expenditures[9]**	**% of total expenditure as of 31/3/2001**
1	71,000	55,000	18,742	34 %
2	99,000	73,000	54,089	74 %
3	160,800	160,800	43,804	27 %
4	51,000	51,000	27,959	55 %
5	95,000	95,000	92,840	98 %
6	87,000	87,000	51,570	59 %
General project support activities	74,000	72,000	40,294	56 %
Miscellaneous.	36,928	38,465	4,071	11 %

As can be seen from the above tables, of 31 March 2001 the actual UNIDO and NEX expenditures amounted to 65.5 % and 53 % respectively of the total budget in relation to the estimate of approximately 75% for the production of outputs.

[4] Budget revision G
[5] Expenditures as of 31-03-2001
[6] Budget revision G
[7] Expenditures as of 31-03-2001
[8] Budget revision G
[9] Expenditures as of 31-03-2001

Compared to the average of 65.5% and 53 % respectively, the rates of expenditures relating to some budget lines have been lower - particularly in the case of international consultants and study tour - and higher in the case of subcontracts and equipment (due to the need to buy new data loggers and wind speed sensors early in the project). Preparatory work for the study tour (activity 4) and training is being undertaken so that these budget lines will be consumed soon.

3.2 Delivery of UNDP and UNIDO inputs

For the inputs of both organisations it needs to be mentioned that although organisations are considered, the project is in contact with 1-2 individuals only from each organisation. In practice this translates to the fact that the inputs and efforts of the individuals that represent the organisation are being evaluated/assessed. In addition each organisation has its own rules and procedures with which they work, but again it is up to the individuals how they deal with these; e.g. be flexible, 'hide behind procedures', use procedures to enforce decisions, etc. Also in this project a number of the negative and positive inputs can be directly traced back to the individuals representing UNDP and UNIDO at the relevant time of implementation.

UNDP inputs

UNDP is the GEF implementing agency and will be held responsible and accountable for the executing of the project. How they execute the project and whom they (sub)contract to carry out the activities is fully up to their internal decision making processes, but GEF will only turn to UNDP and not to any other organisation when problems occur. This is also the case for successes for that matter!

UNDP has decided to out-source equipment procurement and contracting international expertise to UNIDO and to go for national execution (NEX) for the remaining project activities. NEX has been selected to fully make use of national available capacity to successfully undertake activities and at the same time contribute to the sustainability of this national capacity. In the sustainable energy sector a combination of public sector and NGO's are active and UNDP considered including organisation from both backgrounds the most appropriate route. A decision that the evaluation team is in full agreement with.

Public sector entities could be directly sub-contracted by the project as they fit into the NEX-procedures that UNDP makes use of. For NGO's at the time of designing the project, no such implementation modality existed (NGO-NEX), hence use had to made of a public sector entity that would be responsible for the NGO activities, both contents wise as well as financial responsibility. The Energy Conservation Fund (ECF) was selected for this purpose, since it was also believed that ECF would be strengthened and enforced by activities under this project. The evaluation team agrees with the practical solution that was sought to ensure the active participation of NGO's in the project, but has concluded that ECF was not able to play an active role in the project, mainly as a result of internal problems. Since currently NGO-NEX is possible, it is expected that future project designs will make use of this direct implementation modality.

In summary it can be stated that UNDP has out-sourced the elements they are not familiar with or for which they did not have the implementation capacity to another UN agency (UNIDO). UNDP's overall performance is assessed as timely and good throughout the project and it is anticipated that this will also be the case for the remainder of the project. Local presence of UNDP in combination with a practical orientation of its staff members involved in this project has been a huge asset for the project implementation.

For financial inputs provided by UNDP for this project it is referred to tables 3.c and 3.d in section 3.1.

UNIDO inputs

During the implementation of the project to date, UNIDO has had three different project managers. One project manager retired just after a year of project implementation. An interim project manager assumed duties for about 6 months, after which the current project manager got assigned to this project. Three different individuals that have left substantially different marks on the project implementation. In general, the problems indicated below mainly relate to the period of the first and interim project managers. It was generally found that with the appointment of the current project manager the situation has considerably been improved.

Three specific inputs are under the responsibility of; i.e. procurement of equipment; contracting international expertise (TOR, CV issues) and providing technical backstopping:

- Selection and delivery of equipment was not timely and not found satisfactory by the end-users in Sri Lanka, especially where it concerns hydro and wind measurement equipment, including data analysis equipment. Problems most likely originate from a combination of unclear specifications (a responsibility of the end-users, although UNIDO could have detected specification errors or shortcomings prior to releasing the bidding), lack of up-to-date knowledge on the equipment required and its suppliers restricting rules and procedures preventing a fast processing and often go for least cost and not per definition highest quality and a lack of direct communication between the UNIDO project manager and the end-users. Most equipment has been ordered at the beginning of the project and only the first UNIDO project manager was involved in these activities;
- Contracting international expertise has been a problem throughout all 6 activities. The preparation of the TOR in itself has resulted in problems, mainly due to a lack of direct communication between the UNIDO project manager and the end-users. Unfortunately end-users mainly communicate at the final stages of the TOR preparation with the UNIDO project manager (via the national project coordinator) making it difficult for the UNIDO project manager to understand the process leading up to decisions taken as are presented in the TOR. There could not be observed any joint preparation of TOR's between the Sri Lanka end-users and the first and interim UNIDO project managers. There were even situations that the international consultant sub-contracted had a different TOR attached to the contract than the Sri Lanka end-users were informed about. The situation has however improved with the arrival of the current UNIDO project manager;

- Another issue very relevant as it concerns contracting international expertise is the roster of consultants UNIDO has access to as it concerns capacity building for sustainable energy activities. Firstly, some of the CV's offered were outdated with the result that up-to-date information could not be assessed from these CV's hence accepting them by the Sri Lanka end-users was found impossible. Secondly, the type of people offered, by means of their CV's, were not in line with the activities required under the project as was felt by the Sri Lanka counterparts. Especially in a situation where the level of skills, knowledge and experience on sustainable energy aspects is high as is the case for Sri Lanka, it is necessary to have an up-dated roster of international expertise, specialised in their field with solid working experience in developing countries. The evaluation team concludes that currently UNIDO has very limited access to such a type of expertise. In addition the UN system as a whole is not always in the position to offer similar working conditions as for example the (international) private sector with the result that not all available and relevant expertise can be hired by UNIDO; and
- Technical backstopping as provided by UNIDO, has only been shaped up to an acceptable level with the current UNIDO project manager assuming duties in October 2000. One main problem that remains though is the impossibility of the UNIDO project manager to spend much time in Sri Lanka to directly work with the Sri Lanka end-users of the UNIDO services.

Despite of the problems outlined above, the implementation of the six activities continued, mainly as a result of extra efforts and innovative approaches by the local sub-contractors and/or implementing agencies (both public sector and NGO's). The evaluation team observed that the above problems experienced with UNIDO have created anger, frustration and distrust in the continued involvement of UNIDO in the remainder of the project. It will be a challenge for the current UNIDO project manager to deal with that situation and deliver UNIDO services to the project at a more acceptable level.

For more details on the financial inputs provided by UNIDO for this project, please refer to tables 3.a and 3.b in section 3.1.

Detailed information on the activities/use of inputs as described above is included in chapters 4 and 5. Both individual activities as well as project level activities are being dealt with.

3.3 Assumptions

No explicit assumptions have been included in the project document at the design stage. However the chapters in the project document that deal with risks and obligations of the stakeholders (6 and 7 respectively) make assumptions on the risk mitigation activities and ability of stakeholders to provide inputs as outlined under chapter 7. It can be observed that these assumptions made at the time of project design were realistic as the project has been implemented in line with assumptions made.

Three main external factors will potentially have an influence on the sustainability of the project outputs, but had to date limited impact on the implementation of the project. Firstly the World Bank ESD programme that plans to make use of outputs of the programme, notably the solar home system equipment testing facility. Currently

the programme lags behind considerably in their implementation of Solar Home Systems (SHS) as was recorded in the mid-term report of the ESD programme (March 2000) as well as indicated by people interviewed. Secondly the power sector reform process that is currently being planned. Especially for private sector activities in/with renewable energy and energy efficiency activities, it will be important to have clarified the IPP-(im)possibilities, the tariff and conditions for electricity sales, rural electrification plans, etc. And thirdly the GOSL's Power Sector Policy Directions, which dilutes the role of the public sector in small renewable power projects, especially in small hydropower development

3.4 Project management

It is referred to the project document for details on the institutional and organisational arrangements of the project (chapters 5, 8 and annex 3). Implementation of the project has been in concurrence with the design arrangements as included in the project document.

Tripartite meetings have been organised annually and their outcomes have been properly documented in the minutes. Especially the practical orientation of the TPR outcomes could be observed and has been an asset for project implementation. In addition a Programme Advisory Committee met every month and closely monitored the implementation of the project, again with a practical orientation.

It could also be observed that the project management unit has waited for this mid-term evaluation to take place. They have even waited to the extent that some activities were not further followed up actively as they could have been done. Especially the revised work plan that had to be prepared after the TPR meeting in November 2000, was still not finalised in March 2001, despite detailed inputs and communication with UNIDO's project manager dating back from December 2000. In general terms it can be observed that communication between the national project manager, implementing agencies, sub-contractors and the UNIDO project manager is subject to improvement.

4 Results

4.1 Production of outputs

The project document clearly defines the problems to be addressed and the outputs to be achieved. It is found that the concept and design of the outputs takes into account the socio-politic, economic and environmental national contexts. The proposed measurable performance indicators reasonably assess the outputs (see also the table in section 2.6).

Two key, immediate objectives are the basis of the project outputs and by implementing 6 different activities a number of specific outputs have been/will be prepared. The assessment of these outputs is presented in this chapter:

- ***Immediate objective 1:*** *To encourage private sector investment in selected small/micro hydro, wind and biomass projects; and*
- ***Immediate objective 2:*** *To build professional capacities for renewable energy and energy efficiency in Sri Lanka.*

Of course, given the status of implementation, any assessment about the achievement of the outputs or the indicators, as well as their sustainability, impact or effectiveness, is a subjective and interim judgement, contingent on evolution as expected of the project for its remaining implementation time. Therefore an educated opinion about the likelihood of said achievement, and the degree of completion of the outputs themselves is expressed herein.

In the six tables below the assessment is included pertaining to the present status of implementation and the extent in which the planned outputs for each activity have been achieved. Also the likelihood of achieving the performance indicators as proposed in the project document is being rated in the bottom section of each table.

Immediate objective 1:To encourage private sector investment in selected small/micro hydro, wind and biomass projects					
Activity 1 – Mini and Small hydro project preparation					
Outputs	MTP	AP	LTP	SLP	Still Pending
Resource assessment of one hydrologic basin in the country		X			
Pre-investment documentation for grid-connected hydro projects within said basin					X
Methodological documentation and software for further basin analysis of hydro potential		X (*)			
One training and promotion seminar		X			
Measurable performance indicators (Interim assessment)		Likely to be achieved		Unlikely to be achieved	Not yet applicable

Installed hydro capacity identified for pre-investment	X		
Quantity and Quality of prepared procedural documentation and computer models generated			X
Opportunities provided for financial community and developers to explore project opportunities	X		X

MTP = more than planned; AP = as planned; SLP = satisfactory, though not fully as planned; LTP = less than planned
(*) Pending final software versions with adequate user licenses

A number of factors affected adversely the timely delivery of activity 1 outputs:

- The procurement of equipment and contracting international expertise (see also section 3.2);
- Certain on-site modifications have been made to the imported equipment to suit local needs and calibration of the equipment has encountered problems. These matters required extensive attention of the PEU, which otherwise should have been unattended equipment.
- The support that UNIDO gave to the client's complaints to the equipment supplier was not sufficiently client-oriented;
- Calibration of the equipment had also encountered problems;
- The specifications for the procurement of the water level gauges did not foresee maximum water levels as were experienced during the project implementation. This led to flooding of the vent pipes of said equipment during the rainy season and thus to loss of data; and
- Hydrological input data was incomplete, and their quality insufficient for the task at hand. This affects the replicability to other basins, at least if use will be made of the software tools presented and proposed by Hydro-M.

The Hydro-M sub-contract had to be amended to incorporate a civil construction engineer which was an additional requirement generated in the course of implementing activities by Hydro-M. Additional costs could be justified.

The completion of activity 1 seems however likely during 2001, although some concerns were raised by PEU about the software modules (Beta Versions) that need debugging, modification and improvement. In some occasions the theoretical basis of computations need further explanation, and not just an introductory presentation. The latter might have been adequate for many of the external participants of the seminar, in some cases potential investors with not much mini hydropower planning and design experience, but not to PEU staff. Finally, any software delivered must have adequate user licenses and provisions for software updates as they become available.

It is still too early to evaluate its impact on beneficiaries, but the quantity and quality of prepared procedural documentation and computer models generated seem likely to be adequate, with the reservations about final versions and licenses made above. Potential private developers' impressions on the project outputs will have to be ascertained at the conclusion of the activity, possibly through a public presentation.

Immediate objective 1:To encourage private sector investment in selected small/micro hydro, wind and biomass projects					
Activity 2 – Wind assessment and project preparation					
Outputs	MTP	AP	LTP	SLP	Still Pending
Wind resource data for two promising regions of the country		X			
Preinvestment documentation for two promising farm schemes					X
Wind data logging equipment				X	

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Cost-effective wind generated capacity identified for preinvestment			X
Quantity and Quality of prepared procedural documentation and computer models generated			X
Opportunities provided for financial community and developers to explore project opportunities			X

MTP = more than planned; AP = as planned; SLP = satisfactory, though not fully as planned; LTP = less than planned

Similarly to it, but to an extent even greater than with the previous activity, the procurement done by UNIDO for activity 2 led to a number of problems that have delayed implementation, and which resulted ultimately in the buying of a new set of equipment, with the old set of data acquisition equipment being left for wind data measurements outside the project area. It was found that said mishaps are attributable to a number of reasons, notably:

- The selection and procurement of this equipment was originally a NEX function. It was transferred to UNIDO at a meeting of the PAC in the belief that the process could be substantially expedited that way. However, the specifications for it were still to be prepared by PEU. This division of functions lead to a lack of coordination between the different actors involved;
- The equipment did not meet usual quality and finishing standards, and evidenced not being adequate for a tropical environment. Installation manuals and spare batteries were missing, some features deviated from the specifications and the answer given by the equipment supplier to the project authorities' complaints was found unsatisfactory. Furthermore the UNIDO project manager was not copied on the correspondence between equipment supplier and project authorities;
- The provider was a Netherlands-based trading company, which bought equipment from an Australian manufacturer. Although the time pressure for the acquisition of the equipment might have led UNIDO to accept bids from such a trading company, it is felt that only bids from manufacturers or their approved traders should have been considered, as a trading company usually results in a higher price/quality ratio; and
- The difference of price between the UNIDO-led procurement and the subsequent one made on the basis of the international consultants' recommendations, is found

excessive. There was a price difference of US$ 16,780 on a total of US$ 29,388 for the UNIDO-led procurement.

The equipment specifications were prepared by PEU, whilst the international consultants had to make use of it in combination with their 'own' software for data analysis and processing. Communication between PEU and the international consultants was very limited on this issue and hence the software package introduced by the international sub-contractor Espace Eolien led to inconsistencies (7 parameters were needed for the wind data input, as compared with 5 that were to be provided to the originally intended WASP software). This in turn is expected to lead to a lesser quality of the outputs (notably wind mapping) as compared with international acceptable standards. With the purchase of new equipment, specifically designed for such wind measurement applications, the issue seems to have been sorted out. However, due to these delays, collection of data in some sites has commenced only in November 2000.

Another problem found was the unsatisfactory performance of the international consultants during the training activity. As a possible reason, the lack of sufficient detail in the TOR was mentioned. The certain general lack of communication, notably between consultants and implementing actors, has been found also in other activities.

A possible completion date for this activity 2 is to be decided during the next TPR, but it is found likely that it will fall around the second half of 2002. In general, and in spite of the delays incurred, this activity seems promising, although its attractiveness to the private investor has not yet been ascertained (see comments under 4.2 and 4.3).

Immediate objective 1:To encourage private sector investment in selected small/micro hydro, wind and biomass projects					
Activity 3 – Increasing the effectiveness of applied research					
Outputs	MTP	AP	LTP	SLP	Still Pending
Market research report for selected NERDC-sponsored biomass conversion technologies		X			
Trade shows, demonstrations or equivalent commercialization events and activities					X
Technology transfer materials					X
Increased research activity					X
Measurable performance indicators (Interim assessment)		Likely to be achieved		Unlikely to be achieved	Not yet applicable
Number of commercial opportunities identified for conversion to biomass combustors					X
Quantity and Quality of technology transfer materials					X
Number of new products supported by research funding					X

MTP = more than planned; AP = as planned; SLP = satisfactory, though not fully as planned; LTP = less than planned

Activity 3 is one of the more delayed ones in terms of implementation (still only half of it is executed). A number of problems (particularly unsatisfactory deliverance by the international consultant, and lack of adequate communication with UNIDO in this respect) seem to have hindered a timely and effective achievement of the outputs. NERDC expressed their dissatisfaction with the big delay incurred in identifying the local consultant, and with the inadequacy of the international consultants proposed by UNIDO for the purposes envisaged.

NERDC, on the basis of the output "Market Research Report" identified two basic biomass technologies to develop in the framework of this project:

- Direct Biomass Combustion; and
- Biomass gasification for power generation in small/medium scale furnaces.

The activities under the first technology will focus on chipped wood, to substitute direct wood log combustion. It will focus also on fuel preparation (chipping) and furnace design for the tea, tile and brick sectors, currently consuming large quantities of biomass inefficiently. This activity is well received by the here mentioned sectors and is not anticipated to experience notable problems during its execution.

The biomass gasification activities are still in the planning phase and are expected to start not earlier then June, July 2001. This considerable delay has been a result of necessary changes in the programme, including the change of budget allocations, in addition to problems with selecting and contracting international consultants as well as specification of gasification equipment.

Immediate objective 2:To build the professional capacity of the renewable energy and the energy efficiency industry in design and implementation					
Activity 4 – Capacity Building in the Small Hydro Industry					
Outputs	MTP	AP	LTP	SLP	Still Pending
2 Comprehensive two week courses - with course materials		X			
3 Specialized two day courses – with course materials		X			
1 Asia region study tour for 3 weeks – with evaluation report					X

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Participation by private sector developers and implementers in workshops/seminars	X		
Identified innovation as a result of study tour			X

MTP = more than planned; AP = as planned; SLP = satisfactory, though not fully as planned; LTP = less than planned

The evolution of the outputs for this activity was found satisfactory, both in terms of contents and timely delivery. The courses that have been designed and implemented by ITDG have met the objectives as set out in the project document. Furthermore they

have been properly documented and provide a good basis for continued activities in this field. Only the study tour has been delayed, due to delays in determining its content, programme, terms and conditions for accession. The objectives of the study tour were changed during the implementation of the other programme activities as a result of gained experience on what the needs are for continued small hydropower development in Sri Lanka.

ITDG expressed dissatisfaction with the time that took for UNIDO to accept and contract the international consultant they had identified and suggested. They also thought that the time elapsed between project conception and implementation was inconvenient, as there were many policy changes in-between that had a direct relation to the project objectives (see also chapter 2).

It was found extremely positive the way ITDG involved a number of external experts (University, IPPs, ESCOs, CEB,…) in their own programme of training seminars conducted. That possibly enriches the outputs, although in some cases might make their achievement more time-consuming. However, it did not result in substantial delays for this activity. The programme, course materials and participation successes (incl. private sector developers) for the training undertaken certainly deserve credit.

Activities for the design and local manufacturing of 100 kW Pelton turbines have also been initiated. However, the selection and contracting process of the international consultant have delayed the implementation of these activities. Main problems were on TOR's and CV's forwarded by UNIDO, who is responsible for this process. An extension of about 3 months might be necessary for proper implementation of this activity.

Immediate objective 2:To build the professional capacity of the renewable energy and the energy efficiency industry in design and implementation					
Activity 5 – Strengthening energy audit and management capabilities in the commercial, institutional and industrial sectors					
Outputs	MTP	AP	LTP	SLP	Still Pending
Course materials		X			
2 Energy audit and energy management workshops		X			
Energy audit equipment (*)		X			
University certification programme			X		
Student/Industry awards programme					X

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Number of professional attendees at courses	X		
Yearly use of audit equipment by national private and public agencies	X		
University program subscription			X
Uptake by industry of a student intern program			X

MTP = more than planned; AP = as planned; SLP = satisfactory, though not fully as planned; LTP = less than planned
(*) More equipment is needed for a satisfactory energy audit output

The efficiency in implementation (production of outputs as compared with the inputs) can be rated as very good. SLEMA and the University of Moratuwa showed strong commitment and good teamwork abilities, proactively sorting out the difficulties arisen and managing to produce useful course materials, this in spite of problems experienced in the contracting process of international consultants as well as with the already contracted international consultants. Seven studies have been commissioned, 2 research papers have been published and 2 more are under way, all of them prepared by Sri Lankans. Currently only the output concerning the Awards/intern and the University Curricular programmes remain unfinished.

One of the key factors for success was found to be the segmentation of target groups in 3 layers: undergraduate, postgraduate and professionals, with differentiated approaches and goals.

The ownership can be rated in an interim basis as very good. Beyond individuals, whose personal effort and coordination skills seem to have been instrumental for this positive outcome, SLEMA's privileged relationship with energy managers (>200 members) appears also to be/have been a big asset for this component, even if still the uptake by industry of the internship and awards programme remains to be seen and has to be worked out.

Only about 60 % of the equipment for energy audits made available to the stakeholders was acquired under project funds. In order to satisfy the big demand for equipment, some instruments had to be borrowed from other actors. Possibly this is a consequence of the long time elapsed (from 1995 to 1999) since project design, which made the equipment cost much higher than expected.

Immediate objective 2:To build the professional capacity of the renewable energy and the energy efficiency industry in design and implementation					
Activity 6 – Renewable energy equipment performance testing					
Outputs	MTP	AP	LTP	SLP	Still Pending
Test procedures to verify performance specification for critical micro-hydro and solar home equipment					X
Trained manpower in a Sri Lankan Research Center to competently and efficiently conduct the specified tests					X
Supplementary test equipment to provide a comprehensive, yet appropriate level of, testing program		X			

Measurable performance indicators (Interim assessment)	Likely to be achieved	Unlikely to be achieved	Not yet applicable
Testing procedures developed and published			X
Numbers of equipment suppliers taking up the services			X

MTP = more than planned; AP = as planned; SLP = satisfactory, though not fully as planned; LTP = less than planned

Some of the outputs for this activity, although being relevant for the objective, were perhaps too ambitious in comparison with inputs and budget, notably test procedures and linkage with conformity assessment, testing standards and good practices thereof.

Some inconsistency was detected between the power range ITDG was using for micro-hydro for this project (up to 100 kW and above) and the prototype turbine rating (>50 kW), as compared with the maximum rating of the test rig in NERDC; i.e. 10 kW. NERDC was however optimistic that this could be overcome by adoption of model testing for larger capacities, but using the same test rig.

NERDC's previous experience with technology research for renewable energy and energy efficiency is indeed the main asset towards effective achievement of the outputs and completion of the activity. At the time of the evaluation, only the output for procurement of test equipment seems to have been fully implemented. The rest of the outputs remain in different status of implementation. There have been, as with other activities, deficiencies and gaps in the communication path NERDC – project coordinator - UNIDO, which has led to TOR, CV and contracting of the international consultant problems.

NERDC was dissatisfied with the performance of the international consultant to be involved in equipment testing. As a possible reason, it was mentioned the lack of sufficient detail in the TOR, that the international consultant was making use of. At a later stage NERDC found out that this TOR was substantially different from the one they had proposed to UNIDO. The non-delivery of the test procedures has paralyzed the normal development of this activity. NERDC is still waiting for said test procedures, which were provided for in their copy of the TORs for the international consultant, and this is leading to substantial delays for the whole activity. There seems to be a difference in understanding about the role and functions of the international consultant, which NERDC thinks should have prepared the requested test procedures, although under task 6.4 of the project document said test procedures were a NERD task with a cost recoverable component to be provided. Said impasse compromises not just the completion date of the activity, but also its effectiveness and impact.

4.2 Achievement of the purpose/immediate objective (effectiveness)

Effectiveness is understood here as the extent in which the outputs considered contribute to the achievement of the corresponding immediate objective. This has been assessed by estimating the possible use and impact of the outputs by the target beneficiaries (actual or realistically expected) or the confidence in the capabilities of the implementing stakeholder to effectively render these immediate objectives upon completion of the outputs. In general the overall assessment of effectiveness for the whole project is considered sufficient. A short analysis of the effectiveness of the six activities in meeting the immediate objectives is included below.

Immediate objective 1: To encourage private sector investment in selected small/micro hydro, wind and biomass projects

Activity 1: Mini and small hydro project preparation

The outputs are clearly of use to the achievement of immediate objective 1. The Counterpart Agency responsible for this Activity (CEB) has assumed ownership of its respective project activities and is convinced that the project is important for the role they play in the current institutional framework of the power sector in Sri Lanka. The interest and participation of private sector and financial sector representatives in the training course of activity 4 and in the seminar recently held by Hydro-M for this Activity 1 –although criticized by PEU's technical staff for possibly having diluted its technical content- is also an encouraging sign both towards effectiveness of the activity and towards its impact, analysed in section 4.3. The effective utilization of new skills acquired by the PEU in collecting data will facilitate the private sector in formulation of their project proposals. Furthermore, PEU may use the modeling skills acquired from the project for (technical) due diligence of private sector proposals.

Activity 2: Wind assessment and project preparation

The principal target beneficiaries for this activity are PEU, wind power developers and financing institutions. Although only the PEU has been specifically identified as a counterpart agency, the other beneficiaries are implied in the task description for this activity.

Similarly to activity 1 above, the CEB seems to have by now assumed a reasonable level of ownership of its respective project activities and they are convinced that the project is important for the role they play in the current institutional framework of the power sector in Sri Lanka. The opinions expressed by the stakeholders and the preliminary results made the evaluation team conclude that the outputs for this activity will have a good bearing to the achievement of immediate objective 1.

Activity 3: Increasing the effectiveness of applied research

The delays incurred up to now have led NERDC to suggest a reformulation of the activity which probably results in the acquisition of a turn-key package for a (50-100 kW) gasification plant of Indian manufacture, including promotion, demonstration and a methodological approach to commercialisation. It is found that such an approach, if not sufficiently being implemented in a commercial environment, might well end up at providing only a partial contribution to the corresponding development objective; i.e. only demonstrating the technology and not its commercial viability.

The previous experience of NERDC with gasification (based on their own research) is certainly of use will have some positive effect on the implementation of this activity. However, in general terms the effectiveness of this activity in contributing to the immediate objective is sub-optimal, but can still be increased if decisions are made in line with recommendations included under section 5.1.

Immediate objective 2: To build the professional capacity of the renewable energy and the energy efficiency industry in design and implementation

Activity 4: Capacity building in the small hydro industry

ITDG seems to have a good level of long-term commitment to its project activity, and is itself motivated towards advancing project development for micro-hydro in Sri Lanka. The assessment under 4.1 and the results achieved up to now permit to conclude that the outputs for this activity will indeed be very relevant to the contribution of immediate objective 2.

Activity 5: Strengthening energy audit and management capabilities in the commercial, institutional and industrial sectors

This is another activity where not just the efficiency (production of outputs as compared with the inputs) but also the effectiveness can be rated as very good. SLEMA and the Moratuwa University were proactive in sorting out difficulties arisen with the international consultants, and managed to produce useful outputs. The timely production of the remaining outputs seem very likely, and the outputs in place enjoy success and acceptance by the direct beneficiaries, although the uptake of the student internship/awards programme by industry still remains to be fully ascertained.

Activity 6: Performance testing of micro hydro and solar home energy equipment

As commented above, the non-delivery of the test procedures by the international consultant paralysed the development of this activity: NERDC keeps waiting for said test procedures, and this is leading to substantial delays for the whole activity. Said impasse compromises not just the completion date of the activity, but also its effectiveness and impact. By now the effectiveness of this activity can not be properly assessed, since the production of the outputs is very much delayed.

4.3 Contribution to the development objective (impact)

This paragraph includes a short analysis of the relation of project results to the development objective, i.e.: Have any results in the use of indigenous sustainable energy resources through private sector and in energy efficiency in the commercial and industrial sectors been already achieved? Is it likely that such results will be achieved, and if so, under what conditions? Same as above, a short analysis of the impact of the six activities on the immediate objectives is included below.

Immediate objective 1: To encourage private sector investment in selected small/micro hydro, wind and biomass projects

Activity 1: Mini and small hydro project preparation

A good number of private companies (at least 7) have the capability of performing pre-investment level feasibility studies for small hydro, and at least 3 NGO's are presently working in this area. This made the evaluation conclude that the outputs developed under this activity will have a definite demand in the future. The new skills acquired by PEU in collecting data and modeling it with the software tools provided

should be of great impact for their assessment and (technical) due diligence of the private sector proposals. Last, but not least, the PEU has assumed ownership of its respective project activities and is convinced that the project is important for the role they play in the current institutional framework of the power sector in Sri Lanka. However, still some reservation exist about the applicability of the models and software tools as up to now to other basins, which will be the ultimate test for the impact of this activity.

Activity 2: Wind assessment and project preparation

Owing to the interest expressed by the private sector in developing potential wind power potential in Sri Lanka, the outputs developed under this activity are foreseen to have a definite demand in the future. This view has to be ascertained by discussing the project outputs with potential developers, possibly at the conclusion of the activity, through a public presentation. In spite of the delays due to data unavailability, it is foreseen that the outputs of this activity will contribute to the involvement of private sector companies in the wind energy production. However the delays experienced during implementation and the expected limitation of the wind mapping might eventually compromise the overall impact of this activity.

Activity 3: Increasing the effectiveness of applied research

The present impact (short-term) is practically non-existent. Prospects for the provision of impact off this activity could not be assessed for the time being, as most outputs have not yet been produced. However, NERDC is an institution with previous experience with biomass and technology research for renewable energy and energy efficiency in Sri Lanka, and it is hoped that commercialization of the services provided by NERDC for direct biomass combustion will take place in the near future, for they are basically an improvement to existing combustion systems. For biomass gasification activities (not yet begun), it is hardly expected that the current designed activities would have commercial spin-offs (i.e. impact) in the near future (< 5 years).

Immediate objective 2: To build the professional capacity of the renewable energy and the energy efficiency industry in design and implementation

Activity 4: Capacity building in the small hydro industry

Target groups of the training courses also included private sector, representatives from community based organizations and financiers. This in combination with good and timely outputs and demand for the services to be provided as a result of increased capacity at ITDG provides good prospects for substantial impact of this activity. However, much of the expected impact will depend on the future institutional framework of the power sector in Sri Lanka and the role and responsibilities of PEU.

Activity 5: Strengthening energy audit and management capabilities in the commercial, institutional and industrial sectors

The evaluation team considers the developments under this activity successful and promising for the longer term. It is encouraging and indicative of impact that the students of the energy audit training keep hiring the audit instruments to continue

similar activities on their own. Also the studies commissioned and research papers (being) prepared is considered an indication of short-term impact and promise of even better impact in the longer term. This especially holds true if considered the relatively modest inputs provided by the international consultants.

Activity 6: Performance testing of micro hydro and solar home energy equipment

Same as above for the effectiveness, the non-delivery of the test procedures by the international consultant in charge of it has paralysed the development of this activity. Under this condition , the production of the outputs is at risk, and there is no room to discuss neither effectiveness nor impact.

4.4 Sustainability

Project level sustainability mainly results from the sustainability that is expected for the individual activities. Differences in the level of expected sustainability can be observed between activities and some of them are even not expected to be sustainable. However external factors such as the (unpredictable) expansion plans of the grid extension, tariff structure for renewable energy IPP's, Power Sector Policy Directions and the Power Sector Reform process in general have a big impact on the future use of knowledge, skills and experience developed under this project. The project under evaluation has limited power to influence these external factors. Below have been presented the specific sustainability issues for all six activities.

Immediate objective 1: To encourage private sector investment in selected small/micro hydro, wind and biomass projects

Activity 1: Mini and small hydro project preparation

The availability of data for other river basins is a prerequisite for extending the experience gained in this Project to other river basins. Acquiring this data is an important condition for sustainability of this activity. The Sri Lankan Power Sector Policy Directions suggests that PEU will have a less significant role in planning and implementation of small hydropower projects in the future. Commercial sustainability of grid-connected projects is not guaranteed, unless the Regulatory Commission intervenes to address the issue of financial viability of such renewable power projects with specific support measures. Therefore, effective utilisation of new skills acquired by the PEU, CEB in planning small hydropower projects is not guaranteed.

Activity 2: Wind assessment and project preparation

It is foreseen that this activity will become sustainable through the involvement of private sector companies in wind energy projects, although the ultimate success is contingent upon the energy sales price assigned by distribution companies and the predictability thereof.

Activity 3: Increasing the effectiveness of applied research

For biomass gasification activities the focus is too much on R&D, rather than introducing an international proven technology into a commercial environment by

means of a business demonstrator (combining both the technology and business aspects in one pilot/demonstration project). This compromises the sustainability of this part of the activity.

For direct biomass combustion, the sustainability of the activity looks promising, on the basis of the same arguments exposed before for impact and effectiveness, namely the relative ease of achieving good immediate economic savings and the existence of a good number of sectors (tea, tile and brick, beer, paper..) currently consuming large quantities of biomass inefficiently. Therefore this second part of the activity that has been well-received by the sectors mentioned, should not experience notable problems as it concerns its sustainability.

Immediate objective 2: To build the professional capacity of the renewable energy and the energy efficiency industry in design and implementation

Activity 4: Capacity building in the small hydro industry

The good number of private sector investment level feasibility studies for small hydro, the NGO involvement and the long tradition in micro-hydro in Sri Lanka, notably by the tea estates, are good indications that the outputs developed by this activity will be sustainable in the post-project future. The comments about the negative impact on the sustainability of all off-grid projects in Sri Lanka, the unpredictability of both IPP energy price and plans and timing of extending the distribution network remain valid here too. The availability of data for other river basins in activity 1 will clearly have an impact on the sustainability of activity 4 too, for it is a prerequisite for extending the experience gained in this project to other river basins.

Activity 5: Strengthening energy audit and management capabilities in the commercial, institutional and industrial sectors

The success of participation not only suggests good prospects for sustainability of this Activity, but also encourages the design of possible follow-up actions to further leverage said sustainability, such as expanded provision of audit equipment or incorporation of an Energy Conservation Center. In fact, given the good results and the effectiveness shown, the evaluation team suggests that sustainability for this activity deserves to be further improved through a number of possible follow-up actions explained below, like segmentation of the activity for industrial energy-intensive sub-sectors, sector-specific energy benchmarking or an action plan to provide comprehensive support to starting-up Energy Service Companies. The implementors of this activity are considered to be in a good position to develop said follow-up actions and move the results and the outputs of this activity towards even larger self-sustainability.

Activity 6: Performance testing of micro hydro and solar home energy equipment

The sustainability is questionable under the conditions described earlier on, particularly in the absence of insight about the existence of potential external equipment suppliers taking up the service. The prospects for sustainability of the micro-hydro test rig seem reasonable, being the only such test rig in Sri Lanka. This is however contingent upon actual development of local manufacturing, which seems

only promising, but not yet guaranteed. For solar energy the situation is different. In discussions with lending stakeholders active in the ESD project, the feeling was that the demand for financing solar home systems is less than expected (in terms of lending). This leaves the sustainability of the test activities for solar home systems even more at risk, beyond the problems described above.

In addition the coordination of the enforcement of test certificates with the lending actors is not in place. It lies in the nature of this activity that if legal measures or lending conditions do not require testing of the renewable energy equipment, the equipment suppliers will not perform those in order to save costs, unless other mechanisms, like conditional grants or concessional lending, etc. are put in place to enforce the testing. As customer requirements are not anticipated to become very stringent, at least in a first phase of introduction of renewable energy equipment in Sri Lanka, the prospects for sustainability of this activity beyond the time boundaries of the project seem by now quite uncertain.

5 Findings, conclusions and recommendations

In this chapter the findings, conclusions and recommendations are presented on the individual activities as well as at project level. Many of the (partial) findings and conclusions included here have also been presented in especially chapter 4. They have been repeated here for completeness and to create the logical sequence for the recommendations that follows the findings and conclusions. For ease of reference the recommendations are presented in a text box.

The focus of the recommendations is on improving the remaining project implementation, rather than general remarks with limited value for the project under evaluation. In chapter 6, lessons learned from this project will be presented as they can be used for formulation and implementation of future generations of GEF or other similar type of projects.

5.1 Activity 1: Mini and small hydro project preparation

The counterpart agency responsible for this activity (CEB) has assumed ownership of these project activities. The evaluation team did not find any areas of common ownership or of disputed ownership. PEU considers that the project is important for the role they play in the current institutional framework of the power sector in Sri Lanka.

The evaluation team noticed that NEX procurement of equipment has been effectively implemented. However there have been certain initial deficiencies and gaps in communication between the PEU and manufacturer/vendor in delivery of the equipment, which have now been settled. Certain on-site modifications too have been made to the imported equipment to suit local needs, and calibration of the equipment has encountered problems. These matters required extensive attention of the PEU, which otherwise should have been unattended equipment.

During the discussions with ITDG and CEB, it became evident that at least 5 organisations are presently working in the same areas as ITDG, and at least 7 private companies have capability of performing investment-grade feasibility studies for small hydro. Owing to the continued upward trend of developing the small hydro potential in Sri Lanka, the outputs developed by this activity are foreseen to have a definite demand in the future.

The role of the public sector in the small hydropower development has been diluted by the Power Sector Policy Directions, and PEU will have a less significant role in planning and implementation of small hydropower projects in the future. In this light, commercial sustainability of grid-connected hydro projects too is not guaranteed, unless the Regulatory Commission intervenes to address the issue of financial viability of such renewable power projects. Therefore, effective utilisation of new skills acquired by the CEB in planning small hydropower projects is not guaranteed. However, the effective future utilization of new skills acquired by the PEU in collecting data will facilitate the private sector in formulation of their project proposals. Furthermore, PEU may also use the modeling skills acquired from the project for their (technical) due diligence of the private sector proposals. Potential

private developers' impressions on the project outputs will have to be ascertained at the conclusion of the activity, possibly through a public presentation.

The plans for extension of the distribution network were found to be subject to extraneous factors other than commercial considerations and hence the network extension has become unpredictable. This fact might also have an impact on the sustainability of the off-grid projects already in operation.

Lastly, the availability of requisite data for other river basins will have an impact on extending the experience gained in this project to other river basins.

As there are many questions unanswered regarding the software tool, it is recommended to demonstrate it and to ascertain their degree of command in their autonomous use by persons attached to Mini Hydropower Resource Assessment Study Team, such as the CEB team and local consultants. It is recommended that this is done prior to publishing to prospective mini hydro developers.

Furthermore the evaluation team advises the counterpart agencies and the UNDP to ensure obtaining duly licensed software with maintenance support and, if available in Sri Lanka, technical support for the software acquired under this activity. Further it is recommended to organise a training seminar under supervision of international consultants to examine understanding of the models by the PEU. This seminar could coincide with the consultants' visit scheduled for June/July 2001.

All activities for this component are expected to have been implemented before the end of 2001, so no extension date beyond 31 December 2001 is required.

5.2 Activity 2: Wind assessment and project preparation

The counterpart agency responsible for this activity (CEB) has assumed ownership of these project activities. The evaluation team did not find any areas of common ownership or of disputed ownership. PEU considers that the project is important for the role they play in the current institutional framework of the power sector in Sri Lanka.

In this activity too, the procurement of equipment has been made through NEX. There have been certain deficiencies and gaps in communication between the PEU and manufacturer/vendor in the delivery of the equipment, and the activity was adversely affected by procurement problems. The equipment originally purchased has been reported to be unsuitable for wind measurement applications (Note: the same data loggers have been used for activity 1) and incompatible with the software. The evaluation team notes that the reason for this incompatibility had been due to the fact that prescriptor and the user (initially the international consultant, in this case) had been different parties. With purchase of new equipment, specifically designed for wind measurement applications, the issue is no longer existent. However, due to these delays, collection of data in some sites has commenced only in November 2000.

The role of the public sector in power sector development has been diluted by the Power Sector Policy Directions. Therefore, PEU will have a less significant role in

planning and implementation of wind power projects. As for the case of activity 1, commercial sustainability of grid-connected wind power projects is not guaranteed, unless the Regulatory Commission intervenes to address the issue of financial viability of such projects. However, the effective future utilisation of new skills acquired by the PEU in collecting data will facilitate the private sector in formulation of their project proposals. Furthermore, PEU may also use the modelling skills acquired from the Project to assess the wind power potential in other areas of Sri Lanka and for their (technical) due diligence of the project proposals submitted by the private sector.

Owing to the interest expressed by the private sector in developing the wind power potential in Sri Lanka, the outputs developed by this activity are foreseen to have a definite demand in the future. This view has to be ascertained by discussing the project outputs with potential developers, possibly at the conclusion of the activity, through a public presentation.

The evaluation team advises the counterpart agencies and the UNDP to ensure obtaining duly licensed software with maintenance support and, if available in Sri Lanka, technical support for the software acquired under this activity. As a follow-up of this activity, it is recommended that a training seminar by international consultants at a level satisfactory to PEU will be organised.

Since wind assessment data for a 12-month period will only be available by December 2001, it is recommended that this activity will be extended with 3 months till 30 March 2002 to ensure proper completion of this activity, especially data analysis and the preparation of pre-investment documents for private sector.

5.3 Activity 3: Increasing effectiveness of applied research

Activities to be implemented by NERDC under this activity focus on biomass energy technologies and are many if the project document is to be followed closely. The design of this activity is too ambitious as included in the programme, although relevant. Since activities are too many as included in the project document the focus is absent and runs the danger of spreading resources too thinly with very limited impact. There was a role foreseen for ECF as mentioned in the project document, but in practice there was no consultation between the two institutions on the design and implementation of the activities.

However, at an early stage market research has led to selection of two major biomass energy components to be worked out in more detail; i.e. direct biomass combustion in small-medium scale furnaces and biomass gasification. The choice made is realistic given the commercial market potential for both components.

The direct biomass combustion focuses on fuel preparation (chipping) and furnace design for the tea, tile and brick sectors, currently consuming large quantities of biomass inefficiently. This activity is well-received by the here mentioned sectors and doesn't experience notable problems during its execution.

The biomass gasification activities are still in the planning phase and are expected to start not earlier then June, July 2001. This considerable delay has been a result of the necessary changes in the programme, including the change of budget allocations, in addition to problems with selecting and contracting international consultants as well as specification of gasification equipment. As a result of problems experienced by NERDC in the selection and contracting of international consultants they have explored the possibility of changing the execution modality of the biomass gasification activities from UNIDO to National Execution (NEX).

The objective of the activities was to undertake applied research with a focus on commercialisation of the biomass activities (services) of NERDC. It is expected that commercialisation of the services provided by NERDC for direct biomass combustion will take place in the near future, as a result of noticeable direct savings, both in biomass consumption and monetary forms. Although biomass gasification activities have not yet begun, it is hardly expected that the current designed activities would have commercial spin-offs in the near future (< 5 years). For the latter the focus is too much on R&D, rather than introducing an international proven technology into a commercial environment by means of a business demonstrator (combining both the technology and business aspects in one pilot/demonstration project).

Continue activities as they are planned for direct biomass combustion and work towards the situation that projects will be prepared at a pre-investment level to attract investors from the three selected sectors. Documenting these activities will be useful for sustainability of this activity at NERDC and beyond, hence it is recommended that NERDC properly documents its activities and disseminates information through appropriate channels directly targeting the potential investors in the three selected sectors. Expected ending date for the sub-activity is 31 December 2001.

For the biomass gasification activities it is recommended to finalise the activities of the biomass gasification component as soon as possible in close consultation with the UNIDO project manager. Given the importance of a proper design for this revised sub-activity it is strongly recommended that the possibilities of contracting an international expert to design the gasification programme including the gasification turn-key specifications, commercialisation and implementation requirements (work plan) will be addressed during the next TPR in late May 2001. Given the status of this activity in April 2001, it is recommended to extent the ending date to 31 May 2002 to ensure that implementation can be done properly and that results can be collected and analysed and that information can be prepared and disseminated for a larger audience.

Changing execution modality from UNIDO to NEX is not recommended. Instead it is recommended that UNIDO is considered as a team member, rather than a clearing house for TORs, equipment purchase etc. As a result of the latter, communication between UNIDO and NERDC has to be more frequent and UNIDO is to be included in drafts of TORs, specification equipment, etc. as soon as possible, so they are provided the opportunity to assist - and if necessary steer - in the process from the beginning onwards.

5.4 Activity 4: Capacity building in the small hydro industry

Activities to be implemented under this activity focus on small hydro activities and should complement other hydro activities as included under activities 1 (hydro data collection, analysis) and 6 (test rig). Unfortunately linkages between these 3 activities are limited and as such no fine tuning of activities has taken place.

The design of this activity was relevant, although it has underestimated the knowledge, skills, experience and capability of putting this to good use by ITDG. Rather than strictly carrying out activities as outlined in the project document, ITDG has taken activities to the next level by initiating the design and local manufacturing activities of Pelton turbines 100 kW and above. Although ECF was the implementing agency for this activity, in practice they have not provided any input. At the project design stage NGO-execution was not yet possible in Sri Lanka and hence ECF was included to guide and take formal responsibility for activities carried out NGO's such as ITDG as well as to make payments on behalf of UNDP.

The courses that have been designed and implemented by ITDG have met the objectives as set out in the project document. Furthermore they have been properly documented and provide a good basis for continued activities in this field. Target groups of the courses also included private sector, representatives from community based organisations and financiers, being a positive sign for sustainability of small hydro development in Sri Lanka.

The second component of this activity is the organisation and execution of a study tour. The objectives of the study tour kept changing during the implementation of the other programme activities as a result of gained experience on what the needs are for continued small hydro power development in Sri Lanka. This in combination with the recognition that there is only one study tour that has to maximised to the full extent, resulted in postponing the implementation of the study tour.

In addition activities for the design and local manufacturing of 100 kW Pelton turbines have been initiated. However, the selection and contracting process of the international consultant has delayed the implementation of these activities. Main problems were on TOR's and CV's forwarded by UNIDO, who is responsible for this process. Only recently with a new project manager at UNIDO, the situation has improved and smoother operations are expected.

Finalise as soon as possible (before the end of April 2001) the TOR for the study tour, including the selection of participants and the assistance required from an international consultant (TOR). Implement the study tour, latest in the third quarter of 2001 to ensure that information resulting from the study tour can be properly compiled and disseminated to a larger audience before the end of 2001. Finalise as soon as possible the selection procedure for the international consultant to be engaged in the design and local manufacturing of a 100 kW Pelton turbine. Given the delays experienced for the latter activity and hence the short time remaining, it is recommended to extent this activity till 30 March 2001, to ensure proper implementation and that results can be documented and information disseminated to a larger audience.

It general terms it is recommended that UNIDO is considered as a team member, rather than a clearing house for TORs, contracting consultants etc., hence include the UNIDO project manager as early as possible in the above two remaining activities.

Although not included in the project document, the evaluation team concludes that ITDG is in an excellent position to fine tune hydro activities as they are included under activities 1, 4 and 6. For example; making use of the software that is being developed by Hydro-M in nationally run training courses (jointly organised between CEB-PEU and ITDG); using the 10 kW test rig at NERDC for model testing Pelton turbines in the range of 100 kW and above, thereby complementing ITDG's activities in this capacity range. It is recommended that the national project manager, jointly with UNDP and UNIDO discusses this possibility and after agreeing on the concept actively look for funding from the project budget to detail and implement activities.

5.5 Activity 5: Strengthening energy audit and management capabilities in the commercial, institutional and industrial sectors

The project design and relevance is considered good for this activity. One of the key factors for success was found to be the segmentation of target groups in 3 layers: undergraduate, postgraduate and professionals, with differentiated approaches and goals. The ownership can be rated in an interim basis as very good. Beyond individuals, whose personal effort and coordination skills seem to have been instrumental for this positive outcome, SLEMA's privileged relationship with energy managers (>200 members) appears also to be/have been a big asset for this component, even if still the uptake by industry of the internship and awards programme remains to be fully ascertained.

Only about 60 % of the equipment for energy audits made available to the stakeholders was acquired under project funds. In order to satisfy the big demand for equipment, some instruments had to be borrowed from other actors. Possibly this is a consequence of the long time elapsed (from 1995 to 1999) since project design, which made the equipment cost much higher than expected. There was clear disappointment among the stakeholders in connection with the performance of some international consultants; for instance, one of them did not consider included in his TOR the delivery of a public lecture in a professional forum. Beyond the actual detail of the drafting of said TOR, the evaluation team finds such attitude disappointing and an indication towards the assignment that is far from constructive.

The efficiency in implementation (production of outputs as compared with the inputs) can be rated as very good. SLEMA and the University of Moratuwa showed strong commitment and good teamwork abilities, proactively sorting out the difficulties arisen and managing to produce useful course materials, this in spite of problems experienced in the contracting process of international consultants as well as with the already contracted international consultants. Seven studies have been commissioned, 2 research papers have been published and 2 more are under way, all of them prepared

by Sri Lankans. Currently only the output concerning the Awards/intern and the University Curricular programmes remain unfinished.

This is another activity where not just the efficiency (production of outputs as compared with the inputs) but also the effectiveness can be rated as very good. SLEMA and the Moratuwa University were proactive in sorting out difficulties arisen with the international consultants, and managed to produce useful outputs. The timely production of the remaining outputs seem very likely, and the outputs in place enjoy success and acceptance by the direct beneficiaries.

The evaluation team considers the developments under this activity successful and promising for the longer term. It is encouraging and indicative of impact that the students of the energy audit training keep hiring the audit instruments to continue similar activities on their own. Also the studies commissioned and research papers (being) prepared is considered an indication of short-term impact and promise of even better impact in the longer term. This especially holds true if considered the relatively modest inputs provided by the international consultants.

Continue activities as planned and strive to maximize the industry acceptance and sense of ownership for the activity. Finalise as soon as possible the contracting process of the international HVAC consultant, so that its delivery to the project can commence soonest. It is recommended that the contracting process is fully finalised before the end of May 2001.

Communication between UNIDO and SLEMA has to be improved and both parties need to be involved in drafting TORs, specification of equipment, etc. as early and as much as possible, in order to avoid differences in scope and understanding.

Subject to availability of project funds, out of savings, it is recommended that the possibility for extending activities such the provision of more equipment for energy audits, organising training seminars with a close industrial orientation and adding on energy efficiency modules to existing curricula the Moratuwa University will be explored by the PAC/PMU. Activities could then be extended to 31 May 2002.

On the basis of the good work undertaken so far and the advance perceived for the award program, the evaluation team considers it feasible that this activity can be completed before the end of 2001.

5.6 Activity 6: Renewable energy equipment performance testing

The project document envisages identifying resource capabilities and pre-investment issues and options for three important renewable energy sources. In activities 1, 2 and 3 these three renewable energy sources have already been identified. Solar power is not among those, and currently not in Sri Lanka's Energy Balance. The reasons for expanding the objectives of the project by the way of introduction of a fourth renewable energy source in this activity are not evident. Some of the outputs for this activity, although being relevant for the objective, were perhaps too ambitious in

comparison with inputs and budget, notably test procedures and linkage with conformity assessment, testing standards and good practices thereof. Besides, some inconsistency was detected between the power range ITDG was using for micro-hydro for this project (up to 100 kW and above) and the prototype turbine rating (>50 kW), as compared with the maximum rating of the test rig in NERDC; i.e. 10 kW. NERDC was however optimistic that this could be overcome by adoption of model testing for larger capacities, but using the same test rig.

NERDC's previous experience with technology research for renewable energy and energy efficiency is indeed the main asset towards effective achievement of the outputs and completion of the activity. At the time of the evaluation, only the output for procurement of test equipment seems to have been fully implemented. The rest of the outputs remain in different status of implementation.

NERDC was dissatisfied with the performance of the international consultant to be involved in equipment testing. As a possible reason, it was mentioned the lack of sufficient detail in the TOR, that the international consultant was making use of. At a later stage NERDC found out that this TOR was substantially different from the one they had proposed to UNIDO. The non-delivery of the test procedures has paralyzed the normal development of this activity. NERDC is still waiting for said test procedures, which were provided for in their copy of the TOR's for the international consultant, and this is leading to substantial delays for the whole activity. There seems to be a difference in understanding about the role and functions of the international consultant, which NERDC thinks should have prepared the requested test procedures, although under task 6.4 of the project document said test procedures were a NERDC task with a cost recoverable component to be provided. Said impasse compromises not just the completion date of the activity, but also its effectiveness and impact. The effectiveness of this activity can not be properly assessed, since the production of the outputs is very much delayed.

The sustainability is questionable under the conditions described earlier on, particularly in the absence of insight about the existence of potential external equipment suppliers taking up the service. The prospects for sustainability of the micro-hydro test rig seem reasonable, being the only such test rig in Sri Lanka. This is however contingent upon actual development of local manufacturing, which seems only promising, but not yet guaranteed. For solar energy the situation is different. In discussions with lending stakeholders active in the ESD project, the feeling was that the demand for financing solar home systems is less than expected (in terms of lending). This leaves the sustainability of the test activities for solar home systems even more at risk, beyond the problems described above.

In addition the coordination of the enforcement of test certificates with the lending actors is not in place. It lies in the nature of this activity that if legal measures or lending conditions do not require testing of the renewable energy equipment, the equipment suppliers will not perform those in order to save costs, unless other mechanisms, like conditional grants or concessional lending, etc. are put in place to enforce the testing. As customer requirements are not anticipated to become very stringent, at least in a first phase of introduction of renewable energy equipment in Sri Lanka, the prospects for sustainability of this activity beyond the time boundaries of the project seem by now quite uncertain.

Refocus this activity towards a higher demand-orientation and reschedule and implement as soon as possible the remaining tasks. Finalise as soon as possible the contracting process of the international consultant on test procedures, so that its delivery to the project can commence soonest. It is recommended that the contracting process is fully finalised before the end of May 2001.

Communication between UNIDO and NERDC has to be improved and both parties need to be involved in drafting TORs, specification of equipment, etc. as early and as much as possible, in order to avoid differences in scope and understanding.

Document, publish and disseminate results to an audience (equipment suppliers) as appropriate in order for the testing procedures to be of any effective use. And finally fine tune future hydro activities with CEB and ITDG; for example to use the test rig at NERDC for testing models of turbines proposed for local manufacturing, thereby complementing ITDG's and CEB's activities.

On the basis of the current status of the work still ahead for this activity the evaluation team recommends to extent this activity with a period of 3 months, thus with an ending date of 31 March 2002.

5.7 Project level findings, conclusions and recommendations

In addition to the above findings presented findings, conclusions and recommendations the same issues are also presented at project level. Most of the below is an aggregation from the activity level and hence it is presented in a manner less extensive as done in section 5.1 to 5.6:

- The lack of smooth and timely communication between the various actors involved in the programme has often caused delays, misunderstandings, incorrect decisions and an amount of work done double or not done at all. Therefore by introducing a communication protocol combined with for example a list server that automatically copies everyone on the project correspondence will greatly assist in improving the project communication. Both UNDP and UNIDO are in the position to organise this and it is recommended by the evaluation team that this will be discussed and decided upon during the next TPR to be held late May 2002 (see below);
- In contrary to the UNDP staff in Colombo the involvement of UNIDO staff in the project has been considered very formal by the Sri Lanka project stakeholders. This contributed to the fact that early involvement for draft TOR's, CV's, specification equipment and technical backstopping by UNIDO has hardly taken place. It is suggested that for the time remaining for the project a working relationship will be established with the UNIDO project manager that will be as open as considered appropriate for the more effective involvement and contribution of UNIDO to the project. Thus it is recommended that UNIDO is considered a team member, rather than a clearing house for TORs, contracting

consultants, procuring equipment, etc., hence include the UNIDO project manager as early as possible in the remaining activities;

- To avoid problems with TOR's for future activities of international consultants it is recommended that in addition to the international consultants commenting on the TOR before accepting the assignment, they will also discuss the TOR upon arrival in Sri Lanka and agree upon the implementation of it with the local stakeholders (clients). Any mutually agreed upon changes to be communicated to the UNIDO project manager with copies as appropriate (communication protocol to provide guidance on this);
- For the activities in the small and mini hydro development three different activities are producing outputs that is to contribute to such development. However the complementarity of these outputs is subject to improvement. Although not included in the project document, the evaluation team concludes that ITDG is in an excellent position to fine tune hydro activities as they are included under activities 1, 4 and 6. This conclusion is based on the long-term history that ITDG has in small/mini hydro activities; the majority of people working in this field in Sri Lanka have worked at some point in time with in their career with ITDG; ITDG is a not-for-profit organisation and hence is not a commercial threat; and they are considered a professional organisation with solid international backing (from ITDG UK) in their field of expertise. For example; making use of the software that is being developed by Hydro-M in nationally run training courses (jointly organised between CEB-PEU and ITDG); using the 10 kW test rig at NERDC for model testing Pelton turbines in the range of 100 kW and above, thereby complementing ITDG's activities in this capacity range. It is recommended that the national project manager, jointly with UNDP and UNIDO discusses this possibility and after agreeing on the concept actively look for funding from the project budget to detail and implement activities;
- The sustainability of the various project activities is depending on a number of external factors that can hardly be influenced by the project itself. On the other hand there are also a number of activities that are under control by the project stakeholders and can be formulated and implemented during the remaining time period of this project. Especially the formulation of a possible follow-up project making use of the currently developed capacity in a more commercial manner is considered a possibility, especially is the ESD programme will also enter into a second phase. Furthermore, a national programme focusing on energy efficiency would be a realistic next step as well. It is recommended that in addition to the activity level sustainability issues, the PAC and PMU, should initiate and guide the discussions on possible follow-up programmes. It is recommended that during the next TPR, late May 2001, this will be made an agenda point to sort out issues relating to financial, human and time resources;
- The evaluation team recommends to organise an extra TPR in late May 2001, to discuss the outcomes of the mid-term evaluation as outlined in this report, the work plan for the remaining project period and the timing of the project. In table 5.1 the recommended ending dates of the various sub-activities have been presented. It is recommended that this will be reviewed and decided upon during the next TPR.

Table 5.1: Recommended ending dates of the (sub) activities.

(Sub) Activity	Recommended ending dates of the (sub) activities							
	Dec '01	Jan '02	Feb '02	Mar '02	Apr '02	May '02	Jun '02	Jul '02
Act. 1:								
Act. 2:								
Act. 3: combustion								
Act. 3: gasification								
Act. 4: study tour								
Act. 4: design & man.								
Act. 5:		?	?	?	?	?		
Act. 6:								
PAC activities								
PMU activities								

6 Lessons learned

Lessons learned from this project, that are valuable mainly for the future generation projects to be supported by GEF and the multilateral community as a whole, are presented below with a practical orientation for future project developers and programme managers:

- The delays from formulation to execution of this project are considerable, which is difficult to justify for a project that is designed to have a private sector orientation. Recommendations for improvement are not applicable anymore for the project under implementation, but it needs to be kept in mind for future programming;
- The cross-cutting activities that are complementing each other need to be worked out in detail in the project design. A lead agency needs to be appointed to coordinate the cross-cutting activities and a budget for such activities needs to be made available from the start of the project;
- External factors can have a major influence on the sustainability of project outcomes. GEF supported projects are often not in the position to affect macro-economic parameters such as IPP-regulations, tariff settings, power sector reform activities etc. Therefore the minimum that should be included at the project design stage is to determine the indicators for the identification of external factors and a mechanism to monitor these indicators combined with project milestones in combination with decision points as they relate to changes in external conditions;
- The World Bank is undertaking in a number of countries worldwide ESD programmes or similar type of activities under a different name. Having a capacity building component complementary to a sustainable energy lending portfolio being developed is a sound approach with a clear rationale. However at the design and implementation stages of both programmes it is recommended that frequent communication between the programmes takes place and that the coordination of 'joint' (complementary) project activities will be made a specific task of either a representative of the WB or of the UN/GEF. Also a budget, provided by both organisations jointly should be made available for the implementation stage;
- The recruitment and procurement processes as they are being used by the various UN agencies are often not transparent and difficult to understand for the national project stakeholders. Therefore it is recommended to organise at the beginning of the project implementation, a familiarisation meeting to learn about these processes for the key implementers (representatives of executing and implementing agencies). This can be done in the form of a few day visit to the UN agencies and get on-the-job information as well as personally meeting people involved in the various activities in the programme (administration, procurement, project manager, personnel officer, etc.);
- Limit to the extent possible the number of implementing agencies in a project. If one executing agency has also the capacity and willingness to be the implementing agency it is suggested to opt for one combined executing / implementing agency only;
- Changing project management structures creates delays and difficulties in the project implementation and should be limited to the extent possible. In case this is not possible, one should strive to have an overlap between coming and going

project personnel as to enable the effective and efficient transfer of institutional knowledge on (detailed) project activities;

- The lack of a smooth and timely communication between the various actors involved in projects is a major cause of delays, misunderstandings, incorrect decisions and an amount of work done double or not done at all. Therefore by introducing a communication protocol combined with for example a list server that automatically copies everyone on the project correspondence will greatly assist in improving the project communication. Most UN agencies are in the position to organise and implement a list server to be made available for the project duration;
- The involvement of UN staff in projects is often considered quite formal. This can contribute to the fact that early involvement for draft TOR's, CV's, specification equipment and technical backstopping hardly takes place. Given the importance of being part of the process and not just of the outputs of the process it is recommended that UN staff involved in projects establish as soon as possible a working relationship that will be as open as considered appropriate for the more effective involvement and contribution of UN experts to the project. Thus it is recommended that UN staff members are considered a team member, rather than a clearing house for TOR's, contracting consultants, procuring equipment, etc.;
- For projects where equipment has to be procured that will be used by international expertise that also has to be contracted under the same project, it is recommended that the international consultants will be tasked with the writing and procurement of the equipment that they will be using in the process of shaping and delivering their outputs;
- In cases where equipment is procured separately it is recommended that installation and commissioning of that equipment is included in the specifications of the equipment order, especially if it concerns equipment unfamiliar to the national project implementers. Assistance from international expertise is recommended to be used in the writing of the equipment specifications, suggest possible suppliers and to evaluate bid and the procurement of equipment;
- Conditions for payment of equipment procurement and the delivery of international expertise have to be as practical as possible, based on existing procurement rules and regulations at UN agencies. Often consultancy reports are considered outputs required for payment of tranches of the consultancy contract. In the case of capacity building, consultancy reports are to be considered only partial outputs as the satisfied participation in training courses of national actors is not reflected in such reports. Therefore it is recommended that in the consultancy reports also the participant evaluation is included of training workshops, seminars, study tours, etc. and this to be made an integral part to assess the satisfactory delivery of the consultant's inputs;
- In cases where the level of local knowledge, skills and experience, is high it will be necessary to recruit high level international expertise for assisting the project. Since this is not always available to the UN system as a result of limitations experienced by the UN system (fees, flexibility, in general not being able to compete with private sector) one has to be realistic and communicate clearly to the local counterparts what they can, but also cannot expect from the UN system as it concerns international expertise to be recruited to support the project.

ANNEXES

Annex 1: Terms of reference of the mid-term evaluation mission.

Annex 2: Organisations visited and persons met.

Annex 3: Presentation of the wrap-up meeting.

Annex 4a: Budget revisions SRL/97/019.
Annex 4b: Budget revisions SRL/97/019 (STS).
Annex 4c: Budget revisions SRL/96/G32.

Annex 5: Matrix presenting recommendations and follow-up action.

Annex 1: Terms of reference of the mid-term evaluation mission.

Sri Lanka Renewable Energy and Energy Capacity Building
(DG/SRL/97/019 and EG/SRL/96/G32)

1. THE PROJECT

Background:

As an Annex 2 signatory to the Framework Convention on Climate Change (FCCC) Sri Lanka, along with the major nations in the world, has committed itself to the goal of stabilising its nation's green house gas (GHS) emissions. The Government of Sri Lanka (GOSL) has identified renewable energy and energy efficiency as key elements in Sri Lanka's GHG mitigation strategy. The GOSL energy strategy which is designed to support socio-economic and environmental goals, has several objectives relevant to this project:

1. optimally developing energy resources;
2. developing and managing forest and non-forest wood fuel resources;
3. improving institutional capacity for the energy sector;
4. promoting efficient pricing of energy;
5. promoting energy conservation; and
6. diversifying energy sources and reducing dependence on (energy) imports.

The Ministry of Power and Energy (M/P&E) is responsible for the supervision of the energy sector in Sri Lanka. Under its auspices, the Ceylon Electricity Board (CEB) is a key player in the Renewable Energy and Energy Efficiency sector. Another key agency under M/P&E, is the Energy Conservation Fund (ECF). The ECF was established in 1985 and revitalised in 1996 "to promote and initiate activities and projects relating to the improvement of any or all aspects of energy demand management and conservation programmes in Sri Lanka." In 1995, a National Committee for preparing a Sri Lanka Energy Policy was formed comprising fourteen members representing the main ministries, Petroleum Corporation, Chamber of Commerce and individual experts.

The Government of Sri Lanka has received assistance for the renewable energy from various sources and attention has been focussed to a large extent on indigenous Hydro generation. Both the Netherlands and the United States have provided funding for energy conservation projects, and the study of wind and hydro potential. The World Bank **Energy Services Delivery** (ESD) Project which was approved in 1996, provides assistance consisting of US$24.2 million IDA credit and implements a US$5.9 million Global Environmental Facility (GEF) grant. The other donors currently providing assistance to the sector are Germany, Norway **and** the USA.

This project was designed as a technical assistance project to fit under GEF Climate Change Program 6. Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs.

Some of the key agencies working on the project are CEB, Sri Lanka Intermediate Technology Development Group (ITDG), National Engineering research Development & Centre (NERDC), Sri Lanka Energy Managers Association (SLEMA) and Moratuwa

University (MU). The membership to a Project Advisory Committee (PAC), has been drawn from a large number of stakeholders such as M/P&E, CEB, ECF, SLEMA, NERDC, ITDG, the private sector and MU.

Immediate objectives, performance indicators and budget:

The following table summarises the immediate project objectives broken down by Components (called Activities in the project document), and corresponding performance indicators to be used in reviewing the results:

Immediate Objectives	Components ("Activities")	Measurable Performance Indicators
1) To encourage private sector investment in selected small/micro hydro, wind and biomass projects.	1.1) Mini and small hydro project preparation	1.1.1) Potential hydro capacity identified for pre-investment 1.1.2) Quantity and quality of prepared procedural documentation and computer models generated 1.1.3) Opportunities provided for financial community and developers to explore project opportunities
	1.2) Wind assessment and project preparation	1.2.1) Cost effective wind generation capacity identified for pre-investment 1.2.2) Quantity and quality of prepared procedural documentation and computer models generated 1.2.3) Opportunities provided for financial community and developers to explore project opportunities
	1.3) Increased effectiveness of applied research on biomass	1.3.1) The number of commercial opportunities identified for conversion to biomass combustors 1.3.2) The Quality and quantity of technology transfer materials 1.3.3) The number of new products supported by research funding
2) To build the professional capacity of the renewable energy and energy efficiency industry in design and implementation	2.1) Strengthened capacity in the small hydro industry	2.1.1) Participation by private sector developers and implementers in workshops/seminars 2.1.2) Mini hydro turbine fabrication technology 2.1.3) Identified innovation as a result of study tour
	2.2) Upgraded energy audit and management capabilities in the commercial, institutional and industrial sectors	2.2.1) Numbers of professional attendees at courses 2.2.2) Yearly use of audit equipment by national, private sector and public agencies 2.2.3) University program

		subscription 2.2.4) Uptake by industry of a student intern program
	2.3) Upgraded renewable energy equipment performance testing capacity	2.3.1) Testing procedures developed and published 2.3.2) Numbers of equipment suppliers taking up the service

Executing agency for the GOSL is the M/P&E and implementing agencies are the NERDC, ITDG, SLEMA, CEB, ECF and UNIDO. The (originally) planned total UNDP/GEF budget is US$ 1,829,402, the Government inputs (in kind), amount to US$ 142,000. The budget for implementation by UNIDO is US$ 801,651 for EG/SRL/96/G32 and US$ 322,937 for DG/SRL/97/019, of which US$ 539,074 and US$ 165,297 have been spent (disbursements and obligations) respectively (according to the end October 2000 detail reports on project accounts).

The actual starting date of project implementation was January 1999 and December 2001 is the (actually) planned completion date. The project is being implemented through a professional team comprising national and international experts. The implementation is coordinated by the National Coordinator nominated by the executing agency.

2. THE IN-DEPTH EVALUATION

2.1 Purpose, scope and method

2.1.1 Purpose:

The purpose of this in-depth evaluation is to enable the GOSL, the donors (UNDP and GEF), and UNIDO to take decisions on the future orientation of the project, to introduce, if required, corrective measures to improve the implementation of the project, to verify the need, if any, of extension of the project, and to learn lesson from experience for future planning new programmes/projects.

The evaluation is foreseen in the project document (page 21**,** chapter 8, paras 85 through 87 refer). Further, the evaluation was requested and agreed upon at the last tripartite review meeting held in Colombo, November 30, 2000 (page 7, chapter V of the TPR report refers).

2.1.2 Scope:

In-depth evaluation is an activity in the project cycle which attempts to determine as systematically and objectively as possible the relevance, efficiency, effectiveness, impact and sustainability of the project. The evaluation will assess the achievements of the project against its objectives, including a re-examination of the relevance of the objectives and of the project design. It will also asses to what degree the assumption/risks as identified in the project document held true/occurred and identified other factors that have facilitated or impeded the achievement of the objectives. While a thorough review of the past is in itself very important, the in-depth evaluation is expected to lead to detailed recommendations and lessons learned for the future.

In particular, the following issues will be addressed by the evaluation:

Relevance and project design

- *Are the target beneficiaries incl. their needs and constraints for each component clearly defined and identified?*
- *Is there still demand by the target beneficiaries for outputs/services developed or strengthened by the project?*
- *Do the counterpart agencies still consider the project to be important for the role they play in the institutional framework?*
- *Are the project strategy and design realistic? Do they consider sufficiently the policy and institutional framework (such as the price structure)? Is the relation between local R@D and transfer of technology from abroad sound/rational?*
- *Have there been changes in the policy or/and institutional framework which influence the project?*
- *Are the performance indicators adequate to measure the achievements?*

Efficiency of implementation

- *Are the resources used efficiently? (quantity, quality and timeliness of inputs, use of the inputs)*
- *Is the project adequately coordinated with other related programmes?*
- *Are the management arrangements appropriate and functioning?*
- *What are the constraints and bottlenecks encountered by each implementing agency? (UNIDO, ECF, CEB, ITDG, NERDC, SLEMA)*
- *Are the outputs adaptable at the end user level or are there gaps between the project inputs and the prospective end users?*

Effectiveness

- *To what degree have the planned outputs been already produced?*
- *Use and impact of the outputs: actual and realistically expected*

Impact

- *Have any results in the use of indigenous sustainable energy resources through private sector and in energy efficiency in the commercial and industrial sectors been already achieved?*
- *Is it likely that such results will be achieved, and if so, under what conditions?*

Sustainability of the capacity building outputs

- *Do the institutions strengthened by the project have professional, managerial and financial resources to sustain, and further upgrade the capabilities developed by the project?*
- *Is it likely to expect that the energy engineers trained by the project will find a market to apply their newly acquired knowledge and skills?*

2.1.3 Method:

The evaluation will include the following activities:

- studying project documentation, including the TPR related reports and expert reports;
- briefing by the UNIDO Project Manager, Team Leader of the UNIDO Integrated Program and the Office of Internal Oversight;

- briefing by UNDP Colombo and the executing agency (M/P&E);
- interview of the National Project Coordinator;
- interviews of the national implementing agencies (CEB, ECF);
- interview of other counterpart agencies (NERD, ITDG, SLEMA, UM);
- interview of target beneficiaries (trainees/energy managers, industry using services of any of the counterpart agencies strengthened by the project);
- visit to project sites using the equipment delivered by the project; and
- consultations with other national, bilateral or multilateral agencies managing or supporting related programmes in this problem area (such as WB, USAID, …).

The plan of visits will be prepared by the National Project Coordinator before the field mission starts. Interviews can be conducted either individually or as group exercises. Moderated workshops might also be conducted to review the performance and results of the project. Although the mission should feel free to discuss with the authorities concerned all matter relevant to its assignment, it is not authorised to make any commitment on behalf of UNIDO or the donor.

2.2 Composition of the evaluation team

The evaluation team will be composed of the following:

One nominee of the Donor (UNDP and/or GEF);
One nominee of the GOSL; and
One nominee of UNIDO.

The three nominees must have extensive experience in technical assistance projects on energy efficiency and renewable energy sources, be knowledgeable in evaluation of capacity building projects related to energy and have experience of development approaches such as technology transfer and training of trainers. Familiarity with GEF strategies for climate change activities, would be an asset. Sound knowledge of English and good drafting skills are required.

These member of the evaluation team should not have been directly involved in the designing or implementation of the programme/project.

2.3 Timetable and Report

At the last TPR meeting it was suggested to conduct the evaluation before March 2001, but actual timing will depend on the approval of the TOR and availability of the evaluation team.

The evaluation time should consist of:

- one full day briefing and studying reports at UNIDO HQ (only by UNDP/GEF and UNIDO nominee);
- a field mission to Sri Lanka of approximately 10 working days, with (possible) travel within the country, the program of which will be agreed by all parties concerned; and
- two (2) days debriefing at HQ to discuss draft mission report.

Substantive and administrative support to the evaluation team in the field, will be provided by the project authorities. The evaluation report should follow a standard structure used by UNDP or UNIDO. In order to ensure that the report considers the view of the parties concerned and is properly understood and followed up by them, it is required that:

- the main conclusions and recommendations of the evaluation will be presented to and discussed with the development partners and the UNDP office in the field; and

- the draft report is presented to and discussed with the project manager and other (UNIDO HQ) staff concerned with the project after the mission.

As the report is the product of an independent team acting in their personal capacities, it is up to that team to make use of the comments made by the parties involved and to reflect them in the final report. However, the evaluation team is responsible for reflecting any factual corrections brought to their attention prior to the finalisation of the report.

To keep tract of the recommendations of the evaluation exercise and of the follow-up action taken by the responsible persons such as National Project Coordinator, Project Manager, the evaluation team will prepare a matrix. The matrix will be part of the final joint evaluation report and will indicate:

- The recommendations in a concise form;
- The related paragraph in the report (cross reference);
- Who is responsible for what (appropriate) action; and
- The corresponding (suggested) deadline.

The final report should be submitted within two weeks after the completion of the field work and submitted in hard copies to the Office of Internal oversight (with the full text on a diskette, in Word). The final evaluation report should be forwarded in 10 (ten) hard copies and in electronic version to UNDP Sri Lanka by UNIDO enabling UNDP to share the evaluation findings with key stakeholders, the UNDP evaluation office N.Y. and UNDP-GEF-RBAP in New York.

Annex 2: Organisations visited and persons met.

1) Preparatory meetings in UNIDO HQs, Vienna.

Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member
Mr. Giorgios Anestis (UNIDO Project manager)
(Partially) Mr. Jaroslav Navratil, Office of Internal Oversight, UNIDO
(Partially) Mr. Cehit Gurkok, Director, Industrial Energy Efficiency & Climate Change Branch, UNIDO

Mr. Anestis updated both members of the Evaluation Team (ET) on the background and evolution of the project, and debriefed them about the status of implementation, project management process, the objectives of the mission and the nature of the recommendations that would better help a timely completion of the remaining activities. Particular aspects were examined in detail, particularly the flow of communication, the complex implementation structure, pending implementation aspects and the process of procurement and contracting of experts. Short meetings with Mr. Jaroslav and Mr. Gurkok provided insight into the expected components of the Evaluation Report and the possible follow -up actions.

2) Meeting with the Additional Secretary, Ministry for Irrigation and Power, in their premises in Colombo

Mr. M.A. Warnakulasooriya, Additional Secretary, Ministry for Power & Energy
Dr. V.U. Ratnayake, National Project Coordinator, Renewable Energy Project
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

Mr. Warnakulasooriya, as Additional Secretary in the Ministry for Power & Energy, updated the ET on the role of his Ministry in the project (It has the overall responsibility for its execution), as well as on his views on the relevance and effectiveness of the project in relationship with the upcoming restructuring of the Ceylon Electricity Board and hence of the whole Sri Lankan power system. Different aspects of the project implementation structure were shortly discussed.

3) Meeting with the Energy Conservation Fund (ECF), in their premises in Colombo

Dr. P.A. Samaraweera, Chairman, ECF
Mr. W.A.C.P. Wijeratne, Secretary ECF
Mr. H.A. Vimal Nadeera, Project Engineer, ECF
Dr. V.U. Ratnayake, National Project Coordinator, Renewable Energy Project
Ms. Dorthe Jorgensen, UNDP Programme Officer
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

The meeting provided the ET some overview on the role of the ECF in the organizational arrangements for implementation. The rationale for ECF involvement as one more execution layer, the flow of funds and the institutional setup at ECF were discussed at large. ECF elaborated as well on the difficulties it has found to retain qualified personnel and its performing, mainly in awareness raising campaigns for Energy Conservation, its Forum

Function and its relationships with NGOs and SLEMA (The Association of Practicing Engineers). A model of an artisanal cooking stove was showed and commented.

4) Meeting with the Intermediate Technology Development Group (ITDG), in their premises in Colombo

Ms. Sanjeewani Munasinghe, Project manager, Decentralized Energy Options, ITDG
Dr. V.U. Ratnayake, National Project Coordinator, Renewable Energy Project
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

Ms. Munasinghe commented to the ET the achievements of Activity 4, its degree of completion and her assessment about the project implementation, the difficulties her activity found and the way those were solved. She also elaborated on ways and means to streamline implementation of projects like this one, the previous experience with mini-hydro of ITDG, the pros and cons of the activity design, etc.

5) Meeting with UNDP - Sri Lanka, in their premises in Colombo

Ms. Rekha Thapa, acting UNDP Resident Representative
Ms. Dorthe Jorgensen, UNDP Programme Officer
Dr. V.U. Ratnayake, National Project Coordinator, Renewable Energy Project
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

Ms. Thapa and Ms. Jorgensen updated the ET in terms of the Country Framework being discussed with the Government, its priority objectives and areas of action, and about the procedure for any follow-up action. The overall assessment about the evolution of the implementation process, the shortcomings faced and how the project structure responded to it, and the general scope and expectations for this Evaluation Mission and its wrap-up meeting were also discussed at large.

6) Meeting with the National Engineering Research & Development Center (NERD), in their premises in Ja-Ela

Dr. Nihal Somaratna, Chairman, NERD
Mr. M.W. Leelaratne, Deputy General manager, NERD
Mr. G.B. Wimalaratne, Head/Electrical and Electronics Section, NERD
Dr. V.U. Ratnayake, National Project Coordinator, Renewable Energy Project
Ms. Dorthe Jorgensen, UNDP Programme Officer
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

Dr. Somaratna introduced briefly the NERD Center's main functions, organizational structure and present facilities, which were equipped in the framework of another UNDP/UNIDO project in the 80's. Mr. Leelaratne discussed extensively with the ET the different implementation problems found and the present status of the execution. He and Mr. Wimalaratne showed the testing facilities of NERD to the ET, as well as testing equipment in connection with the project and a demonstration park set up for biomass gasification technologies.

7) Meeting with Hydro-M

Mr. Pierre Lefevre, Studies' Engineer, Hydro-M
Mr. Francois Calando, Hydraulic engineer, Shynergie
Mr. Benoit De La Salve, Engineer, Hydro-M
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

Mrs. Lefevre, Calando described to the ET the scope and objectives of the role of Hydro-M in the project, together with their views on its implementation and their expectations on the impact and follow-up of the project.

8) Meeting with the Pre-Electrification Unit, PEU, in their premises in the Ceylon Electricity Board HQs, Colombo

Mr. P.L.G. Kariyawasam, Chief Engineer, PEU, CEB
Ms. Primali Siriwardene, CECB
Mr. A.M. A. Alwis, PEU, CEB
Dr. V.U. Ratnayake, National Project Coordinator, Renewable Energy Project
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

Mr. Kariyawasam and Ms. Siriwardene exposed to the ET their views on the implementation and its present status, the communication path, the project concept, the problems found and their possible completion dates. Several suggestions for improvement in future programme/projects were analyzed, as well as prospects for future actions in terms of wind energy.

9) Meeting with the Department of External Resources (ERD) and the Department of National Planning, Ministry of Finance & Planning, in their premises in Colombo

Mr. P.H. Sugathadasa, Director, Department of External Resources, Ministry of Finance & Planning
Ms. C. Kulatunge, Deputy Director, Department of National Planning, Ministry of Finance & Planning
Mr. S.T. Kodikara, Deputy Director, Department of National Planning, Ministry of Finance & Planning
Dr. V.U. Ratnayake, National Project Coordinator, Renewable Energy Project
Ms. Dorthe Jorgensen, UNDP Programme Officer
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

The process of Management for External Assistance programmes was discussed, together with the participant's views on the project, its relevance and prospects for a possible follow-up for some activities. The energy planification process of the Sri Lankan Government, the forecast for grid expansion, other ongoing and planned projects (notably biomass) and their assessment on the sustainability of the project were also discussed.

10) Meeting with the World Bank ESD project coordinator in the WB facilities in Colombo

Dr. Sumith Pilapitiya, Senior Environmental Engineer, WB
Dr. V.U. Ratnayake, National Project Coordinator, Renewable Energy Project
Ms. Dorthe Jorgensen, UNDP Programme Officer

Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

Dr. Pilapitiya explained the evolution of the implementation of the World Bank's ESD project and its relationship with the Renewable Energy project. Also a number of other aspects, like coordination, follow -up prospects for a second phase of ESD, prevailing commercial financial conditions and relationship with DFCC, linkage with major energy policy developments, notably the Electricity Act which is being discussed, sustainability of both ESD and the Renewable Energy project were discussed at large.

11) Meeting with Sri Lanka Energy Managers' Association (SLEMA), in their premises in Colombo.

Mr. M.A. Justin, President, SLEMA
Mr. L. Ariyadasa, Project Director, SLEMA
Mr. Shavindranath Fernando, former Director, SLEMA
Dr. P.D.C. Wijayatunge, Executive Committee, SLEMA
Dr. V.U. Ratnayake, National Project Coordinator, Renewable Energy Project
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

The ET was briefed on SLEMA's role and constituency, saw the Energy Manual, which constitutes an output of the project and learned about the problems faced in terms of procurement and consultants during the development of SLEMA's led activity.

12) Meeting with the DFCC Bank in their premises in Colombo.

Mr. Jayantha Nagendran, Senior Vice President, DFCC Bank/Administrative Unit of ESD Project
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

Mr. Nagendran explained the evolution of micro finance out of World Bank's concessional lending on the ESD project and its relationship with the Renewable Energy project. Also a number of other aspects, like segmentation of the different renewable energies covered, real rates and conditions, both under PCI lending and commercial financial conditions and implications of a possible second phase of the ESD and/or UNDP/GEF projects.

13) Meeting with CEB's Additional General Manager (Transmission Projects) in his office in Colombo

Mr. D.G.D.C. Wijeratna, Additional General Manager (Transmission Projects), CEB
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

Mr. Wijeratna presented briefly his views on the future possible development of renewable energy in Sri Lanka, as well as about the sustainability and impact of the project.

14) Wrap-up meeting

Most people/organisations mentioned in this annex were represented during the wrap-up meeting held on 6 April. For details on the contents please refer to annex 4.

15) Meeting with UNDP in their prem ises in Colombo

Ms. Manel Jayamanna, UNDP Assistant Resident Representative
Ms. Shireen Samarasuriya, UNDP/GEF Small Grants Coordinator
Ms. Dorthe Jorgensen, UNDP Programme Officer
Mr. Ad Dankers, Evaluation Team leader, UNIDO consultant
Mr. Bandula Tilakasena, National expert, UNIDO consultant

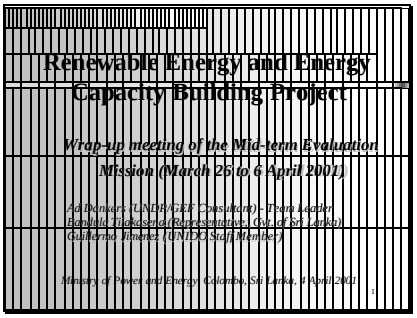
Issues resulting from the wrap-up meeting were discussed as well as the process that would follow in completing the mid-term evaluation mission and report. In addition the possibilities of the UNDP/GEF Small Grants Programme were discussed with the objective to find ways of financing follow-up activities emerging, or already having emerged from the project under evaluation.

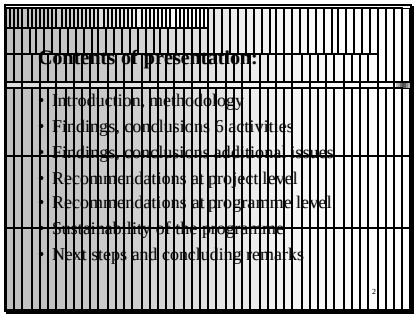
16) Meeting with UNIDO's Integrated Program (IP) Focal Point in their office in Colombo.

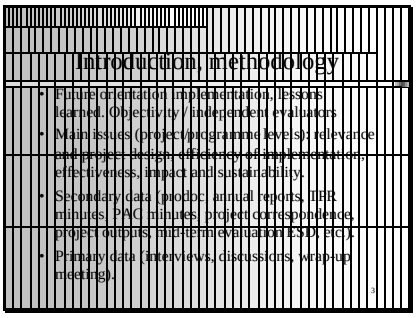
Mr. Nihal Abeysekera, National Project Director, UNIDO's IP
Mr. Sarath Abeysundara, National Project Coordinator, UNIDO's IP
Mr. Guillermo Jimenez, Evaluation team member, UNIDO staff member

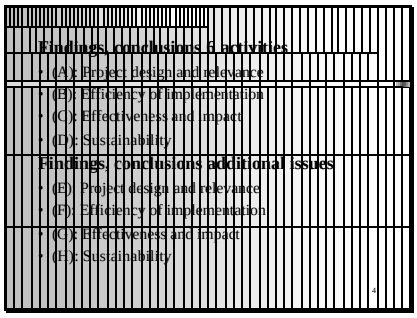
Messrs. Abeysekera and Abeysundara explained the present status of implementation of UNIDO's IP for Sri Lanka. Mr. Jimenez updated them on the Renewable Energy project and prospects for a follow-up on energy activities that might have a potential for synergies with some IP's components.

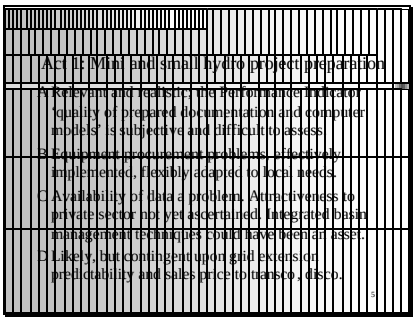
Annex 3: Presentation of the wrap-up meeting.

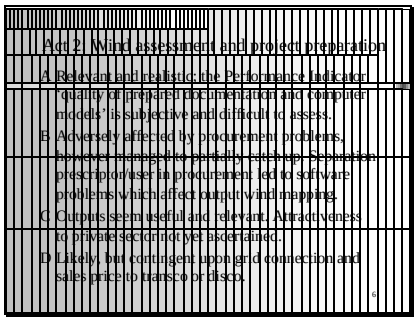


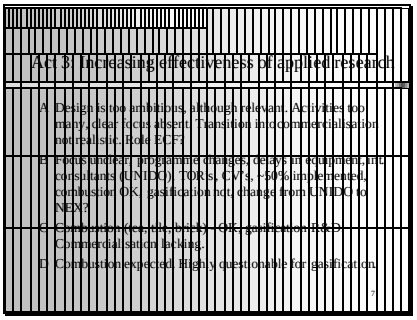


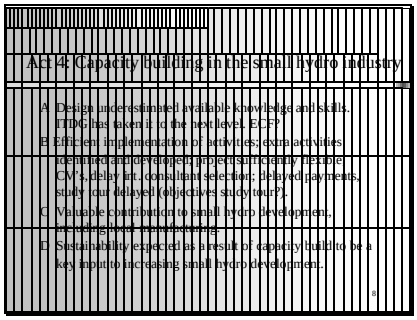












Act 5: Strengthening energy audit and mgt. capabilities in the commercial, institutional and industrial sectors

A Relevant and cross-cutting, well developed (3 layers), good resource use, could have been more ambitious (equipment), still large potential for follow-up

B Different TORs, lack of flexibility by Int. Consultants to adapt to local needs, leverages good local expertise, strong commitment and good linkage SLEMA-Univ

C Impact only limited by (still) low awareness on EE, relevant studies, qualitatively good research, and capacities, improve industry links

D Sustainability to be improved, given its relevance.

9

Act 6: Renewable energy equipment performance testing

A Relevant, but concept too much ESD-specific. Follow-up desirable, otherwise a piecemeal approach. Test equipment shortcomings. Lack of design synchronization with other actors and activities.

B Procurement and expert insatisfactory. Lack of communication, different TORs. Test rig for hydro too limited.

C Test procedures question still unsolved. Outputs too ambitious for the inputs planned. Requires redefinition? and TPR attention.

D Unclear under present conditions.

10

Institutional, implementation arrangements

E Many 'implementors'. Processes and procedures UNIDO, NEX not clear and not transparent. NGO-execution/ECF

F CV's, TOR's, contracting, payment delays, miscommunication, unauthorised payments, NEX implementation relatively smooth (NGO payments?)

G Delays, frustration, distrust mainly with UNIDO. Improvement after change of UNIDO project manager (issue of CV's, consultant roster remains).

H Not applicable: infrastructure is project related.

11

Linkage to ESD programme

E Institutional implementation level linkage is poor, but the linkage is established through people involved in both programmes. Hydro: linkage is good. Wind: no linkage. Biomass: no linkage. SHS: artificial inclusion UNDP/GEF programme linked to ESD, EE: no linkage to DSM/ESD.

F Efficiency of implementation (limited overlaps, maximum complementarity) is good, mainly through individuals involved in both programmes. Communication with DFCC (financial institutions) is weak. Delay in providing pre-investment data from act. 1 adversely affects ESD impl.

G Especially good for the case of hydro. SHS problems in both programmes. Others not applicable.

H Possible formulation ESD-II / UNDP/GEF-II

12

Recommendations at project level (1)

- Act. 1 and 2: Extend to other sites and basins making use of gained capacity and equipment.
- Act 1: Ensure licensing of software. Organise training seminar under supervision of international consultants to check understanding of models (June/July 2001).
- Act 2: Have the international consultant prepare and undertake training at a level satisfactory to CEB/PEU and make this a payment condition.

13

Recommendations at project level (2)

- Act 3: Finish TOR, specifications gasification turn-key package < 2 weeks. Implement gasification activities in commercial environment, not NERDC. Communicate with UNIDO; Stay with UNIDO (not NEX) and consider them as team member not clearing house; Extend act. 3.4 to 1 July 2002; Actively promote outcome combustion activities to commercialise NERDC services in tea, brick, tile sectors.
- Act 4: Contract design/manufacturing consultant asap. Finalise TOR study tour, implement and disseminate info within the programme. Link activities with Act. 1 (software) and 6 (test rig).

14

Recommendations at project level (3)

- Act 5: Timely provision of the remaining consultant inputs. Improve uptake by industry with an outreach and marketing effort. Improve access by women w/ family responsibilities. Evolve act. 5 into an Energy Conservation Center with own institutional structure and equipment. Improve uptake of EE by industry by going sectoral and providing assessments/support to ESCO start-ups.
- Act 6: Improve testing coherence w/ other activities (e.g. power ratings). Coordinate test certificates with lending actors. Work out enforcement schemes and expand capacities for standards, certification, good laboratory practices & quality infrastructure (both follow ups)

15

Recommendations at programme level

- Institutional arrangements: UNIDO team member, CV's (2-way traffic), TOR's (joint signature), timely financial transparency project manager, payment upon signature project manager only, informal/open communication (list server?), explain processes/procedures, circulate draft reports, TOR's, equipment specs, etc.
- UNIDO/UNDP/NEX, UNDP is the only organisation to be held responsible by GEF
- Extra TPR, work plan for remaining period (early May);
- Budget revisions in line with work plan;
- Closely follow ESD programme (ESD-II ?) and Power Sector Reform Process;
- Ending date (selected activities) 1 July 2002.

16

Sustainability of the programme

- Private sector interest (wind, hydro, biomass - combustion, energy audits);
- ESD-II (piggy backing);
- GEF - energy efficiency / energy conservation centre;
- Possible linkages with UNIDO integrated industrial support program for Sri Lanka ?
- UNDP Colombo - $ for promoting results;
- Bilateral donors (to be explored);
- Other sources……...

17

Next steps and concluding remarks

- Draft report, debriefing at Vienna (27 April) and presentation of report in Sri Lanka (early May);
- TPR meeting, decisions on workplan and budgetary revisions necessary (early May);
- Formulation of a phase II? Need? Who, when?
- Lessons learned from this project for UNDP/GEF (valuable for project formulation, implementation)
- In general, good work has been done that deserves a follow-up and international attention!!

18

Annex 4a: Budget revisions SRL/97/019.

SRI LANKA RENEWABLE ENERGY & ENERGY EFFICIENCY CAPACITY BUILDING
SRL/97/019

Budget Revisions

Denomination	Date signed	Type	**Brief description**	**Total Budget in US $**
B *)	05.06.1998	General	Reflects estimated budget for 1998 and for future years based on the workplans for the six project components approved by the Project Advisory Committee at the meeting held on 15 May 1998.	352,003
C	04.06.1999	Mandatory	Rephasing of unutilised funds to 1999 and future years. Total budget remains unchanged.	352,003
D	17.11.1999	General	This revision D reflects the estimated expenditure for 1999 and rephasing of the balance funds to future years.	352,003
E	12.06.2000	Mandatory	This revision E reflects actual expenditure for 1999 and rephasing of the balance funds to the year 2000.	352,003

*) no previous revision exist on record at UNIDO or UNDP Sri Lanka.

Annex 4b: Budget revisions SRL/97/019 (STS).

SRI LANKA RENEWABLE ENERGY & ENERGY EFFICIENCY CAPACITY BUILDING
SRL/97/019

Budget Revisions for UNIDO's STS (Support for Technical Services)

Denomination	Date signed	Type	**Brief description**	**Total Budget in US $**
A	01.12.1997	General	UNIDO agrees to provide technical services for preparation of work plans for implementation of the six project components and a consolidated work plan for the project and to prepare TORs for consultants and sub-contracts to be implemented by UNIDO.	15,100
B	14.08.1998	Mandatory	The revision reflects the actual 1997 expenditure and re-phasing of unutilized funds to 1998. The total budget remains unchanged.	15,100
C	30.07.1999	General	The revision reflects actual expenditure for 1998 and increase in the total budget by US$ 19,000 to include 2 work-months of technical backstopping in 1999.	34,100
D	18.12.2000	Mandatory	The revision D reflects actual expenditure for 1999 and increase in total budget by US$ 19,000 to include one work month/year of technical backstopping for 2000 and 2001.	53,100

Annex 4c: Budget revisions SRL/96/G32.

SRI LANKA RENEWABLE ENERGY & ENERGY EFFICIENCY CAPACITY BUILDING
SRL/96/G32

Budget Revisions

Denomination	Date signed	Type	**Brief description**	**Total Budget in US $**
B *)	5.6.1998	General	Prepared to reflect estimated budget for 1998 and future years based on workplans for six project components approved by Project Advisory Committee at meeting on 15 May 1998.	1,506,465
C	17.2.1999	General	Revision C reflects funds required to procure flow and wind measurement equipment under BLs 45.07 and 45.08 respectively as agreed at Project Steering Committee meeting on 12 February 1999. Total budget remains unchanged.	1,506,465
D	4.6.1999	Mandatory	Revision D reflects actual expenditure of 1998 and to rephase balance funds to future years.	1,506,465
E	17.11.99.	General	Revision E reflects estimated expenditure for 1999 and to rephase balance funds to future years.	1,506,464
F	12.6.2000	Mandatory	Revision F reflects actual expenditure for 1999 and to rephase balance funds to future years.	1,506,464
G	2.2.2001	General	General revision G: 1) reflects other country office costs according to September CDR 2000 and reflects adjustment under BL 13.01 and 17.01 for future years, 2) transfer funds from year 2000 to year 2001 for BL 16.01 (Evaluation)	1,506,464

*) no previous revision exists on record at UNIDO or UNDP Sri Lanka.

Annex 5: Matrix presenting recommendations and follow-up action.

Recommendation	Reference	Action	Actors responsible	Deadline
To ensure obtaining duly licensed software with maintenance support and, if available in Sri Lanka, technical support for the software acquired under this activity.		Contact the international wind and hydro energy consultants and raise the issue and initiate a process that results in acquiring a license and possible technical back-up.	CEB/PEU to be assisted by UNDP and UNIDO.	1 August 2001.
To assess the understanding of the hydro models by PEU.		To organise a training seminar under supervision of hydro international consultants.	CEB/PEU jointly with international hydro consultants.	End of July 2001, fully implemented.
Increase the quality level of the wind energy training and the level of understanding of course participants.		To organise a training seminar by international wind consultants at a level satisfactory to PEU.	CEB/PEU jointly with international wind consultants.	1 November 2001, fully implemented.
Prepare pre-investment packages for interested private sector in wind development.		Undertake a thorough data analysis, based on data collected and prepare pre-investment documents;	CEB/PEU jointly with international wind consultants.	1 March 2002.
Get private sector investors more prominently involved in improved direct biomass combustion.		Continue activities as they are planned for direct biomass combustion and prepare pre-investment level documents for investors from the three selected sectors.	NERDC.	1 October 2001.
Improve information availability and awareness on biomass fuel use.		Properly document activities and disseminate information through appropriate channels directly targeting potential investors in three selected sectors.	NERDC.	1 December 2001.
Initiate work on biomass gasification based on a turn-key gasification package.		To prepare detailed specifications of the gasfication turn-key package. To prepare a gasification programme.	NERDC assisted by UNIDO.	1 July 2001.
Commercialise biomass gasification activities		To undertake biomass gasification activities in a commercial environment to demonstrate technology and commercial attractiveness simultaneously.	NERDC, UNIDO and local manufacturing associations.	1 January 2002.
Design and implement the planned study tour.		Finalise the TOR for the study tour, including the selection of participants and the international assistance required. Implement the study tour.	ITDG, UNIDO. ITDG, international expert.	1 June 2001. 1 October 2001.

Design and implement local manufacturing of a 100 kW Pelton turbine activities.		Initiate activities of the international consultant that has been recruited for the design and local manufacturing activities of a 100 kW Pelton turbine;	ITDG, international expert.	1 February 2002, fully implemented.
Initiate activities on HVAC.		Finalise the contracting process of the international HVAC consultant.	SLEMA, UNIDO.	1 June 2001.
Actively explore possibilities for extending activities such as the provision of more equipment for energy audits, organising training seminars with a close industrial orientation and adding on energy efficiency modules to existing curricula at the Moratuwa University.		Design a concept paper of possible additional work and make suggestions for funding sources.	SLEMA, UNDP, PMU, PAC.	1 March 2002.
Refocus this activity towards a higher demand-orientation and reschedule and implement as soon as possible the remaining tasks.		Work out the details of a (revised) work plan for this activity	NERDC, UNIDO.	1 June 2001.
Initiate activities on PV and hydro testing procedures.		Finalise as soon as possible the contracting process of the international consultant on test procedures;	NERDC, UNIDO.	1 June 2001.
Improve communication amongst project stakeholders		To introduce a communication protocol, including a list server.	UNDP, UNIDO, PMU, PAC.	1 June 2001.
Organise an extra TPR late May 2001, to discuss the outcomes of the mid-term evaluation as outlined in this report, the work plan for the remaining project period and the timing of the project.		Prepare TPR and invite UNIDO project manager.	UNDP, PMU, PAC, UNIDO.	Late May 2001.
Coordinate hydro activities and their outputs.		Fine tune hydro activities 1, 4 and 6, including their outputs.	ITDG, CEB/PEU, NERDC, PMU, PAC, UNIDO and UNDP.	To be discussed during next TPR.
Initiate a national energy efficient programme.		Put on the agenda for the next TPR.	PAC, PMU, UNDP, UNIDP, SLEMA.	To be discussed during next TPR.