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PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT · PROGRAMA DE LAS NACIONES UNIDAS PARA EL MEDIO AMBIENTE
ПРОГРАММА ОРГАНИЗАЦИИ ОБЪЕДИНЕННЫХ НАЦИЙ ПО ОКРУЖАЮЩЕЙ СРЕДЕ
UNEP

Terminal Evaluation of the project 'Building Sustainable Commercial Dissemination Networks for Household PV Systems in Eastern Africa'

Project No: GF/4040-04-22

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Main abbreviations used in the report

AC - DC	Alternative or Direct Current
a-Si	amorphous silicon (module)
CBO	Community-based Organisation
DAR	Dar Es Saalam
DGEF	Division of GEF Coordination (of UNEP)
EOU	Evaluation & Oversight Unit
ER	Eritrea
ERT	Energy for Rural Transformation
ESDA	Energy for Sustainable Development, Africa
ESD-T	Energy for Sustainable Development, Tanzania
ET	Ethiopia
E+Co	Energy Through Enterprise
FFS	Fee-For-Services
GEF	Global Environment Facility
GTZ	German Technical Cooperation
KCL	Konserve Consult Ltd
KO	Kick-Off
M&E	Monitoring and Evaluation
MFI	Micro Finance Institution
MOU	Memorandum of Understanding
MPL	Megen Power Ltd
NGO	Non-Governmental Organisation
O&M	Operating and Maintenance
PID	Project Identification Document
PV	Photovoltaic (or Solar)
SACCO	**Sa**vings and **C**redit **Co**-operative
SHS	Solar Home Systems
TOR	Terms of Reference
TOT	Training of Trainers
TREDF	Triodos Renewable Energy Development Funds
TZ	Tanzania
UG	Uganda
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VAT	Value Added Tax
WB	World Bank
Wp	Watt Peak

Indicative Exchange Rates (31/12/06):

1 USD =	**1750**	**UGS**	or Uganda Shilling
	1300	**TAS**	or Tanzania Shilling
	9.1	**ETB**	or Ethiopian Birr
	15.7	**ERN**	or Eritrean Nakfa

1 Executive Summary

For the first time, UNEP has implemented a solar photovoltaic project which aimed to support the establishment of commercial dissemination networks in 4 Eastern African countries. The project budget has been used mainly to increase local awareness and to help actors of the supply chain to set up or strengthen their solar business in a sustainable way. The project implementation during 2005 and 2006 has been quite challenging due to some major delays, co-financing difficulties, and socio-political constraints. However, all planned activities have finally been implemented and several lessons have been drawn.

In Uganda & Tanzania, the national policy is clearly supporting the private sector development and the promotion of renewable energies. Therefore the establishment of a commercial route or supply chain for PV dissemination was facilitated and, after the project ended, many actors were in place and (more or less) involved. In this rather positive context, two new projects with similar commercial approach for PV dissemination came out as a replication effect based on lessons learnt from UNEP project. MFI and local cooperatives are slowly attracted by the solar business.

In Ethiopia, the political and economical context was less favourable to PV commercialisation as the whole financial sector and many companies are still regulated by the government. Consequently, the dissemination network between the capital and the project area is disadvantaged (only 2 dealers) and low sales volumes have been reached during the project period. The recent investment of E+Co in one PV supplier to develop his business is an encouraging impact of the project.

The case of Eritrea is separate as the political and economical context was extremely unfavourable to PV commercialisation, and thus to the project implementation. The Terminal Evaluation has confirmed that the project activities in Eritrea were clearly outside the scope of the project. There is no achievement in terms of establishing a dealers' network between the capital and a rural area. However the 'Fee-For-Services' dissemination model developed in Eritrea by the national consultant has shown interesting results; with reduced upfront barriers, the rate of PV system penetration in the villages is drastically increased and the PV business becomes more profitable and more sustainable.

The Terminal Evaluation has been conducted by an independent consultant between May 2007 and July 2007, a few months after the project ended. Project information and evidence have been collected from interviews of relevant stakeholders and from field inspection visits (except Eritrea). Such global evaluation according to fixed criteria becomes less relevant when the countries have such different political and socio-economical contexts. The general state of governance and development of each country has significantly affected the final overall rating of the project.

The UNEP-GEF project has been globally evaluated as **Moderately Satisfactory** according to the UNEP evaluation criteria. This overall evaluation, although affected by the unfavourable context in Eritrea, shows clear evidence of positive outcomes and impacts at the end of the project and reflects pretty well the 4 major shortcomings that have jeopardized the project: long gestation period, lack of co-financing (also linked to the long gestation period), weakness in management, poor monitoring and evaluation (M&E).

In conclusion, the UNEP-GEF project has demonstrated its capacity to establish a network of PV actors (suppliers, dealers, technicians, agents) between capitals and targeted districts and to create a "PV Aware Market" thanks to full support (market studies, capacity building, awareness-raising, co-financing, overall supervision and M&E). However, achieving a

sustainable and effective "PV Sales Market" was found much more difficult as PV sales will take off only if prices are significantly reduced or attractive credits are available. Therefore the mobilisation of microfinance institutions is an essential but arduous and drawn-out pre-requisite.

2 Introduction and Background

The UNEP project entitled "***Building Sustainable Commercial Dissemination Networks for Household PV Systems in Eastern Africa***" was initially designed to replicate the positive experience of commercial dissemination network developed in Kenya over the last decade between capital and high potential demand area and without institutional support (the model of the "dealer network").

This project aimed to establish a **sustainable supply chain** of solar photovoltaic systems in targeted districts from 4 countries in Eastern Africa (Tanzania, Uganda, Ethiopia, and Eritrea). This is the first UNEP project promoting solar photovoltaic (PV) and a commercial approach.

The **executing agency**, ESDA based in Nairobi, has implemented the project and coordinated the efforts at regional and national levels to develop effective and viable linkages between commercial and local stakeholders (private sector, institutions, and consumers).

The project activities have included awareness-raising and promotional campaigns, policy and financial workshops, trade fairs, study tours, technical and sales trainings, etc. and were implemented in each country by the **selected national consultants** (project partners).

The project was designed to be co-funded at 56% by GEF Trust Fund, 36% by Triodos Renewable Energy Development Funds (TREDF) and 7% by in-kind contributions from private companies.

The project officially started in October 2004 after the approval by UNEP and GEF and ended after 26 months in December 2006. The first field evaluation was carried out by ESDA and UNEP in June and in December 2006 while the present **Terminal Evaluation** was carried out between May and July 2007, a few months after the project ended.

3 Scope and Objectives

The Terminal Evaluation of the completed project mentioned above is required by the UNEP-DGEF (Implementing Agency) standard procedures to check whether the project objectives have been effectively achieved (degree of achievement), whether project activities have been properly conducted and the budget efficiently used as proposed in the initial project planning and, finally, to assess the project performance and impacts. Such evaluation and the lessons drawn are very instructive and decisive when considering a project extension or a new project design or another strategy. The Terms of References (TOR) of this Terminal Evaluation consultancy are given in annex B-9.1),

On the other hand, the Terminal Evaluation of a regional pilot project on solar system marketing is also of the utmost importance for the regional solar PV community. In fact, the commercial development approach to disseminate solar systems in rural areas versus conventional government-led approaches has been a long-lasting and challenging debate. Should solar PV technology be goods to be sold or should it be an energy service? So the outcomes of this project and the findings of the evaluation will give valuable information to the PV community as well as to policy-makers involved in rural electrification schemes, not only in Eastern Africa but in all Developing Countries placing hopes in solar energy technology.

The present report on the Terminal Evaluation provides the broad outline of the overall project assessment and final ratings, and the detailed assessment of project performances for each country is provided in the Annex A.

4 Methodology and Limitations

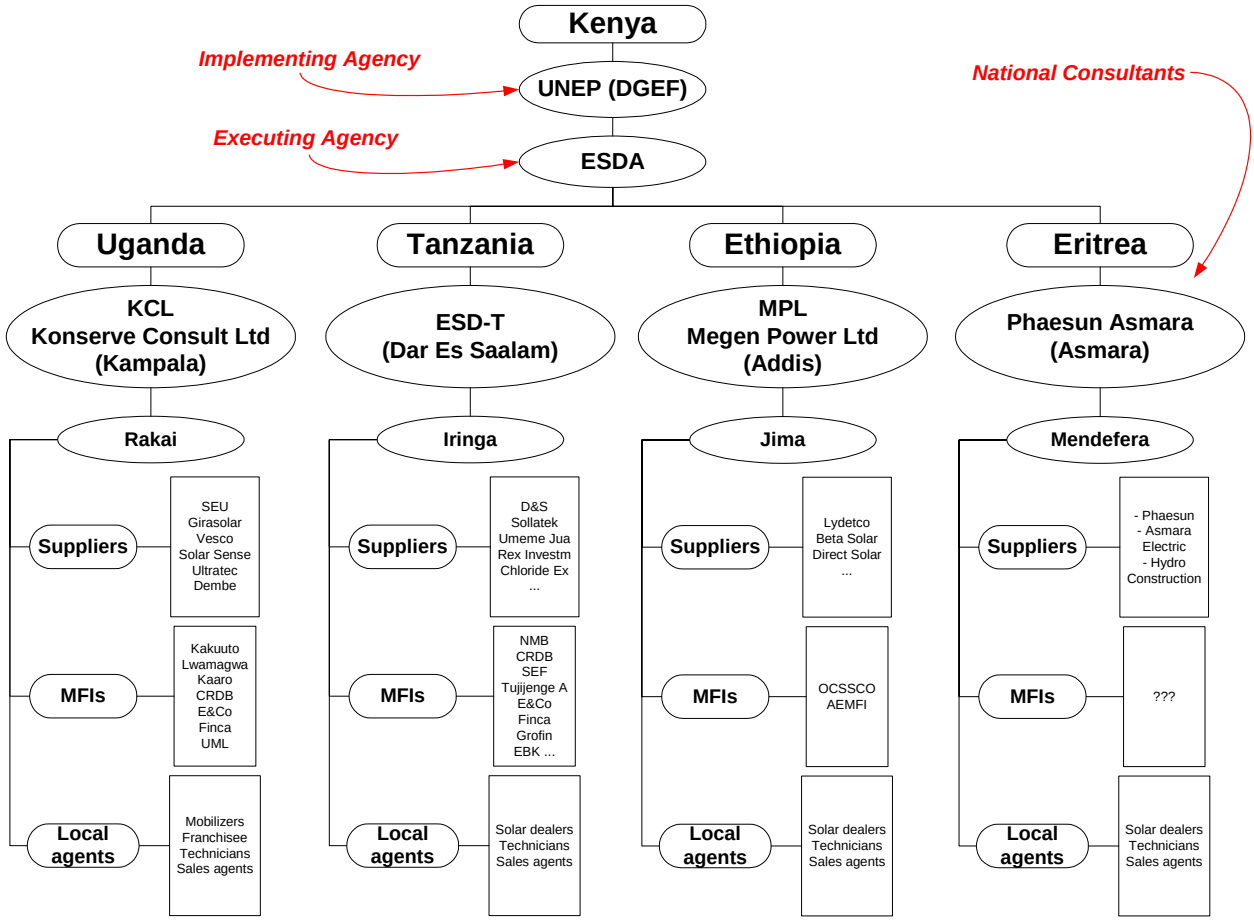
The methodology used by the evaluator has been similar to the proposed approach in the TOR giving priority to the interview of all key actors involved in the project and to the collection of clear and substantial evidence of project achievements.

Given the political situation in Eritrea, the TOR did not request the Evaluator to visit that specific country. However final evaluation has been completed by using email information exchange.

The activities of the Evaluator consisted of 3 major phases:

1. Preparation of the field mission
    - Desk review of project documents, reports, previous evaluations provided by UNEP. A list of all documents consulted is given in Annex B-9.3.
    - Preparing the *Interview Guidelines* or check-lists including the main issues to discuss with the different categories of stakeholders (cf. Annex B-9.4)
    - Preliminary contact by email and phone with UNEP Task Manager and national consultants for logistics and organisation of field trips in the 4 countries (Kenya, Tanzania, Uganda and Ethiopia)
2. Field missions in East Africa[1]
    - Briefing meeting with UNEP (EOU and DGEF) and ESDA
    - Interviews of relevant stakeholders from capitals to rural sites to collect key information. The list of interviewees is given in annex B 9.5 and the next figure summarise the different stakeholders in the project and in the supply chains.
    - Site visits and technical inspections of a sample of solar systems installed during the project
    - Debriefing with UNEP and ESDA to present main preliminary findings.
    - For most of the capital meetings and all the field trip the Evaluator has been accompanied by a representative of the national consultants: **Paul Amambia** (in Kenya), **Boniface Hanga** in Tanzania; **Bobby Namiti** in Uganda; **Hilawe Lakew** in Ethiopia.
3. Data analysis & Reporting
    - Collecting specific data by email questionnaire in the special case of Eritrea.
    - Analysing information and data collected per country
    - Complementary requests by email when necessary
    - Sorting evidence-based findings to evaluate project performances, outcomes, impacts and sustainability
    - Draft report to be submitted to UNEP (EOU and DGEF)
    - Final report integrating all comments received from UNEP.

[1] Due to the tight calendar of the evaluator, the evaluation mission in 4 countries (total 22 days) has been split in two parts; one early in May in Kenya, Ethiopia and Uganda and one end of June 2006 in Tanzania and Kenya.



The resources for the Terminal Evaluation were estimated in the TOR at **30 days**, including 8 days for desk work and 22 days for field mission, i.e. 4-5 weeks that could be spread over 13 weeks. The actual time consumed for the evaluation exceeded **50 days** of work and can be summarised as follow:

Step 1	about **4 days** of preparation
Step 2	**23 days** including 14 days for the first mission and 9 days for the second one (international travel time not included).
Step 3	**4 weeks** including more than 3 weeks for the per-country analysis and evaluation and 1 week for the overall final evaluation.

A Time Schedule of the Evaluation mission is provided in Annex B-9.2.

The significant overrunning of the time resource was necessary to do in-depth analysis and evaluation for each country, based on data and information collected. This evaluation report includes the detailed assessment of project performances in each country in a separate annex (Annex A) in order to share the lessons learnt with the solar PV community, as mentioned above.

During the field missions, 5 to 6 days only spent in each country was just enough to collect basic information but not enough to have a complete understanding and a correct, accurate perception of the whole project realities and national context specificities. The present Terminal Evaluation is based as much as possible on pieces of evidence found during the field mission but also on some estimates and assumptions as some information were found unavailable, inaccurate or unreliable.

It should be noted that the Terminal Evaluation mission was almost impeded by the lack of resources/allowances for the local consultants to join the mission and to assist the Evaluator. Thankfully, the 3 consultants (Tanzania, Uganda, and Ethiopia) have been exceptionally cooperative and did their best to make the evaluation mission successful. However, after the field mission had ended, the national consultants didn't contribute further (they didn't answer the Evaluator's additional questions sent by email to clarify specific issues).

In addition, the Terminal Evaluation has been affected by the lack of management and coordination at regional level, as well as by the lack of monitoring and reporting efforts at national level. It was cumbersome and time-consuming for the Evaluator to collect valuable data from different sources on real project outcomes and achievements. Data on baseline conditions, on outcomes, on monitoring were found rather poor and sometimes contradictory and unreliable. Only one national consultant (Uganda) has provided a final report (not requested by the project!) gathering major details of their activities and achievements during the project period.

Lastly, it is found that to carry out such global evaluation according to fixed criteria becomes less relevant when the countries have such different political and socio-economical contexts. Eritrea and to a certain extent Ethiopia have significantly affected the final overall rating of the project.

5 Project Performances and Impacts

5.1 Baseline Data

This substantive chapter on Project Performances and Impacts follows the structure proposed in the TOR to present the overall assessment of the UNEP project (findings and evidence of the evaluation) based on the given Evaluation Parameters (*Parameter A to Parameter F*).
The Annex A-8 presents a detailed analysis of the baseline conditions, the project achievements and performances, as well as the sustainability and catalytic role of the project for each of the 4 project countries. All findings and pieces of evidence presented briefly in this chapter shall be referred to in this key annex.
Another important source of information that will be referred to is the Annex C-10 summarizing all key technical, socio-economical, financial data on the UNEP project as well as maps of project areas and site location. Some of the tables (*Table A to Table J*) have been extracted and inserted in this chapter.
A large number of activities (listed below) were implemented under the UNEP project to achieve the main objective "*to stimulate increased rural sales of quality PV systems and components by increasing consumer awareness and by sharing experiences between commercial markets and projects in the region*".
UNEP Project Activities:

A: Management and Technical Support
- A 1: Set up project management team and office.
- A 2: To develop a project operational framework

B: Trade fair and project Kick-off meeting.
- B 1: Inaugurate and officially introduce regional PV project.
- B 2: International trade fair on Eastern Africa PV market potential.
- B 3: Discuss and share experiences of regional PV projects.
- B 4: Share information and introduce media

C: Market assessment in target districts
- C1: PV market assessment reports from pilot areas
- C2: Local market awareness presentations in target areas

D: Business Opportunities & Financing

E: Technicians and sales training
F: Country PV Trade fairs and Product awareness
G: Inter-country visits and information exchange
H: Regional PV awareness & demo campaigns
I: Policy Workshop
J: Finance Workshop
K: Monitoring & Evaluation

A time schedule of those implemented activities is given in the next Table A (Annex C-10.1.1).

Work Plan and Timetable		2004						2005												2006												2007					
Activities	Location	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Initial project duration					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
Project extension																										X	X	X	X	X	X						
Project approval and start-up					X	X	X	X	X	X	X																										
KO workshop + Trade Fair	Nairobi												X																								
Financial WS + Trade Fair	Dar es S																					X															
Policy WS + Trade Fair	Addis																								X												
Steering Committee meeting 1	Nairobi												X																								
Steering Committee meeting 2	Dar es S																					X															
Steering Committee meeting 3	Addis																								X												
Management meeting 1	Nairobi												X																								
Management meeting 2	Nairobi																	X																			
Microfinance trip (study tour)	Bangladesh																											X									
Trade fairs	(regional)												X									X			X												
Market Assessment	(national)													X	X	X																					
Technical TOT	Kenya																X																				
Sales TOT	Kenya																				X																
Awareness campaigns	(national)																	Tz	Tz			Ug															
Technical training	(national)																Ug	Tz	Er	Et																	
Sales Training	(national)																								Er	Tz		Et									
Start of PV sales	(national)															Er				Et																	
Monitoring & Evaluation																																					
Mid-Term Review (UNEP)	(regional)																								X												
Field Evaluation (ESDA/UNEP)	(national)																								X					X						
Terminal Evaluation (Ext.)	(regional)																																			X	X
Financial Audit (FY 2005)	(regional)																													X							
SolarNet Magazine												X				X			X		X		X					X									

The main baseline conditions of the project have been found in the market assessment studies prepared by each national consultant (Activity C). Key baseline numbers used to evaluate the performances with key indicators are provided in Table D (see below in § 5.2) and basic socio-economical data of the project are given in the next Table B.

Table B: Socio-Economic & Market Data

Socio-Economic & Market Data	Tanzania	Uganda	Ethiopia	Eritrea
Selected districts	Iringa	Rakai	Jima	Mendefera
Distance from capital to district (km)	500	600	500	70
Project area (approx. diameter in km)	400	80	150	?
Total no. of households	160,182	300	561,218	52,527
Access to Electricity (in% of popul.)	0,06	0,1	0,08	0,26
Monthly income range (US$/hh)	50 to 900	120 to 800	80	35 to 85
Estimated installed capacity (kWp per country)	104	62[1]	1400	585
Estimated installed capacity in project district (kWp)	N/A	N/A	N/A	N/A
Potential outlets for stocking solar PV	30 Electronic shops	N/A	11 electronic shops	30 Electronic shops
Willingness to pay by Cash / Credit	34.2% / 65.8%	20% / 40%[2]	46.5% / 53.5%	10% / 90%
Installed PV system price (US$/Wp)	15	12	20	29
Battery charging shops	19	43	5	5
Cost of re-charging (US$/battery)	1.2	0.8	0.6	2

Projected demand (kWp per country?	2400	900	1400	34.8
National kWh price (US$/kWh)	0,023	N/A	0,051	N/A

5.2 Attainment of Objectives (Parameter A)

The project performances in the concerned countries are rather non-uniform and this section proposes to analyse the attainment level of the specific objectives of the project during the 2-years period.

5.2.1 Project Achievements and Shortcomings

	SPECIFIC OBJECTIVES	ACHIEVEMENT & SHORTCOMINGS
O-1.	Select, prepare and make investments in 5-10 PV companies with the $400,000 from Triodos Renewable Energy for Development Fund finance. This target investment of $400,000 is meant for the region as a whole	This crucial objective to co-invest in local PV companies has reached a low level of achievement. The main reason is the long project gestation and the resulting **withdrawal of TREDF** by the time of approval (Table A[2]). National consultants and/or local private companies have put efforts in varying degrees to find financial **alternatives** with local or international institutions. The project duration (2 years) was found too short to actually move from "interest" toward practical achievements in terms of financing. Only few initiatives (E+Co and some SACCOs) came off providing credit to 2 PV suppliers (in Uganda and Ethiopia) and to some customers (in Uganda). It is expected that some others might come off soon. The initial target of **750 PV systems** to be sold in the 4 countries was not very ambitious so it could be easily reached despite the lack of direct co-financing. The targeted regions were large and rich enough to allow cash sales to customers. Only Ethiopia who promoted credit sales has reached a low level of sales because limited credit was available (as summarised in Table E below). The achieved sales have been considered within the time frame of project execution but that the 'dealership machinery' is in place for continued sales and the 'dealership networks' set the stage for continued marketing of solar for residential use in the project regions and in other regions of the respective countries. The **lack of capital** of all local PV suppliers/dealers remains a major barrier for the future. The total leverage, including the customer contributions has been estimated to **US$ 365,163**; the difference being mainly due to low contributions from Eritrea.
O-2.	Build linkages between East African country PV sector stakeholders, including companies, dealers, NGOs, rural energy projects and international companies	The **regional linkage** could be considered satisfactory as many regional activities (3 workshops, 3 trade fairs, 1 study tour, project meetings) have been organised with significant participation from different sectors (see Table C below). Except for Eritrea (only 1 participant to only 1 workshop), the other 3 countries have benefited from information exchange, experience sharing, discussions on PV commercialisation, financing and policies. The project has not been able to induce major **effective changes** in national policies (still high tax & duty in Ethiopia, standards not yet harmonised and enforced ...) but more and more decision-makers have been sensitised and have expressed their willingness to go ahead. However the national consultants regret the absence of a final (steering committee) meeting to share one another's findings.

[2] *(*) All Tables from A to G mentioned in the text are provided in Annex C-10.1*

O-3.	Increase involvement of international PV companies in the region by building awareness of potential markets, linking them with local players	**International awareness** on potential PV market and businesses in the 4 countries has been raised during the 3 workshops and trade fairs as several international companies participated (Singapore, India, Sri Lanka, Germany). However there is no indication of real benefits at international or local level as no new agreements have been reached between those international suppliers and national actors attributable to the UNEP project. Another reason seems that given the constraints on the solar PV international market (scarcity of PV modules), most national suppliers prefer to keep their **independence for procurement**. Some exceptions have been identified as the commitment of Free Energy Europ in TZ and the partnership between Ultratec, Shell Solar and Shell Foundation in UG to develop a Franchise model.
O-4.	In each country, assist to develop market linkages between the major commercial center (Addis, Asmara, Dar, and Kampala) and a selected rural district. In each district, to increase awareness of PV among consumers, suppliers, sales agents and technicians	The **national linkage** to establish a commercial route for PV products was the **core activity** of the project and can be considered as rather successful in 3 countries (TZ+UG+ET). The good-value **market assessments** have confirmed the large potential of the selected districts. The 3 national consultants have actively supported national suppliers and local dealers to develop their business through **awareness and promotional activities** on PV technology and services (poorly reported by consultants). Most of the target indicators (numbers of suppliers, dealers, technicians, sales agents) have been reached for those 3 countries (cf. Table D). But the challenging mobilisation of the **microfinance institutions** has been limited in particular in Ethiopia and Tanzania where interest and/or confidence were lacking. In Tanzania, the very large size of the project area hindered the development of the PV actors' network yet some local dealers are very active despite their lack of capital. In Uganda, the project has led to sustained negotiations between a proactive private sector and several financial institutions. In Ethiopia, the local PV market has not developed much as there were few dealers, one of them being quite active and on the point of taking the monopoly. In Eritrea the effective achievements (increase of sales through Fee-For-Services) were outside the scope of the project as only one company was involved in the whole project and in the delivery chain. Furthermore the selected district was close to the capital and therefore local agents with stock were not cost-effective and awareness-raising was not that necessary.
O-5.	Promote selection, procurement and installation of quality systems and system components and increase awareness on product quality for systems and individual system components	The national consultants have, in varying degrees, promoted **quality** for PV components, systems and installations through 2 main activities: (i) training and awareness (see next objective O-6), and (ii) effective sales & field installations. Confirmed by the 2 field evaluations (ESDA/UNEP and Terminal), it seems that the project has not adequately **guided the private sector** to design and install the PV systems. As could be expected from a commercial approach, each company/dealer has focused on sales volume and project schedule rather than on quality issues. The intermediate field evaluation (by ESDA and UNEP) has denounced the generally **unsatisfactory status** of many PV installations (especially in Ethiopia and Uganda) due to a lack of standards, workmanship and follow-up from national consultants and from dealers. The background and contractual link of **hired technicians** had a direct impact on the final quality; qualified rural electricians (as in TZ) have given the best results, at least for in-house wiring. The **common shortcomings** were: mismatch of components, poor installation of PV modules, battery, in-house wiring and poor electrical connections. Generally the PV components were of acceptable quality (except for few controllers and batteries). The national consultants have requested the main dealers to **correct** their previous installations and to re-train their technicians to minimum requirement levels. The Terminal Evaluation has confirmed the serious shortcomings in the field and has noticed that globally few corrections were properly done, in particular in Uganda.

O-6.	To develop local capacity to sell, install and service PV systems	According to the UNEP project design, 2 **trainings of trainers** (TOT) were conducted by the project for at least 2 technical trainers and 2 sales trainers in each country (cf. Table C below). The trainers were then supposed to be involved in the national trainings of rural trainees, but some of them have never participated nor passed down their knowledge. In TZ for example, the effective trainers in the district had not been trained by the project! The national **technical trainings** provided rather good quality training to local technicians / electricians (most of them freelance). So the low quality of installations achieved in the field seems to come partly from the absence of minimum requirements and partly from the lack of practical work after the training. Actually, many technicians have suffered from a lack of practice during training, the very small number of installations, the absence of supervision/advice from dealers, and in some case the long period between the training and the first sales, etc. Specific training on after-sales services does not seem to have been addressed. The national **sales trainings** were conducted during the last project semester, often during or after the effective sales period, limiting the impact on the project sales. The selection of trainees was different according to the country but it was commonly found rather difficult to find the proactive profile that could have marketing and commercial skills as well as real interest in developing business in less-attractive remote rural households. The Terminal Evaluation points out that globally the training activity has been carried out but with a rather low performance level except in Tanzania that has clearly benefited from the local availability of well-trained electricians. In any case, the durations of the training sessions were certainly too short and regular follow-up was missing.

Table C: National participations

Event	Place	Date	Tanzania	Uganda	Ethiopia	Eritrea	Total
KO workshop + Trade Fair	Nairobi	June 05	7	13	5	1	**26**
Financial WS + Trade Fair	Dar es S	Mar. 06	46	6	5	0	**57**
Policy WS + Trade Fair	Addis	June 06	6	8	?	0	**14**
Microfinance trip (study tour)	Bangladesh	Sept. 06	3	1	2	0	**6**
SC meeting 1	Nairobi	June 05	0	2	0	0	**2**
SC meeting 2	Dar es S	Mar. 06	1	2	1	0	**4**
SC meeting 3	Addis	June 06	1	2	1	0	**4**
Management meeting 1	Nairobi	June 05	2	1	1	1	**5**
Management meeting 2	Nairobi	Nov. 05	1	1	1	1	**4**
Technical TOT	Kenya	Oct. 05	2	2	2	1	**7**
Sales TOT	Kenya	Feb. 06	3	3	2	2	**10**
			72	**41**	**20**	**6**	

Table D: Performance indicators

Baseline --> Achievement

Dealers' network	Target	Tanzania	Uganda	Ethiopia	Eritrea	Total
Capital-based suppliers (--> district)	**6 - 8 - 6 - 5**	2 --> 5	5 --> 8	3 --> 5	1 --> 1	**19**
District-based dealers	**2**	3 --> 7	2 --> 5	1 --> 2	0	**29**
trained technicians	**10**	16	9	0 --> 9	5	**39**
trained sales agents	**5**	5	6	0 --> 9	5	**25**
Total sales	**200**	480	386	56	258	**1180**

Other Performance Indicators	Target	Tanzania	Uganda	Ethiopia	Eritrea	Total
Awareness campaign		***	***	*	–	
Number of internat. traders involved		n.a.	n.a.	n.a.	n.a.	
Number of interested MFIs & NGOs		Low	High	Medium	None	
Increase access to commercial financing		NMB expected	E+Co, Saccos	**E+Co**	None	
Loan value to dealers (US$)	**0-50,000$**	$0	$0	$116.000	$0	**$116.000**
National Taxes and Duties		full exemption	partial exemption	no exemp. + surtax	partial exemption	
Projection of sales 5 yrs	**3000**	5000	6000	5000	1000	**17000**
Carbon emission reduction (ton/yr)	**300**	80	36	12	28	**156**
Further influenced PV projects		SIDA-MEM	GTZ-ETC	*WB/GEF/ EREDPC/EAP*	-	

Table E: Project achievements

UNEP project	Target	Tanzania	Uganda	Ethiopia	Eritrea	Total
Estim. Nb. of systems sold	**750**	480	386	56	258	**1180**
Average Wp per system		30	15	35	23	
Estim. kWp installed		14	5,8	2	5,8	**27,6**
Project price ($/Wp inst.)		**$14,0**	**$15,0**	**$19,0**	**$17,0**	
Market prices ($/Wp)		$15-20	$13-20	$13-20	$20-40	
Estim. Leverage	**$400.000**	$113.842	$91.700	$140.721	$18.900	**$365.163**
Estim. Tons CO_2/year		84	34,8	12	34,8	**165,6**

5.2.2 Effectiveness

When compared to key performance indicators provided in the PID document, some specific objectives of the project, as mentioned in § 5.2.1, have been effectively achieved as O-2 (regional linkage), O-4 (national network) while other achievements as O-1 (co-financing), O-3 (international involvement), O-5 (quality awareness) , O-6 (capacity building) have reached a less satisfactory level. The effectiveness of the project implementation has been affected by the variable local contexts; the political and economical context in Tanzania and Uganda was certainly more favourable for such commercial project than less liberal countries such as Ethiopia and Eritrea.
The assessment rate for the Effectiveness sub-criterion is **Moderately Satisfactory** mainly due to the poor achievement in terms of co-financing to facilitate sustainable PV commercialisation through local dealers.

5.2.3 Relevance

It is quite clear that the UNEP project aimed at *stimulating rural sales of quality PV systems and components* and was designed to be in-line with the national policy and government strategies. The proposal was submitted for approval before implementation. National policies in Tanzania and Uganda really promote renewable energies including PV and support the private sector for rural development. In Ethiopia and Eritrea, the political and financial contexts are different and the local policies don't appear to give the same priority to renewable energies, although some programmes as rural electrification are ongoing. The relevance of the project in Eritrea was certainly the most questionable as the political situation and the fiscal constraints impede any private sector development. The outcomes were however rather positive given those structural barriers that could not be removed within the short project period.
Therefore the assessment rating for the Relevance sub-criterion is **Satisfactory**.

5.2.4 Efficiency

The cost-effectiveness of the project proved rather good once the project actually started in May 2005 with the 'Kick-off' meeting. However, considerable time had been lost between the official starting date in October 2004 and the 'Kick-Off' meeting in June 05.
The market assessment activity took 2-3 months at the beginning but allowed each national consultant to prepare the next activities (capacity building, awareness, workshops and meetings). Consequently, the remaining time for network development, awareness raising, PV sales and installations was reduced to less than 12 months.
The financial resources proposed in the budget for the different activities seem to be adequate in regard to the project activities, except that a very small budget was planned for the M&E activity at regional and national level (only $7,000 in Miscellaneous!? – cf. 5.7.4).
All activities were finally conducted before the project end, which was extended by 6 months (December 2006), except the M&E activity that was very poorly addressed by the Executing Agency ESDA (cf. § 5.6).
Therefore the assessment rating for the Efficiency sub-criterion is **Satisfactory**.

5.3 Assessment of Sustainability (Parameter B)

This chapter aims to identify if the project outcomes and benefits will effectively sustain or enhance over time after the project ends. More details on sustainability are given for each country in Annex A. The major factor, by far, that jeopardizes the project's sustainability is

the availability of financial resources. Other factors such as the socio-political context, institutional framework, governance and ecological concerns have also been assessed

5.3.1 Financial Resources

From the in-depth evaluation in the 4 countries (Annex A), it appears that the 2-year project duration allowed for; the creation of business awareness, promotion of marketing and the development of confidence among stakeholders and to some extent to establish a commercial network with rural areas, but the project duration was too short by far to establish a sustainable delivery route in the target rural areas that can survive after project end. Indeed, the PV commercial markets created in those areas are not mature enough (still hesitating or reluctant actors, lack of stock and capital, high cost of solar PV equipment, not enough public awareness, etc.) to be sustainable and the co-financing mechanisms have not been efficiently implemented.

Financial resources are definitely needed to cover some long-term activities that cannot be supported by local private sector or by the customers:

- continuous support and supervision of key field actors, especially MFI
- continuous awareness and market support
- strengthening technical and sales trainings
- appropriate financing mechanisms for PV firms (capital) and for customers (credit or smart subsidies)
- quality control of PV components, systems and installations
- M&E

Without those activities, PV suppliers, dealers, technicians will suffer from the non-cost-effective business models related to the small number of widely scattered customers, and risk, sooner or later, coming back to their core activities (hardware, general electricity, repairing, charging stations, automotive spare parts …). The solar business usually makes up less than 30% of their activity allowing them to survive these solar business hazards.

The absence of co-financing from the initial sources (TREDF and University of Hawaii as mentioned in TOR for Evaluation) is seen by the Evaluator as rather positive as it has encouraged the UNEP project implementer(s) to develop more sustainable alternatives where local co-investors (MFIs, SACCOs) will involve in the long-term, as opposed to the "one-shot loan" from Triodos.

Uganda and Tanzania have ongoing similar projects (cf. § 5.4) that luckily address those issues in several districts including the project area. In those cases, the short or medium term sustainability is ensured as the PV business development will be supported thanks to other project financing (mainly from GTZ funds). Governments and MFIs are actively involved to take over the financing issues in the long term.

The Fee-For-Services approach promoted in Eritrea during the project has helped to gather many nearby customers (low fees during 10 years = high penetration rate) and make the PV business more profitable and more sustainable (if quality is ensured). But the monopolistic situation of the main PV company in place doesn't reflect that commercial reality.

The assessment rating for the Financial sub-criterion is **Moderately Unlikely**, mainly due to low achievement of alternative co-financing during the project and risks to alter medium or long term benefits.

5.3.2 Socio-Political Factor

The socio-political situation differs from country to country and might be a factor of risk in the long term sustainability in particular in Eritrea and Ethiopia.

Eritrea is in a particular situation of conflict with its neighbour Ethiopia and the context has even deteriorated since the UNEP project formulation. The government has strongly regulated

its fiscal policy to channel most of the foreign exchange to the defence of the country. Therefore the overall economy is stagnant and there is no chance that the PV sector can develop as no solar components can be imported.
In Ethiopia, the sustainability is also critical as there is no visible source of financing. The Government is controlling the financing sector (including local MFIs) and is not giving any priority to support the PV private and financial sectors. They are presently committed to large infrastructure and poverty reduction programmes, including rural electrification but with low interest in solar.
On the other hand, Uganda has a real national policy to promote the private sector (Private-Public Partnership) and is very active to support solar PV.
The assessment rating for the Socio-Political sub-criterion is **Moderately Likely**.

5.3.3 Institutional Framework and Governance Factor

The UNEP project has been intentionally designed to have as little interaction as possible with the government to establish a pure commercial network for PV systems and there was no plan to involve them in the medium or long term.
On the other hand, in contrast to this, it was expected that the UNEP project could stimulate through workshops relevant government representatives to modify / adapt the national policies to alleviate specific barriers to PV commercialisation. Therefore key institutions as the national Bureau of Standards and the national Rural Electrification Agencies have been invited to participate to the regional workshops with a view to harmonise and enhance national strategies that may help to promote PV technology.
However, most of the government participants were not high-ranking officials or decision-makers (Eritrea didn't even send any representative). There were discussions and experience-sharing on key issues such as import-tax regimes, PV standards and codes of practices, and synergy with rural electrification programmes and it was recognised that those issues should be properly and rapidly dealt with to ensure the sustainability of project outputs and of PV commercialisation. More advanced countries in PV standardisation and quality control (Uganda) or in import tax exemption (Tanzania) have provided worthwhile guidance to less-advanced countries such as Ethiopia.
But in practice, there were no real breakthroughs, no effective achievements and no major impact on those specific institutional frameworks during the project. Tanzania had already exempted some solar products from tax and duties before the project started and extended the exemption to all products in 2006. Exemption was and remained partial in Uganda and Eritrea while solar components were still highly taxed in Ethiopia (10% surtax was even added during the project!).
The reasons may be multiple: poor confidence climate between UNEP project implementer(s) and local government officials, "last minute" official invitations from ESDA, no relevant representatives to participate, long drawn-out processes to implement new standards or new tax regulations, lack of relevance to national priorities (Ethiopia), etc.
Therefore the assessment rating for the Institutional Framework sub-criterion is **Moderately Likely**.

5.3.4 Environmental Factor

The environmental benefits from the sales of solar systems are unquestionable; however the battery disposal is an important issue that has not been taken into account in the UNEP project. The risk of pollution and sickness by lead contamination is not negligible and may become a serious problem should the volume of sales increase. A simple collection measure of used batteries can be taken by dealers to avoid undermining the environmental benefits of the project.

However, the assessment rating for the Ecological sub-criterion is **Likely.**

5.4 Catalytic Role (Parameter C)

The UNEP project was a pilot initiative to promote commercial sales of PV systems in emerging countries based on the more advanced Kenyan experience. The lessons learnt both during the UNEP project design and implementation were expected to have a catalytic role and to increase the likelihood of the sustainable outcomes.

In Tanzania and Uganda, the UNEP project has effectively been replicated through 2 other larger projects focusing on similar marketing strategies; both being implemented by the same coordinator as for UNEP project and heavily supported by GTZ and governments.

In Tanzania, the so-called SIDA-MEM project is ongoing for 5 years in the whole country (including the UNEP project area) and has been designed on the basis of lessons and experiences drawn from the UNEP project.

In Uganda, the EAP/RERE project, also called GTZ-ETC project, has already started and will be implemented for 5 years in 4 districts, and the pilot phase is focusing on the UNEP district first. This project takes advantage of the network of PV dealers and basic infrastructures established under the UNEP and the experience gained by the coordinator during the UNEP GEF project.

The **lessons learnt** during the UNEP project and capitalised in the new projects are roughly the same for both projects:

- need to involve government institutions
- need to support actively MFIs and to develop adapted solar loan products
- more time for follow-up, monitoring and evaluation
- more attention to select good dealers, technicians and trainers
- need to control better quality and enforce national standards (or at least min. requirements)
- additional training and awareness activities (continuous programme)

In Ethiopia, there is no such replication going on but the lessons learnt might be used by one of the government institutions (REES) negotiating a large solar PV programme (50,000 systems) with the WB.

In Eritrea, there is obviously no likelihood for scale-up or replication of the UNEP project.

The Evaluator has not been able to clarify whether this catalytic effect is actually due to a real dynamic generated by the UNEP project (i.e. would the established commercial PV network and existing infrastructures need some more assistance/support to become sustainable?) or if it is a rather common attitude to extend project and consultancy activities via other financing sources.

No rating is required for this criterion.

5.5 Achievement of Outputs and Activities (Parameter D)

Output	Listed Delivered Output	Associated activity[3]	Achievement and Assessment
1	**Set up of Overall Project Management and Coordination**	A + K	ESDA as main Executing Agency has established national consultants in every country and has setup realistic project Work Plan ESDA has issued various reports (monthly and biannual progress reports, financial reports, terminal report) reflecting the

[3] The list of Activities from A to K are listed in § 5.1 as provided in the PID Document (Version 8).

			achievements and difficulties in each country. It seems that those reports have not been disseminated, e.g. to government representatives. None have been provided to the Evaluator. 5 project meetings were organised (3 steering committee and 2 management) by ESDA and were worthwhile to have overall supervision of the project. Unfortunately, the last meeting planned at the project end never took place due to lack of funding. ESDA didn't set up an effective M&E system to follow the project achievements so there has been no management of evaluation.
2	**Solar PV Trade Fairs Held**	B + F	3 trade fairs were organised in combination with the 3 international Workshops to present PV products from the region to national suppliers/dealers There is no specific report on those trade fairs but it seems that only 4 international PV firms (outside the region) and some more from the region (Uganda, Kenya, Ethiopia, Tanzania) have attended Some suppliers were expecting more international firms with PV products in order to secure better their importation of PV components (better prices and delivery) National PV firms didn't set up any commercial agreement with the international suppliers.
3	**Delivery of Market Survey of Target Regions for Private Sector**	C	Detailed reports on market surveys with valuable information (cf. Table B) have been produced by each national consultant and shared through Solarnet[4] magazines & project website with other stakeholders interested in building PV businesses in the target regions. SolarNet has issued 6 magazines (instead of the 8 planned) dealing with the project progress and market potential that were distributed to all suppliers/dealers involved in the project as well as other key regional stakeholders. The surveys came rather late in the project and contain the baseline conditions for the project. National consultants of UG and TZ have provided quite detailed reports on their promotional campaigns and marketing tools (road show, village visit, theatre show, media campaign, banners, brochures, as well as consultative meetings). Campaigns in UG have targeted wide range of stakeholders (dealers, technicians, CBOs, NGOs, MFIs, SACCOs) but there is no clear evidence that local sales of PV systems have significantly increased afterward. UNEP as well as ERT experiences in Uganda have shown that actual involvement of actors after awareness and training still requires supportive efforts. The Ethiopian consultant has not issued any report on their awareness and promotional activities. They have produced video, leaflets, posters and planned "business seminars" to present the findings of the market survey. It is not clear what has actually taken place in the field. Lack of baseline data on the PV actors active in target districts before the project started.
4	**Raise of Business Opportunity Awareness, Assistance and Investments**	D	Significant increase of PV suppliers and dealers active in the selected area, close to target value, except for Eritrea (cf. figures in Table D above). Most are enthusiastic about solar PV as it is a very attractive and innovative technology for the households but they complain about small sales and profits.

[4] SolarNet has been the partner of ESDA (contract based) to disseminate information regarding the project activities through 8 Supplements of 8 pages each.

			However, there was a major problem of capital to purchase quality PV equipment at good prices due to the pull-out of TREDF and the lack of time to find effective alternatives. Emergence of some MFI institutions (e.g. E+Co, Grofin, NMB, EBK and national SACCOs) promising financing initiatives as lending mechanism to users and/or capital borrowing for companies. Dozens of national PV firms participated to regional workshops and inter-country visits (Kenya + Bangladesh) More than **1180 systems** were sold during the project implementation (the sales period actually covered about 12 months – cf. Tables A and E) through purely commercial transactions starting with international suppliers. Some follow-up surveys to assess regular development of PV businesses were planned in the PID but there is no indication that this M&E activity took place.
5	**Build of technical and sales capacity at national and target region level**	E + G	2 Trainings of Trainers (TOT) have been organised by ESDA on technical and sales issues but no report has been mentioned or made available to the Evaluator. National technical training (5 days) and sales training (2 days) were provided to rural candidates from varied backgrounds (freelance technicians, dealers, shop keepers …) PV technical skills have definitely risen in the region. Significant increase of technicians and agents (cf. Table D), close to target objectives, except for Eritrea. In Uganda, the technical training has been jointly conducted with the national PV training from ERT project (BUDS-ERT). However, the quality of the PV system design and installations remained below the minimum requirements mainly due to the lack of field practice for the freshly trained technicians and the absence of supervision. Moreover, the marketing skills of trained agents were also limited mainly due to the inappropriate profile of candidates and a too short training session (2 days only)
6	**Awareness of End-User and promotional campaigns**	H	The market survey has underlined the low awareness level in the 4 target districts and provided the baseline needs. Each country has adapted the campaigns according to the identified needs. TZ has provided an intensive awareness campaign (> 1 month with meetings, village solar fairs, radio adverts) targeting both potential consumers and dealers of the district and giving priority to road shows in villages. The report doesn't mention the number of villages or households involved in the campaign but the impact seems to be low as it was conducted during a low-income season. UG has prepared general brochures for customers on solar systems and more specific on solar loans jointly with some local MFIs. Those brochures are made available at dealers' shops and local MFIs. The national consultant has provided adapted tools for local actors to do the awareness by themselves as they did not organise any major village show or public awareness campaign. The micro-financing experience in UG is really interesting as some local cooperatives (SACCOs) joined efforts with the national consultant to develop specific solar loans for customers. The initial loan conditions (3-4%/month – 6 month repayment – high collateral) were still too restrictive to target large segments of the population. New loan products and more MFIs are expected to come onto the market soon. Consequently, TZ & UG have reached high sales record during the project (respectively 480 and 386 systems sold, i.e. 73% of sales)

			The Ethiopian consultant has not provided any report on their promotional activities. From the interviews it appears that solar theatre shows have been partly done in 8 villages (out of 15), promotional posters and brochures distributed in dealers' shops. One business awareness seminar was planned but not properly organised (low turnout). In Eritrea, the public awareness campaign was considered not relevant as raising the demand for solar will put more pressure on the supply which is rather blocked by the political and fiscal context. Therefore the national consultant has submitted an alternative proposal to replace that activity. But the proposal was not implemented as the project slowly fades out given the political and economical situation.
7	**Awareness of Policy makers about PV for RE**	I	Rather good participation from TZ, UG, ET to the Policy workshop held in Ethiopia (excluding the possibility of Eritrea to participate) but a low profile of Government representatives. Production of workshop proceedings and dissemination to relevant stakeholders No actual changes in national policies can be ascribed to the UNEP project but committed discussions occurred on PV standard harmonisation and exemption of tax & duties. Everybody agrees on the need to reform some fiscal or policy barriers (especially in ET & ER) but the government priorities are sometimes different. Policy-makers and other participants have shared experiences on commercial versus government-led projects and the role of PV in rural electrification programme, etc.
8	**Awareness of Finance stakeholders about PV market**	J	A Financial workshop was held in TZ with many national participants including local banks and MFIs as NMB, NBC, CRDB and Tunakopesha but no SACCO. Moderate participation of ET and UG, and no attendance of ER, probably due to administrative constraints for travelling and attending the workshop. Production of workshop proceedings and dissemination to relevant stakeholders Wide range of discussions around financing barriers and remedies for PV business (solar loan, subsidies, capital credit for dealers, etc.) and different dissemination models (cash sales, credit, fee-for-services). The grant incentive based on performances offered by BUDS-ERT to local PV companies in Uganda ($ 2.5 rebate on each Wp sold) has aroused keen interest as it also allow control of PV component quality and service performances. Growing interest from larger MFIs and from local SACCOs to finance PV businesses and/or customers. For example local SACCOs are expecting to increase their members with new products as solar loan.

The overall rating for the Outputs Achievements sub-criterion is **Moderately Satisfactory**.

5.6 Assessment of M&E Systems (Parameter E)

5.6.1 M&E Design

The Monitoring & Evaluation (M&E) component is essential and challenging in such regional project where the stakeholders are numerous and scattered in remote areas, and involved in many activities. Current M&E requirements are fairly recent in UNEP projects (mid 2005). However, according the Project Identification Document (PID), the UNEP project was already properly designed to take into account this substantial activity as an **integral part** of the project (Activity K). This activity is carefully described and structured with clear work plan, key performance indicators of outcomes, list of "deliverables" and responsibility sharing

between partners (UNEP task manager, ESDA management team and Steering committee). The M&E deliverables, basically regular reporting on activities and Steering Committee meetings, were to be used to validate disbursements based on minimum outputs achieved.

The major delay in the project execution had a significant impact on the project design and the M&E activities and financing described in the early PID were not revised to fit with the actual project implementation and requirements.

In the PID, 3 categories of **M&E indicators** are proposed: (i) reporting, (ii) amount of co-financing and (iii) number of actors and volume of sales. The last category of indicators is not fully relevant to the project approach and has demonstrated its limitations and weaknesses. The important outcomes are not the achievement in terms of "numbers" but rather the "quality" of what has been implemented as well as the real involvement and commitment of dealers or MFIs, the actual skills of technicians, the numbers of systems properly installed, etc. In most of the countries for example, a high number of technicians have been trained by the project and this number has been reported but there is no follow-up indicator to check if those trainees are skilled enough and if they are effectively active in the solar business.

In addition, as the **awareness and promotional campaigns** were a major activity within the project, there should have been a specific indicator to assess the specific progress and achievements (e.g. number of inquiries at dealer shops). Only Tanzania did an internal evaluation of its business promotion and awareness campaign, but no feedback has been shared with the project. The purpose of this evaluation was probably to prepare the replicated project.

At an early stage of project implementation, ESDA produced a general **work plan** of project activities containing a rather poor section on the different M&E activities to be implemented over the 2-year project. Those planned activities included:

- a review of reports by Steering Committee,
- training evaluation (TOT + local),
- monitoring of Sri Lanka trip,
- PV sales evaluation,
- terminal evaluation and report.

Regular visits to project sites by ESDA as required in the PID are missing in the general work plan. A more detailed schedule of M&E activities would have been useful to follow carefully the performance indicators and the project progress.

The **role and responsibilities** are given for the 3 "upper" actors of the project (UNEP, Steering Committee and ESDA) but nothing was provided for the national consultants that were actually in charge of the field work and part of the supervision (PV sales, network development and local co-financing).

The UNEP project has not considered any **long-term monitoring plan**, either in the PID document or in the ESDA terminal report. The project seems to have ended without any concern from the ESDA coordinator about what will happen after. In Uganda for example, the government has shown interest in taking part in the M&E activity in the medium- and long-term, as well as coordinating national public awareness campaigns. But financing long-term M&E activities remains the 'sinews of war'.

The assessment rating for the M&E Design sub-criterion is **Satisfactory**.

5.6.2 M&E Plan Implementation

The implementation of the M&E plan should not have presented major difficulties to ESDA, provided that enough budget was available (cf. § 5.6.3). The most challenging part was to

organise the field activities and to supervise regularly the work of the national consultants (training, awareness, support to rural stakeholders, installations).

Compared to its initial work plan, ESDA has rather poorly managed **to report** to the Steering Committee and UNEP on the project activities carried out. The national consultants from Uganda and Ethiopia have often been the cause of delays as they didn't provide the raw data to ESDA on time. The financial reports also appear to have been late and low quality. All planned reports have been submitted to the steering committee and UNEP, except the terminal report that was still in a draft version at the time of evaluation.

Regarding the **follow-up of field activities** as PV delivery chain development, local trainings, awareness campaigns and PV sales, ESDA has not collected appropriate data regularly from local consultants to efficiently monitor the project progress. The UNEP has repeatedly requested for monitoring data on PV sales but the demands remained unanswered. The follow-up system to evaluate the achievements of field activities has not been effective. Moreover there was confusion between the records for PV systems installed and that for systems sold.

At the time of evaluation, there was **no reliable database** available including the recorded information and performance indicators of the project achievements, neither at regional nor national level.

Obviously, the request for **detailed commercial sales records** was not much appreciated by the dealers/suppliers. This raises the question of the relevance to implement a monitoring activity within a commercial approach.

On the other hand, the indicator associated with the **co-financing achievement** is a capital one to assess success and sustainability of the project. However, there was no effective tracking of this performance; this may, perhaps, be because the initial indicator was designed for the TREDF co-financing?

As there were no specific M&E assignments given to national consultants, the monitoring of activities at **national level** was also poorly addressed. The consultants have not contributed much to the preparation of monthly reports.

Moreover, ESDA should have carried out **regular field visits** to verify achievement levels and to control the quality of outputs. Only one visit per country was organised in combination with the UNEP evaluation trip in 2006. This means that ESDA prepared most of their activity reports based on information forwarded by consultants, without any field verification.

The UNEP was also supposed to conduct an **annual supervision mission** to visit selected project sites. Only one mission could be carried out, the second one in Eritrea having been cancelled because of political and administrative problems. (See also the further Section F on "UNEP Supervision").

The **Steering Committee** had the responsibility to organise 5 meetings over the project duration to review activity progresses and reports, only 3 meetings took place, the last one in June 06 before the serious concerns about Eritrea and before the UNEP field evaluation. The absence of a last meeting at the end of the project was deplored by several partners since it reduced the chance to capitalise on the final outcomes of the project and to exchange the lessons learnt in each country. The reason seems to have been the absence of a specific budget to invite the participants to those meetings. The problem was solved for only 3 meetings out of the 5 by organising them just after each regional workshop where all stakeholders were invited.

Therefore the assessment rating for the M&E Implementation sub-criterion is **Unsatisfactory**.

5.6.3 M&E Budgeting and Funding

Despite the importance of the M&E activity for such regional project in remote areas, the financing remains **unclear** as there are no detailed budget available for this activity.

A GEF funding of $20,350 was announced in the PID for M&E activity but not included in the master budget of the project (?). However in more recent documents (such as the "Reconciliation table for GEF budget"), the budget for activity K was found to be **$7,200 only**; and apparently only for ESDA, with no provision for national consultants. The Evaluator has not received appropriate information to clarify the reason(s) for this significant reduction of budget for such crucial activity.

As this **small budget** (1.0% of project cost and 2.1% of management cost!) cannot cover all the planned activities and regional transportation for field follow-up, it is no wonder that most of the costs were supported by the budget for Activity A (Project Management) and by the Consultancy fees paid to the national consultants. In that case the M&E activity should have been described as part of the general Project Management activity and not as a separate activity.

There is no track of any **disbursement record** for the M&E activity and no check by an external auditor.

As to the **Terminal Evaluation** planned after the project end, it is logical that this later-on activity was financed under a separate budget. But here again the budget was too tiny to cover both the international consultancy and the local assistance in each country by the national consultants.

Therefore the assessment rating for the M&E Budget sub-criteria is **Moderately Unsatisfactory**.

5.7 Assessments of Other Affecting Factors (Parameter F)

5.7.1 Readiness and Management

The UNEP project design had a very long gestation process between the first proposal in 1999 and the approval by UNEP and GEF in Oct. 04. The final design presented in the Project Identification Document (PID) is rather well formulated with clear and attainable objectives and methodology.
The project was rather ambitious in terms of establishing, in 20 months, commercial networks in 4 different contexts with involvement of stakeholders from various sectors (private, public, financial).
The project delays increased the challenge to reach the objectives, in particular the co-financing. Other objectives such as regional and international linkages, awareness and capacity building, and quality installation of PV systems have also been affected.
The resources mobilised to implement the project seemed appropriate with one regional executing agency (ESDA) based in Nairobi and 4 proactive national consultants responsible for the local management and implementation in their country.
The PID document only described the roles and responsibilities of the main managing actors (ESDA, UNEP/GEF and Steering Committee) while the relationship or partnership between ESDA and the national consultants is described in individual contracts.
However the choice of the "consultant" in Eritrea is ambiguous as it was also a private PV company which furthermore was the main supplier and the main dealer in the project.

Another ambiguous issue is the initial selection of the regional coordinator of the project who was, at the same time, the managing director of one of the 4 national consultant firms (Konserve Consult - Uganda).
The real weakness observed during the project is the day-to-day management from ESDA to coordinate all activities and to monitor the progress and achievements, as well as the accounting and disbursements. The challenging assignments for ESDA required one full-time manager involved in the project coordination. However, the skills and the availability of the manager seem to have been far below the needs as the UNEP project has suffered from poor activity planning, coordination, accounting, and monitoring.
The task manager from UNEP has on various occasions, both formally and informally urged ESDA to improve its performance but multi-country managerial skills were not easy to find and the first project manager was changed only late in 2006. This key personnel change had a rather positive impact on the final management and project termination though it did affect the overall effectiveness and institutional memory. The previous shortcomings (unclear situation of disbursements, no evaluation of awareness and training performances, lack of quality in PV installations, weak decision on Eritrea, etc.) could not all be solved during the last few months before the project ended.
On the national side, the local consultants have made serious efforts to conduct all activities but the overall organisation was rather chaotic and inefficient. In Ethiopia for example, the field installations of PV systems came a few months after the training (which lacked practical experiences) of rural technicians; part of their knowledge had already dissipated, leading to poor installations below acceptable standards. In Uganda and Tanzania, the national consultants have been overwhelmed by the simultaneous management of the UNEP project and other similar PV projects that benefited from the UNEP outcomes. On the contrary, in Eritrea, the national consultant has demonstrated a much more professional way of managing the project including adequate monitoring of their customers and PV installations, a clear accounting system and activity planning.
As a whole, the assessment rating for the Readiness and Management sub-criteria is **Moderately Unsatisfactory**.

5.7.2 Country Ownership / Driveness

The UNEP project has been designed to establish self-sustaining commercial route of PV dissemination with as little as possible Government involvement (either financial or organisational). No government representatives were members of the Steering Committee, except the PV standard expert from the Uganda Bureau of Standards.
However, the project proposal was submitted to relevant representatives to verify the compliance of project objectives with national policies and priorities and to get their official approval before implementation, as for all GEF projects. At this stage no problem was noticed as the improved access to renewable or clean energies and the promotion of private sector were on the national agendas (except Eritrea).
During project implementation, the relevant representatives of Governments were invited to participate to the 3 regional workshops dealing with adapting the policy framework and developing financing mechanisms to promote PV commercialisation. However the participation rate was below expectations mainly due to:

- Lack of high level interest and conviction about the project outcomes for and impacts on national programmes;
- Disappointment regarding their non-involvement in the project and the limited budget for national activities;
- Last-minute invitation and administrative constraints to get funds and clearances;

- Low feed-back to Government representatives on UNEP project progress and achievements (no report, only quarterly solar magazines).

The major outcomes of the project that can potentially contribute to the national development plans are the progress made on regional harmonisation of PV standards and import tax regime. (Cf. more details in Output 7 in § 5.5)

In Eritrea, national representatives could not participate in regional workshops and study tours due to bureaucratic procedures to get government clearance and lack of Government interest to support PV sector.

As a whole, the assessment rating for the Country Ownership sub-criterion is **Moderately Satisfactory**.

5.7.3 Stakeholders Involvement

All countries have faced the difficulty to sensitise and to commit the local actors in the PV supply chain within the project period, in particular the financing institutions and also to some extent some PV firms and dealers. More continuous follow-up was needed to achieve real involvement.

- The **government institutions** have taken only limited interest in the project implementation and follow-up (as explained in previous § 5.7.2) but some key institutions[5] from various countries have been invited to participate to the regional workshops. The main involvement was from the Bureaus of Standards which are still sharing experience at regional level and cooperating to harmonise their strategies.
- The **private sector** from all countries concerned (except Eritrea) actively participated to the project showing a real interest in solar business. The introduction of such innovative and efficient technology in non-electrified rural areas usually generates strong initial enthusiasm and sometimes excessive expectation in terms of business and profit. In general, all national consultants from TZ, UG and ET have faced difficulties to change the mentality and behaviour of the private and financial sectors. Finally, the PV suppliers/wholesalers and dealers have reached an appreciable awareness and commitment level that provides good hopes for a long-term development, on the strict condition that the financial obstacle can be soon overcome. Despite the lack of capital, they have tried to strengthen their local infrastructures (solar shops, stocks …etc).
- As shown before, the achievements for microfinance greatly differ from one country to another. Only in Uganda were many local **financial institutions** mobilised and committed giving a good chance of long-term success. Tanzania and Ethiopia could catch up soon if more follow-up efforts are made. The involvement of this sector really depends upon the strategy and efforts engaged by the national consultants during the project implementation.
- The last category of stakeholders is the **customer** that has been moderately informed and made aware of PV systems. From the field interviews, all end-users of solar systems have expressed their high satisfaction, even when systems were found poorly performing. Their main complaint was the high upfront cost. They confessed that they have been made aware about solar, not from the project, but through other sources (often while shopping in rural centres or through relatives living in town). Awareness campaigns in rural villages and local training have sometimes been dashed off and need to be repeated.

For this Stakeholders Involvement sub-criterion, the assessment rating is **Satisfactory**.

[5] Invited institutions basically include Ministries of Energy and national agencies as Rural Electrification Agencies, Bureaus of Standards, Authorities of Regulations, etc.

5.7.4 Financial Planning & Co-financing

5.7.4.1 Co-financing

The following Table H indicates that total budget for the project was US$ 1,308,230 (without M&E activities). The main source of finance was the GEF grant (US$ 693,600) under the UNEP Agency (53%). The planned co-financing was estimated at 43% of the total project budget with 3 sources of contribution:

- Triodos fund (TREDF): predominant contribution but as mentioned before the investment loan didn't materialise
- PV companies: they brought in-kind contribution for awareness campaigns and participation to the workshops and other international events but there is no information available on their actual co-financing level. Anyway, activities were conducted and companies participated.
- Hawaii University: no activity and expenses were recorded during the project implementation

Alternatively, 2 other sources of co-financing were mobilised during the project:

- A significant loan from E+Co to support one local PV supplier in Ethiopia
- Purchase of PV systems by customers, considered also as leveraged financing for the project.

Therefore the **actual co-financing** is estimated at 38% of the actual expenditure.
However the co-financing achievement is far below expectations as the crucial co-financing (from Triodos or anyone else) was supposed to overcome the capital barrier for dealers and is still not yet available (except for one dealer only).

Table H: Co-Financing

Co financing (Type/Source)	IA own Financing		Government		Other*		Total	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants (GEF/UNEP + TREDF)	693.600	693.600			49.450	49.450	743.050	743.050
Loans/Concessional (TREDF)					400.000	0	400.000	0
Credits (E+Co)					0	116.000	0	116.000
Equity investments							0	0
In-kind support (PV companies)					90.180	90.180	90.180	90.180
Other (*)								
- University of Hawaii					75.000	0	75.000	0
- Leverage from Beneficiaries					0	249.163	0	249.163
Totals	693.600	693.600	0	0	614.630	504.793	1.308.230	1.198.393
						Grant:	***57%***	***62%***
						Co-financing:	***43%***	***38%***

5.7.4.2 Planned and actual costs versus activities

The cost breakdown table I-1 given below provides a summary of the financing sources versus project activities while the table I-2 gives the per-country distribution of the budget versus activities. Only a third of the budget (excluding the $ 400,000 loan for hardware) seems to be allocated to the 4 national executing agencies, mainly for village awareness campaigns and for national management.

Table I (Annex C-10.2.2)

I - 1: Financing Sources versus Activities (source: PID - version 8)

Cost Breakdown	**Financing Sources (Budget)**			
Activity	**GEF**	**TREDF**	**PV firms**	**Total**
A - Management	$334.740	$5.000	$0	$339.740
B - KO meeting + trade fair	$11.000	$17.000	$8.800	$36.800
C - Market assessment	$7.740	$0	$4.140	$11.880
D - Business awareness …	$0	$461.840	$0	$461.840
E - Trainings	$75.000	$0	$6.440	$81.440
F - Trade fair & awareness	$22.800	$22.500	$1.000	$46.300
G - Inter-country visits	$53.850	$0	$5.000	$58.850
H - Village awareness	$203.520	$0	$64.800	$268.320
I - Policy workshop	$9.950	$0	$0	$9.950
J - Financial workshop	$0	$9.950	$0	$9.950
K - Monitoring & Evaluation				*$0*
	$718.600	**$516.290**	**$90.180**	**$1.325.070**

I - 2: National Budget versus Activities (source: Minutes of Management Meeting)

Country Distribution	**National Budget**					***Budget Balance***
Activity	**Tanzania**	**Uganda**	**Ethiopia**	**Eritrea**	**Total**	
A - Management	$20.000	$20.000	$20.000	$20.000	$80.000	*$259.740*
B - KO meeting + trade fair					$0	*$36.800*
C - Market assessment	$1.920	$1.470	$2.070	$1.080	$6.540	*$5.340*
D - Business awareness …					$0	*$461.840*
E - Trainings	$12.000	$10.000	$11.000	$6.500	$39.500	*$41.940*
F - Trade fair & awareness	$6.000		$6.000		$12.000	*$34.300*
G - Inter-country visits					$0	*$58.850*
H - Village awareness	$45.000	$35.000	$55.000	$25.000	$160.000	*$108.320*
I - Policy workshop			$4.000		$4.000	*$5.950*
J - Financial workshop	$4.000				$4.000	*$5.950*
K - Monitoring & Evaluation					*$0*	*$0*
Total Budget	**$88.920**	**$66.470**	**$98.070**	**$52.580**	**$306.040**	***$1.019.030***
Payments out - 2005	$11.500	$27.410	$25.010	$20.795	$84.715	
Payments out - July 2006	$39.910	$31.900	$61.950	$24.000	$157.760	
Total Payments (in July 06)	**$51.410**	**$59.310**	**$86.960**	**$44.795**	**$242.475**	
	58%	89%	89%	85%	79%	

The next table I-3 provides the balance between the planned budget and the actual expenses for each project component, as presented to UNEP in financial reports. What is worth mentioning is that the accomplishment rate at the end of year 2005 only attained 76% of the planned expenses and the disbursements caught the budget up in year 2006. Administrative expenses as personal and sub-contracting expenses reached rather good achievement in 2005 although practical field activities as training were somehow below expectations.

I - 3: Balance versus Components (source: UNEP/DGEF - FMO)

Cost Breakdown	Budget			Expenses		
Component	**2005**	**2006**	**Total**	**2005**	**2006**	**Total**
10 - Project personnel	$185.520	$170.040	$355.560	$159.338	$202.228	$361.566
20 - Sub-Contract	$57.740	$59.800	$117.540	$52.784	$60.971	$113.755
30 - Training & Conferences	$92.800	$46.000	$138.800	$64.478	$69.678	$134.156
40 - Equipments & Premises	$22.500	$40.000	$62.500	$3.337	$58.140	$61.477
50 - Miscellaneous	$8.000	$11.200	$19.200	$194	$18.818	$19.012
Total	**$366.560**	**$327.040**	**$693.600**	**$280.131**	**$409.834**	**$689.965**

Assessment	Balance			Accomplishment rate (%)		
Component	**Δ for 2005**	**Δ for 2006**	**Δ Total**	**05**	**% '06**	**% Tot.**
10 - Project personnel	-$26.182	$32.188	$6.006	86%	119%	102%
20 - Sub-Contract	-$4.956	$1.171	-$3.786	91%	102%	97%
30 - Training & Conferences	-$28.322	$23.678	-$4.644	69%	151%	97%
40 - Equipments & Premises	-$19.163	$18.140	-$1.023	15%	145%	98%
50 - Miscellaneous	-$7.806	$7.618	-$188	2%	168%	99%
Total	**-$86.429**	**$82.794**	**-$3.635**	**76%**	**125%**	**99%**

Those findings based on official data have been confirmed and strengthened by detailed analysis of internal accounting documents used by ESDA (cf. summarised data in Table J provided in Annex C 10.2.3). The evaluator has found some discrepancies between numbers analysed by the Auditor for year 2005 and the numbers found in this document. The global disbursement rate was even lower (70% at the end of 2006) with worrisome levels for training activities (49%). Moreover, it seems that the status didn't change much until the last quarter of the project. According to this table, 20% of the initial budget still remained to be spent over the last 3 months. Surprisingly, all accounts have finally been well-balanced, as shown in the official table I-3 (99%).

Additionally (and correlatively), the ESDA new manager complains now about poor accounting from national consultants and the lack of vouchers and receipts, in particular from Ethiopia (they recently provided most of them) and Uganda (they had not provided any receipts at the time of evaluation).

5.7.4.3 Financial controls and Audits

The financial controls carried out by ESDA during the project implementation include mainly:

- **Monitoring** of the national activities and related disbursements. According to previous findings on poor accounting and financial follow-up, the control system of ESDA was not satisfactory.
- the **financial reports** prepared by the accounting department of ESDA and properly sent quarterly to UNEP. *(documents not received and not evaluated)*

A **first Audit** was done early in 2006 on the Fiscal Year 2005. Actual expenses for each project component have been compared to the initial budget and only 4 sub-components have been pointed out as slightly exceeding the budget allocation. However, the overall budget, as well as specific components, were within the limits leaving a surplus of US$ 86,430. The very brief report doesn't mention any lack of vouchers or discrepancy with numbers.

A **second Audit** was conducted for the Fiscal Year 2006 but no report was available at the time of evaluation.
For this Financial Planning sub-criterion, the overall rating is **Moderately Satisfactory**.

5.7.5 UNEP Supervision and Backstopping

The UNEP staff has professionally assisted and supported the Executing Agency ESDA with regular advice. However four major issues should have required more attention from the UNEP during the project implementation:

- Co-financing shortage: this critical issue, as mentioned previously, has been discussed between UNEP and ESDA at early stage, and the idea was that alternative co-finance would be identified. However little efforts came out to ensure alternative solutions and to strengthen the follow-up by ESDA, partly due to the commercial approach where SHS systems were being sold to people who could, in general, afford them.
- Management and Monitoring capacity of ESDA: there is clear evidence that ESDA faced several management weaknesses during the implementation of the project, as detailed in § 5.6. The UNEP should have played more of a decision-making role in the internal conflicts of ESDA (various personnel shifts).
- Eritrea complications: the UNEP has always been aware of and worried about the difficulties generated by the Eritrea political context. The UNEP even expressed serious concerns during the Steering Committee meeting in March 2006 which was followed by long uncertainty period but no official decision to actually stop the project in Eritrea was taken before the project end. It was only agreed that no further funds would go to Eritrea before project end.
- Quality of Demo units: the UNEP initiated inspection visits in June 06 (that should have been done by ESDA earlier!) and pointed out the shortcomings of field PV installations, in particular the rather poor quality of PV systems design, installation and services. During the remaining project months, worthwhile recommendations to improve the situation with the few remaining funds and limited time for corrections. Some corrections were indeed made here and there but without much conviction to complete successfully the project. As the recommendations came rather late, project partners might have been busy with other project or already disinterested.

For this UNEP Supervision sub-criterion, the assessment rating is **Satisfactory**.

5.7.6 Delays and Project Outcomes & Sustainability

The project has suffered from 2 types of administrative delays (caused by UNEP/GEF):

- The first major and most penalising delay was due to the very long gestation period between the first proposal in 1999 and the effective endorsement by GEF and UNEP in August 2004. As this medium-size regional project with PV technology using a commercial approach was the first of its kind for the UNEP, many issues had to be clarified, modified and adapted before approval. The contract was subsequently awarded to ESDA in February 2005; about 6 months after endorsement by GEF. This "bureaucratic and systemic delay" - rather common for such internal processes at UNEP - was however to some extent quite convenient for ESDA as they had a hard time finding the right candidate for project director. The major problem seems to have been that the overall budget didn't really change while the required efforts increased. In addition, the project suffered from the occurrence of unexpected events at inception such as (i) worsening political situation in Eritrea, (ii) change of Triodos bank policies/strategies leading them to pull out from co-financing, (iii) disinterestedness of some government representatives, (iv) implementation of similar projects as SIDA-MEM.

- The second delay from the moment the project was approved (October 2004) until the project actually started (April 2005) seems to be due to delay in money transfers from the UNEP. The first disbursement came in March 2005 and the 'Kick-Off' meeting was finally organised 2 months later (June 2005), leaving only 12 months to implement the project. Therefore an extension of 6 months was agreed on and partly helped the efficient implementation of the project.

As mentioned before, those delays have had serious impacts on overall project outcomes. The major one is the pull-out of Triodos co-financing and the need to find alternative sources within the short remaining time. The low achievement for this outcome has consequently increased the risk of affecting the project sustainability.

For this Delays sub-criterion, the assessment rating is **Moderately Unsatisfactory**.

6 Conclusions and Ratings

Overall rating table

Criterion	Evaluator's Summary Comments	Evaluator's Rating[6]
Attainment of project objectives and results (overall rating) **Sub criteria (below)**	The project achieved Satisfactory outcomes in Tanzania and Uganda, Moderately Unsatisfactory in Ethiopia, and Unsatisfactory in Eritrea	**MS**
Effectiveness	All 6 specific objectives have been attained to a certain extent but 4 of them have reached less satisfactory levels, in particular the co-investment in local PV companies to facilitate sustainable PV commercialisation (§ 5.2.2)	**MS**
Relevance	In Eritrea, and to a certain extent in Ethiopia, the project objectives were not adequately in-line with the national policies and strategies; priorities were not in promoting the private sector (§ 5.2.3)	**S**
Efficiency	Initial project delay has been partially compensated by 6 months extension allowing the project achievements to be rather cost-effective, except the M&E activity (§ 5.2.4)	**S**
Sustainability of Project outcomes (overall rating) **Sub criteria (below)**	The financial sustainability will be the limiting factor for this project	**MU**
Financial	The low achievement in implementing the (alternative) co-financing during the project will have serious impact on medium or long term benefits (§ 5.3.1)	**MU**
Socio Political	The difficult socio-political (and economical) situation in Eritrea, and to a certain extent in Ethiopia, jeopardizes the business development of local PV firms (§ 5.3.2)	**ML**
Institutional framework and governance	The government institutions have been (voluntary) little involved in the project except for PV standard harmonisation and import tax cuts, but limited outcomes have been achieved. High system prices and low quality level may affect sustainability (§ 5.3.3)	**ML**
Environmental	Used lead-acid battery collection and recycling should be considered in the near future to avoid undermining the environmental benefits of solar energy (§ 5.3.4)	**L**
Achievement of outputs and activities	All activities have been conducted and most of the outputs have been achieved but often modestly: mitigate level of training & awareness, low level of coordination & management (§ 5.5)	**MS**
Monitoring and Evaluation (overall rating) **Sub criteria (below)**	The implementation was unsatisfactory and affected the project's performance in spite of the acceptable initial M&E plan.	**U**
M&E Design	Despite some weaknesses in the formulation of performance indicators, the general M&E activity was well-designed (§ 5.6.1)	**S**

[6] Ratings for Sustainability: L – Likely; ML – Moderately Likely; MU – Moderately Unlikely; U – Unlikely
Ratings for other criteria: HS – Highly Satisfactory; S – Satisfactory; MS – Moderately Satisfactory; MU - Moderately Unsatisfactory; U – Unsatisfactory

Criterion	Evaluator's Summary Comments	Evaluator's Rating[6]
M&E Plan Implementation (use for adaptive management)	The regular M&E activities according to the initial plan have been poorly considered by the Executing Agency (ESDA) with very limited supervision and quality control of field activities and disbursements (§ 5.6.2)	**U**
Budgeting and Funding for M&E activities	According to interviews and data collected, there was no clear budget breakdown and no significant funding for M&E activity (§ 5.6.3)	**MU**
Catalytic Role	The UNEP project has engendered 2 larger projects with similar approaches in Uganda and Tanzania, based on lessons learnt (§ 5.4)	**HS**
Readiness & Management	Ambiguous choices of project manager and national consultants/partners. Serious shortcomings in the day-to-day project management have affected the project performance: poor planning and monitoring of regional activities, weaknesses in accounting practices, reporting below standards (§ 5.7.1)	**MU**
Country ownership / driveness	Except for Eritrea, 2 national institutional sectors (Energy and Finance) have shown some involvement and commitment (project compliance, PV standards, tax regime) but their real interest for the project was low, certainly due to the poor confidence climate between project implementer(s) and government officials (§ 5.7.2)	**MS**
Stakeholders involvement	In-line with the objectives, the project has managed (except in Eritrea) to sensitize and to commit various stakeholders from private and financial sectors (suppliers, dealers, freelance technicians, MFI, SACCO …) in rural areas (§ 5.7.3)	**S**
Financial planning & Co-financing	At the end of the project, co-financing and leverages have almost reached the planned value; the Budget/Expenses has been balanced and confirmed by external audit but the low "accomplishment rate" observed at mid-term for field activities (as trainings) and the lack of vouchers doesn't give much confidence in results (§ 5.7.4)	**MS**
UNEP Supervision and backstopping	The crucial supervision role of UNEP has not been fully efficient as there were some gaps/differences between assessments (Eritrea, co-financing, management and M&E, quality control) and corrective measures (§ 5.7.5)	**S**
Delays and Project Outcomes	Two significant administrative delays associated to project approval and to first disbursement (thus caused by UNEP) have seriously impacted the project outcomes and its overall sustainability (§ 5.7.6)	**MU**
Overall Rating		**MS**

The UNEP-GEF project has been globally evaluated here above as **Moderately Satisfactory**. The poor outcomes attained in Eritrea (see below) have significantly affected this overall rating; this shows that global evaluation with overall ratings present problems for such regional projects with very different national contexts.

Nevertheless this overall evaluation has shown clear evidence of positive outcomes and impacts at the end of the project and reflect pretty well the 4 major shortcomings that have jeopardized the project (they received a rating below the average in the previous table): (i) administrative delays, (ii) lack of co-financing, (iii) weakness in management, (iv) poor monitoring and evaluation (M&E)

The UNEP project has been the first solar PV project and the first commercial project implemented by UNEP. The project incentives have been used mainly to help actors of the supply chain to set up or strengthen in a sustainable way their solar business. The project has been quite challenging given the weaknesses listed above but all planned activities have been implemented and several lessons have been drawn (cf. Chapter 7).

In Uganda & Tanzania, the national policy is clearly supporting the private sector development and the promotion of renewable energies. Therefore the establishment of a commercial route or supply chain for PV dissemination was facilitated and after the project ended, many actors were in place and (more or less) involved. In this rather positive context, 2 new projects with similar commercial approach for PV dissemination came out as a replication effect based on lessons learnt from UNEP project. MFI and local cooperatives are slowly attracted by the solar business.

In Ethiopia, the political and economical context was less favourable to PV commercialisation as the whole financial sector and many companies are still regulated by the government. Consequently, the dissemination network between the capital and the project area is disadvantaged (only 2 dealers) and low sales volumes have been reached during the project period. The recent investment of E+Co in one PV supplier to develop his business is an encouraging impact of the project.

The case of Eritrea is separate as the political and economical context was extremely unfavourable to PV commercialisation, and thus to the project implementation. The Terminal Evaluation has confirmed that the project activities in Eritrea were clearly outside the scope of the project. There is no achievement in terms of establishing a dealers' network between the capital and a rural area. However the 'Fee-For-Services' dissemination model developed in Eritrea by the national consultant has shown interesting results: with reduced upfront barriers, the rate of PV system penetration in the villages is drastically increased and the PV business becomes more profitable and more sustainable.

In conclusion, the UNEP-GEF project has demonstrated that:

- It is not insurmountable to create a "PV Aware Market" in Eastern Africa and to establish a network of PV actors (suppliers, dealers, technicians, agents) once there is a project beside to organise and to finance (what private sector could not take over) market studies, capacity building, awareness-raising, overall supervision and M&E.
- On the contrary, it becomes far more difficult to reach a self-sustaining and effective "PV Sales Market". This "Supply-driven" approach[7] should consider that PV systems for lighting and audiovisual are not given a priority by most of the rural households. Sales will happen only if prices are reduced or credit is available and if the service is worth the price. Adequate financing mechanisms are essential to support the

[7] Opposed to the "Demand-driven" approach conventionally supported by Government-led projects

emergence of rural PV dealers and to increase the PV sales and the profitability of the rural businesses. The mobilisation of microfinance institutions is an arduous and long-drawn-out job as 'solar loans' for PV are perceived as too risky.

The synergy with national programme as Rural Electrification would probably have given better access to subsidy mechanisms that – if cleverly designed – can drastically improve the sales of solar PV systems toward low-income rural households. The challenge with subsidies is not affecting significantly the private sector business and not creating an exporting black market toward other countries.

7 Lessons Learnt

The section presents the lessons that have been learnt from UNEP project design and implementation during the Terminal Evaluation of the UNEP project.

1. Importance of Reducing Project Delays

The UNEP project outcomes have been seriously affected by 2 major delays: 1st delay before project approval (project gestation period) and 2nd delay linked to the first disbursement. The long administrative period in-between seems to be rather common for such projects at UNEP but should be minimised as much as possible. Indeed, when such project is implemented several of years after the initial design, the local context and conditions are likely to have changed affecting project effectiveness (sites/countries, partners, budget, financing …). The key element of the UNEP project (Triodos co-financing) that was supposed to overcome the capital investment barrier and to help the local private sector pulled out just before the start-up.

2. Effectiveness of Supervision and M&E framework

The lack of supervision and corrective measures by the Implementation Agency (UNEP) and/or the Steering Committee (SC) on project evolution (drift, weaknesses …) can have seriously negative impacts. Specific key activities implemented by the executing agency such as managing resource recruitment, site selection, M&E plan implementation must be controlled and monitored regularly.

3. Need to involve Government Institution(s)

Depending of local contexts, some government institutions – when proactive and committed – can effectively contribute at various level of commercial project implementation. Common tasks and responsibilities are: to be member of Steering Committee, to supervise national actors, to facilitate project acceptation locally, to alleviate the tax regime, to enforce PV standards and code of practices, to take over the awareness campaign, to establish synergies with national rural electrification programmes and financial incentives (subsidies), etc.

4. Importance of Flexibility in Project Design

The UNEP project has also shown the difficulty of attempting the existing commercial model in a multi-country project with different socio-political contexts and the need to be flexible and to adapt the approach to the different realities. For example, the 4 countries involved in the project have shown very different entrepreneurial spirit and PV dissemination models: (i) 'Fee-For-Services' was preferred in Eritrea; (ii) Subsidy (50%) was promoted in Ethiopia; (iii) Micro-finance was encouraged in Uganda and (iv) Cash sales were dominant in Tanzania.

5. Adequate Financing Mechanisms

The UNEP project has demonstrated that, even in high-income areas, the effectiveness of the PV commercial sales depend of the selected financing scheme: cash sales lead to very small

sales volume (< 5% of households), sales can reach 20-30% of households with attractive micro-credit or solar loan products and over 50% with high subsidies or fee-for-services approach.
But the financial mechanisms have to be adapted to each national or local context and enough time should be planned to convince, support, and involve the financial sector in rural areas and to develop appropriate solar loan products.

6. Solar PV Technology as Least-Cost Option

The UNEP project has promoted quality PV systems in the 4 countries as the most appropriate and least-cost option in the targeted villages when compared to current domestic energy expenses. Furthermore this clean technology has been softly introduced without "forcing" customers. Even in some villages recently connected to the grid the PV owners still prefer their solar system rather than the unreliable grid supply.

7. Continuity in Capacity Building and Awareness Raising

The technical and sales trainings (5 and 2 days) provided by the UNEP project were definitely too short to ensure proper assimilation. It was clear from experience in each region that regular and 'refresher' field trainings are necessary. The project has also underlined that to have effective and efficient rural training, the trainees should have effective work during the period following the training and they should be closely supervised to assess and confirm their skills.
The public awareness-raising and business promotional activities and tools promoted under UNEP project have been closely adapted to local & social conditions and were found very important to support the PV commercialisation. However, those field activities need to be repeated for all (potential dealers, customers, MFIs) as it takes a long time to raise consciousness and commitment.

8. Limits of Commercial Approach

The UNEP project having put efforts to promote commercial dissemination of PV systems in rural areas has contributed to identify the benefits and the limits of this commercial approach. The limiting factors found during the project are:

- The establishment of a commercial network of actors, hardware and financing is rather complex and requires many costly activities (market study, capacity building, awareness-raising, financing organisation).
- The M&E activity is not easily compatible with the commercial approach, especially in rural areas.
- The mobilisation of microfinance institutions is an arduous and long-drawn-out job as solar loans for PV are perceived as too risky
- Attractive and effective financing mechanisms (micro-credit, solar loans, smart subsidies) take long time to be designed and implemented.
- Valuable local technical and commercial resources are difficult to find.
- Limited fractions of the rural population can afford cash-sales and even credit-sales for PV systems.

8 Annex A: Per-Country Project Performances (Case Studies)

8.1 Project performances in Tanzania

8.1.1 Country Background

8.1.1.1 PV market overview[8]

The PV industry in Tanzania has been developing very fast the last 5 years with an evident increase of all related activities (awareness, training, financing, sales and after-sales services) moving from donor-led market (telecom and institutional) toward commercial market (cash-household market). Just over 100 kWp of solar systems were sold in 2005, and 204 kWp in 2006. There seems to be now an increasing demand for SHS (40% of PV sales) and in particular for smaller systems (exponential growth of amorphous a-Si modules – usually 14Wp). The national PV market potential has been recently assumed at 20 MWp (75% for rural households).

8.1.1.2 UNEP-GEF Project

The UNEP-GEF project effectively started in Tanzania after a Kick-Off workshop in June 05. It was implemented by the local consultant **Energy for Sustainable Development, Tanzania (ESD-T)** (national executing agency). Its main objective is to *stimulate rural sales of quality PV systems and components* and is properly in-line with the national policy to promote renewable energies for rural development and to support private sector in solar commercialisation. The project has been implemented in the Iringa region, renowned for its high income level coming from tea and timber but also poorly aware about solar electricity.
One of the key objectives of the UNEP project is to complement and bridge areas by linking regional and international players to the Tanzanian market.
The UNEP project has also been designed and adapted to be complementary to or in continuation of the following previous or parallel projects:

- The **UNDP/GEF project** called "**Transformation of Rural PV Market**" started in March 04 for 5 years; 3 years pilot phase in Mwanza region (located in the NW of Tanzania whereas Iringa is situated in the SE). Total budget: 2.5 M$
- The SIDA-MEM[9] project called **Solar PV Market Development in Rural Areas of Tanzania**, funded by SIDA and started in May 2005.
- ERT programme (WB/SIDA project). This project provided the framework for a Rural Energy Agency (REA) that will provide subsidy for private sector through a Rural Energy Fund (REF).

8.1.1.3 Baseline conditions in Iringa

The solar PV market was clearly little developed in Iringa before the project started. The lack of awareness among the village people and of access to a sales point in this very large region with scattered villages was the main reason. The project has produced 2 reports on the Solar PV market in Iringa which give the potential in each district, the results of assessment but very few data on baseline conditions.
Before the project started, the solar PV market in Iringa was characterised as follows:

[8] Tanzania PV Market Overview – Renewable Energy Magazine n°1 – Jan-March 2007
[9] The project is funded by SIDA, the Swedish International Development and Cooperation Agency and implemented by Ministry of Energy and Minerals (MEM). More details on http://www.tasea.org/projects.php

- Of the 3 dealer companies selling PV components settled in Iringa town (Burhani and Cemma) and in Njombe town (Luyungu), only 2 were invited to participate to the project. Those dealers had connections with 1 or 2 importers/suppliers in Dar es Salaam but also purchased components from Kenya and Malawi.
- There were no so-called solar technicians or sales agents beside the staff of the 3 dealers but more than 30 potential electrical shops have been identified.
- Despite the large number of MFIs and SACCOs in Iringa region, none of them was involved in or even knew about solar PV products.

The sales level of PV modules in Iringa before the project started is not known due to lack of sales records at dealer level.

8.1.2 (A) Attainment of Objectives and Planned Results

8.1.2.1 Project achievements

The UNEP project in Tanzania has achieved major outcomes such as the increase of key stakeholders for PV commercialisation in the region and that of PV system sales. To a certain extent, all specific objectives were reached during the 2 year project period as described here after.

8.1.2.1.1 Financing:

- By the time of project approval there was a big change in the project co-financing scheme for investments in local PV companies. The long gestation period before the project got approval and actually eventually led to the withdrawal of Triodos/TREDF supposed to provide a US$ 400,000 loan for investment in PV businesses in the 4 countries. This fundamental change however can also be positively seen as it forced the project implementer(s) to find other –local-, and therefore more sustainable, alternatives for financing.
- ESD-T strives to sensitize one of the main national MFI, called NMB[10] which has a nation-wide network of active branches (108), to finance solar PV businesses.
- In Tanzania many financial institutions (NMB, FINCA, E+Co, Grofin, EBK, CRDB …) and SACCOs had good potential to be involved in solar business in Iringa but ESD-T rapidly turned toward NMB and didn't spend any time in developing alternative initiatives and in following-up the financing institutions. NMB financing scheme was expected to be a good solution that can be easily replicated at the national scale.
- Unfortunately despite strong interest from NMB staff at an early stage, there was no achievement during the project period. And recently (end of 2006?) NMB has been subject to internal reform and new management which meant postponing giving priority to efforts on solar loans.
- Nevertheless, the expected **co-investments** (leverages) have occurred from the customers themselves and have even exceeded the target as **480** solar systems (about 741 PV modules or 13,958Wp) have been sold by Iringa-based dealers. The average size of systems is about 19Wp and the average installed price is $14/Wp. In the end the total leverage in Tanzania is estimated at **US$ 113, 842**, which is more than the expected part of the initial TREDF co-financing.
- The good previous results of sales without microfinance can be explained by the very good marketing skills of one dealer that is active not only in Iringa region. However the penetration rate of PV systems in Iringa villages is still very low and the major barrier for

[10] National Microfinance Bank (NMB); Savings and Credit Cooperative Union League of Tanzania (SCCULT); Foundation for International Community Assistance (FINCA); E+Co Energy Through Entrepreneur

sustainable dissemination of solar PV systems in Tanzania remains the **high capital cost** for all companies, dealers and customers. Further and continuous efforts are still needed to effectively involve the microfinance institutions so that they would provide solar loans for potential customers. The ongoing SIDA-MEM project is addressing this financial barrier (upfront price) in the Iringa region (cf. § 8.1.3 on Sustainability).

8.1.2.1.2 Regional linkage:

- Relevant stakeholders from Ethiopia were invited to the various meetings, workshops, PV trade fairs and study tours and agreed to say that those regional events where an excellent opportunity to exchange experience and to build relation. The 3 workshops (Kick-Off, Financing and Policy) were very positive in terms of discussion and interaction between representatives from different countries and organisations.
- For example, there was a very good working session on "PV standards and regional harmonisation" encouraging the relevant Government representatives to work close together so as not to reinvent the wheel. Furthermore GTZ has expressed strong interest and willingness to support further harmonisation of PV standards in the region.
- However, now the project has been implemented, there seems to remain few linkages between countries. Most PV stakeholders haven't even heard about the project progress in other countries since the last Steering committee meeting in June 06; except for the national Bureaus of Standards that still actively communicate in the region.
- The major outcomes from those regional activities were the raise of awareness amongst financial and policy maker sectors and the provision of ideas/guidelines/tools for better PV commercialisation.
- The **financial workshop** was held in DAR in March 06 giving a good chance to many Tanzanian stakeholders (45 over 69 participants) to participate to the regional and international exchange. Surprisingly only 2 financial institutions have participated: NMB (4) and CRDB (1) and no SACCOs were present.
- ESDT has not participated to the **Bangladesh** study tour as it was specifically designed for MFIs; 3 Tanzanian MFI (CRDB, Small Enterprise Foundation (SEF) and Tujijenge Afrika) participated in the tour but ESDT didn't get any outcome (report, idea) from them.
- The removal of **VAT tax and import duties** on solar modules in Tanzania in July 2005 is not a direct result of the UNEP project as other projects had also been lobbying for a long time to obtain that incentive. Tax and duties exemption were extended to all solar products in 2006. The policy workshop was held one year later and the Tanzanian achievement proved a good example for other less advanced countries.

8.1.2.1.3 International involvement:

- The activities of the UNEP project have included the organisation of 3 major international workshops combined with commercial trade fairs. An important number of international manufacturers/suppliers did participate as described in the terminal report. It is very difficult, if not impossible, in the very dynamic and moving international PV business to find evidence that the actual links established between Tanzanian importers and foreign companies as Shell, FEE, STECA, Sundaya, Chloride Exide … are a direct result of the UNEP project. Anyway the project has definitely contributed to inform both demand side (TZ) and supply side (international) about the market potential and the growth perspectives and to establish the commercial/ entrepreneurial links that are noticeable today.
- The PV market in Tanzania remains very open. Most importing companies in Tanzania are used to purchase solar components from different sources, depending to some extent on market prices and supply conditions. For example, amorphous a-Si solar modules (mostly

from FEE and Sollatek) are today dominating the Tanzanian market but there is no special or exclusive contract agreement with national importers. Only D&S seems to have some exclusive agreement with their suppliers.

- Out of the 7 major **national suppliers** (import and distribution companies) based in Dar es Salaam (DAR), 5 (in bold in the next list) have been actively involved in the UNEP project and the Iringa region. There is another importer (Burhani) based in the Iringa region who deals directly with Asian suppliers for most of his components. Usually those suppliers have more or less secured their supply from outside but a few have had stock problems (lack of modules or batteries occurred during the project period).
- List of main PV suppliers in DAR:
    - **Davis and Shirtliff – D&S (Shell-Sundaya)**
    - **Sollatek**
    - **Umeme Jua (only PV – FEE - Victron)**
    - **Rex Investments**
    - **Chloride Exide**
    - Aglex Company Limited (Kyocera)
    - BP Solar
- List of main PV dealers in DAR:
    - Ensol Tanzania Ltd
    - Resco Tanzania Ltd

8.1.2.1.4 National network:

- The UNEP project main objective to *develop market linkages between commercial centre (DAR) and rural project area (Iringa)* is probably the most crucial one and achievements here have been most successful.
- Indeed, the **market assessment** in the Iringa region has shown a tremendous lack of awareness and the need for private sector support (marketing, financing & training) to establish a sustainable commercial network of dealers and technicians. A large market segment (employers, businesses, farmers, civil servants, SACCOs …) has the capability and willingness[11] to pay cash or with credit for PV systems but the study also shows that credit schemes are strongly expected by both households and businesses.
- 5 **national** capital-based **suppliers** (see above) have been supported by the project to develop or reinforce their network of rural-based dealers in the Iringa region. Their strategy does not consist in having direct sales to the Iringa customers but in selling a large volume of PV systems and components to the local dealers.
- In the Iringa region, the UNEP project has selected and supported 13 local companies (mostly electronic shops) to start or develop solar activities in each of the 6 districts and to encourage local stock of PV components. According to the Umeme Jua, they claim to have 12 solar dealers in the Iringa region while other suppliers only have 2 or 3 dealers. In total 22 **solar dealers** are sharing the market in Iringa without feeling much competition. 7 dealers were interviewed during Terminal Evaluation. The Iringa region is so large that there is a need for more proactive dealers but it is quite difficult for ESD-T to find the appropriate dealer profile combining technical and marketing skills.
- Those dealers selected and sent in total 26 candidates for specific technical and sales training in DAR. In the end, 16 “electricians” received technical training (5 days) and 10 managers got sales training (2 days) (see further § on Capacity Building.).

[11] The « willingness to pay » figures given in this study are not reliable as there are no indication of a proposed system size or price. E.g. 17% of households are willing to pay cash for a solar system but of what size and at what price ?

- Therefore there is clear evidence that the number of **solar technicians** in Iringa has increased over the last 3 years, most of them trained through the UNEP project but also through other development projects and by the suppliers themselves. Suppliers recognize the added value and the importance of providing quality services to customers which consistently reduce costly after-sales services. 5 technicians were interviewed during the evaluation mission.
- In Tanzania, the sales training has focused on company managers only and there are no so-called **sales agents** involved in proactive marketing in rural villages who would sell equipment directly to rural communities. The technicians have very little sales skills and small incentives to do marketing in the villages.
- Beside UNEP trainings, a large **awareness campaign** was organised by ESD-T for 1 month in Iringa at the end of December 2005 to sensitize the potential customers, dealers and technicians (47 venues in villages and sub-towns). Among the different marketing tools (village solar fairs, meetings, radio adverts …), the road-shows were well-adapted and successful. The impact was lower than expected probably due to the fact that, given the project constraints, the campaign was conducted during the rainy and low-income season. Furthermore financing issues such as access to credit were not much addressed during this campaign. Only one campaign during the project was certainly not sufficient for such a large region and for a long term impact, even if the effective implementation period was actually extended by 6 months.
- It should be noted that all Tanzanian dealers aspire to be independent from suppliers and they do their market-shopping (on-the-shelf or "purchase on need-basis") in Dar Es Saalam according to the lowest market prices and stock availability. None of those dealers, as for suppliers, has an exclusive agreement or a signed contract.

8.1.2.1.5 Quality PV systems & installations:

- One of the UNEP project aims was *promoting quality PV components, systems and installations* in the Iringa region through 2 major activities. The first one was the technical training provided to rural actors (technicians and dealers) on quality design, procurement and installation. The second activity was the implementation of quality PV systems in project regions. The Quality concerns different aspects: PV components, system design, installation and training.
- All interviewed PV dealers in the project area seem to be well sensitized about and concerned by quality issues. Almost all **PV components** purchased by the project are from reputable brand and quality and no significant failure has been reported, except with some batteries and locally-made inverters. Sales of 14Wp amorphous solar modules from FEE and Sollatek are increasing very fast in the region. Even if the average size is 40-50Wp, most of the systems are made of multi-14Wp modules in parallel. Only one dealer (Mwaflugs) is not selling such small amorphous modules. All PV components in Tanzania are imported by air or sea or come overland from bordering countries.
- This rather good component quality results from complementary efforts from the UNEP project through technical training and from government awareness campaigns through TASEA/TBS[12]. The challenge will be to maintain this quality level within the fast growing PV market. Some inexpensive locally-made DC lamps and inverters of rather poor quality have recently appeared on the local market.
- Regarding **design quality** of PV systems, most of them are composed of mixed and variable components as dealers do free market-shopping. They don't provide standard PV systems with fixed prices and performances. However most dealers and technicians seem

[12] TASEA : Tanzania Solar Energy Association – TBS : Tanzania Bureau of Standards

to have enough background to design systems without excessive mismatch of components (use of standard sizing sheet). The problem is more related to how users change/upgrade their systems after purchase.

- The question of automotive battery versus "solar" battery is not that simple. According to TASEA, some so-called solar batteries[13] (e.g. Chloride Exide) are not real deep-cycle batteries and give poorer results than some previously used car batteries. The promotion of solar batteries should go with strict enforcement of quality control, in particular for those manufactured in Kenya.
- There is another important issue regarding the abusive use of the inverter which seems very common and appreciated by rural consumers. Both consumers and dealers/technicians do not seem to realize the actual losses and the very low voltage disconnection which has a bad impact on battery capacity and lifetime. Customers should be better informed and even discouraged to use inverter, especially oversized inverters and low-cost & locally-made inverters. Even if DC appliances are more expensive, using PV systems without inverter will be more cost-effective in the long term.
- As regards **installation**, the quality of in-house wiring in Tanzania is definitely better than in other countries mainly due to the higher background and skill level of the selected field technicians. Nearly all of them had received vocational training in AC electrical installation before the UNEP training and demonstrated very good workmanship. Nevertheless the quality of solar module and battery installations was found rather poor during the evaluation visits. An increasing number of customers buys PV components separately and installs them on their own, which damages the final quality. Warranties are then not given by the dealers.
- During the first UNEP evaluation visit in Dec.06, many modules were wrongly tilted or oriented, put on roof without air cooling and poorly anchored to the roof with sub-standard support frame. Moreover many batteries were badly or dangerously installed.
- Those technicians require some **refreshing training** focusing on state-of-the-art instruction about how to connect batteries and install properly solar modules. Some of them consider that the UNEP training provided good basics but they ask now for more advanced training (design and installation).
- In case of failure or breakdown, dealers send their technicians to the customers; some cover all costs while others ask the customer to share.
- In addition the UNEP project has financed small **solar demo units** for dealer shops (total value: US$ 1529.48) but no minimum requirement was set up by the project and the PV systems are usually below 20Wp with rather poor design (not state-of-the-art). 11 companies have benefited from demo units but during the Terminal Evaluation, only 3 complete and installed demo systems were visible: at Burhani, Luyungu, and Swale shops. According to project data, other dealers as Chavala and Koko should have acquired demo systems but no system could be seen. There is suspicion that components have progressively been sold to customers.
- After the first UNEP/ESDA evaluation in Dec.06, 7 dealers were requested to **correct their solar installation** according to the mission report. At least 18 faulty installations visited in 5 districts required optimisation: basically module orientation, enough gap under module, provide battery box or protection, proper house wiring and wire connection on terminals. The corrections for 18 systems in Iringa have only cost US$ 425 and were finally financed through the limited remaining UNEP project funds. The terminal evaluation visit in June 07 revealed that the technicians-installers had corrected most of the

[13] Solar batteries are supposed to be adapted for deep cycling and to have longer lifetime thanks to their thicker plates and reduced contact area.

18 (not always satisfactorily) and had taken into consideration the previous comments in their new installations.

8.1.2.1.6 Capacity building:

- As far as the specific **Trainings of Trainers** (TOT) conducted in Kenya to in order to ensure quality systems and installations in each country, it should be noted that of the 5 trainers coming from Tanzania that attended the Nairobi UNEP trainings, only one (Arnold Nzali) has actually provided the field training (sales) to the national dealers. Most of the technical training was provided by 2 engineers who had not been trained by UNEP!
- Despite this inefficient management of the training, the 5-days **technical training** of 16 selected technicians from Iringa region (Dec. 05) has covered many topics with effective on-the-job training and final evaluation. It is somehow disappointing - but not surprising - to see the rather poor quality of module and battery installations after this training. Indeed rural technicians can hardly acquire complete installation skills in a one-shot training. Training materials are not described in training report and were hardly found at technician level. Neither tool nor testing equipment has been provided by the project.
- The **sales' training** (July 06) for sales agents in Iringa had a very ambitious content but was conducted only in 2 days, which is very short for the 10 rural dealers that attended the training. Some material was presented during the field evaluation and utilised by the dealers.
- The success of marketing or business development is strongly linked to the **personality of the dealer/individual** who carries out the commercial activity. It is very difficult to identify those key actors in the frame of the UNEP project; many identified dealers are not proactive enough or don't have appropriate education/skill for marketing. Some have quickly declined, after being trained.
- From the total 16 technicians trained by the UNEP project, only 8 were interviewed by the evaluator and are still active in the PV business in different districts. 2 technicians are no longer involved (2/10) and the remaining 6 were not met during evaluation.
- Final **end-user's training** has usually been provided by the technicians with rather basic instructions for operation and maintenance. No manual was provided to users.

8.1.2.1.7 PV Sales achievement

- Although the UNEP project started in June 05, the actual **sales and installation** in the Iringa region started after the awareness campaign in Dec. 2005. The total PV sales recorded in the region for the 13 **solar dealers** amount to approximately **480 solar systems** sold over the project duration, i.e. 12 or 13 months for the effective period. Not all dealers kept detailed records of their sales over the project period; however the terminal evaluation confirmed the order of magnitude.

	Dealer	Nb of systems installed
1	**Luyungu General Electrical Store**	43
2	**Njombe Electronics Centre**	18
3	**Swale Electrical services**	?
4	**Chavala Hardware**	4
5	Mgumba Enterprises	
6	**Mwaflugu enterprises**	4
7	**Burhany Machinery &Tractor Parts**	389
8	Mgaya Hardware	
9	Mwakapinda shop	
10	**Igubike Enterprises**	?
11	**Mwaisela Electrical Services**	12
12	Huruma shop	10
13	Msemwa Shop	
	TOTAL	**480**

In **Bold** : Dealers still active

- 80% of the sales come from Burhani Machinery & Solar Equipments who is the main dealer. He is also occasionally the importer of PV components and supplies for other local dealers. Luyungu General Electrical Store is the second with more than 40 systems sold and installed. Due to stock problems in the region, some dealers also happen to resell to other dealers.
- At least 5 out of the 13 solar dealers have not been active in the solar sector since the trainings provided by the project, leaving today 2 districts without any solar dealers (Ludewa and Mafinga). The others still have their solar shop but, except Burhani and Luyungu, the smaller dealers have sold limited number of systems (less than 20) and have very little or no stock.
- The size of the module stock can also be a valuable indicator of liquid assets and sales growth. With some of the dealers, the stock has doubled to quadrupled in that period to meet growing customer demand. But usually the dealers expressed lack of capital to buy a large amount of PV components and had rather small stock or no stock at all. All of them paid back their credit to supplier within 1 or 2 months. They rarely provide credit to customers; cash sales are the most common and the less risky.
- In few cases, dealers and customers have found local micro-finances (usually from SACCOs) to respectively improve their solar shop or buy their solar systems. Those isolated cases are individual initiatives and have not been supported by the project at all.
- It should be noted that the **selected project area** is extremely large compared to other project's countries and is characterised by a much lower population density. ESDT has put efforts to establish local dealers in each of the 6 districts of the Iringa region (initial aim was 2 dealers/district) providing a better geographical coverage of PV sales & services points for further market expansion. PV technology remains definitely the **most cost-effective** electrification option for most of those remote and scattered households in the region. However some districts as Ludewa and Makete are extremely remote and, since the end of project, ESDT has not got information about their status and progress, if any. It seems that ESD-T has not been able to provide equal support and follow-up to those remote dealers.
- The sales record from **Njombe Electronics** illustrates the positive trend of solar sales in Iringa during and after the UNEP project. This medium-size dealer sold about 15 systems (system sales – total 707Wp) and 41 PV modules (component sales – total 613Wp) over 18 months (from Jan 06 to June 07). The rate of system sales has increased fourfold over the

last 6 months, after the end of the project. The share of amorphous modules (14Wp) was 20% in 2006 and rose to 40% in 2007.

Njombe El.	2006 (12m)	2007 (6m)	Total
module Nb.	24	17	41
systems Nb.	5	10	15
total Nb.	**29**	**27**	**56**
module Wp	495	118	613
systems Wp	212	491	703
total Wp	**707**	**609**	**1316**

- Some price cost reduction for solar PV components was seriously expected after the project implementation. But one can conclude that no real downward trend was observed either in the Iringa region or in Dar es Salaam. Common prices for installed solar home systems in Jima during the UNEP project ranged between 15 and 20 US$/Wp depending the system size, despite tax exemption. Amorphous a-Si module only ranges between 3.6 and 4.8 $/Wp in the capital and up to 5.5 $/Wp in rural town. Crystalline modules are between 6.0 and 8.0 $/Wp in the capital. (See Annex C-10.1 for international PV market price comparison – Table F).
    - Tax and duties waiving had no significant effect on market prices. It is not clear whether this is due to lack of proper information among importing companies or to higher margins from PV companies or higher international module price.
    - The commercial network of dealers built in Iringa has actually not lowered the market prices for solar. The area is large enough for the small number of actors involved and they have kept relatively high profit margins on the final cost of installed PV systems or sold components.

8.1.2.2 Project outcomes

The UNEP Project Identification document clearly presents the expected outcomes at the end of the project. The medium and long term effects of the accomplished activities described above have been assessed during the Terminal Evaluation as follow:

8.1.2.2.1 Operational commercial delivery route between capital and selected rural district

The project has clearly established an operational linkage between DAR and the Iringa region, increasing:

- the number of capital-based suppliers involved in Iringa from 2 to 5 (target was 3 to 6)
- the number of Iringa-based dealers from 3 to 22 (target was 2 per district[14])
- the number of trained technicians from 0 to 16 but fewer than 14 are still active (target was 10 per district)
- the skill level of 5 dealers after sales training. There is no additional specific sales agent in the region (target was 5 sales agents per district)

8.1.2.2.2 Educated PV businesses in cities seeking to develop commercial rural markets

Based in Iringa cities, there are at least 3 dealers (Burhani, Luyungu and Njombe Electronics) very active in developing their solar business as described above.

[14] In Project Identification Document, the project targets 1 district per country. In Tanzania the project area is a region including 6 districts.

8.1.2.2.3 Network of influential policy makers promoting PV in RE plans

Several key policy makers of Tanzania (MEM, TBS, TASEA, TRA[15]) have participated to the international Policy Workshop held in Ethiopia and all of them are involved in promoting PV in rural electrification plans through the different ongoing projects mentioned above.
One impact of the UNEP project - though not a direct output - is the VAT tax and import duties exemption for all "solar products" and not only for solar PV modules.

8.1.2.2.4 Increased participation of international companies in national PV markets

Some international companies as Sundaya, Free Energy Europ, Sollatek, Chloride Exide, etc. have strengthened their involvement in Iringa region through intermediary companies based in Dar es Salaam. As mentioned before there are no real exclusive agreement between international and national companies.

8.1.2.2.5 Increased access for local companies to commercial financing

As mentioned above the NMB bank in Tanzania was on the point of implementing a solar loan product not only for Iringa but for the whole country through its 108 branches but recent structural changes have modified their objectives and strategy delaying the solar activities for a couple of months or years.
Despite many other potential alternatives through other micro-financing institutions in Iringa region (including SACCOs), the project has failed to provide today specific financing for solar dealers in Iringa. Awareness has been raised but some major efforts are still needed to end up with concrete and appropriate solar loans. The regional study trip organised by UNEP project in Bangladesh on financing of SHS has effectively brought some new ideas among the participants from 5 countries but none of them actually developed any concrete action. Only one company Davis and Shirtliff has approached NMB bank to develop a credit scheme for dealers but no concrete plan has been achieved yet. The results of this trip will hopefully come on the long term.
Despite a rather good potential to develop financing mechanism in Tanzania, one should note that the UNEP project has not succeeded within the short project duration in improving financing access to private dealers or suppliers; yet, there are tiny and shy initiatives in gestation.

8.1.2.2.6 Increased sales and installation of solar PV systems

About **480 PV systems** were sold in about 18 months in Iringa region with an average size of 30Wp. Total installed capacity is then **14,000 Wp**.
The PV **sales projection** for the next 5 years is rather difficult given that the PV market growth will depend strongly on MFI involvement that so far has not shown much interest yet and on the government support to renewable energy companies. If everything is set in favour of the private and financial sectors, a target of 5,000 SHS of about 40 Wp in 5 years after the end of the project should be a minimum, i.e. **200 kWp**. The total number of households in Iringa region is estimated to 300,000, i.e. the target of 5000 SHS sales corresponds to only 1.7% of the non-electrified households.
Based on that sales volume, the Terminal Evaluation also estimated the reduction of Carbon emission during the project phase in Tanzania at **80 to 90 tons of CO_2 per year**. The direct post-project abatement could reach **240 tons of CO_2 per year** if we consider the previous projection over 5 years. These assessment is based on various studies which have tried to

[15] Ministry of Energy and Mines (MEM), Tanzania Solar Energy Association (TASEA), Tanzania Bureau of Standards (TBS) and Tanzania Regulation Authority (TRA)

estimate the **direct abatement of CO_2** (kg per household) from the use of solar home systems in different developing countries. In Kenya for example[16], a 40Wp module is assumed to displace about 350kg of CO_2 emission per year by replacing inefficient kerosene lighting alone, i.e. 8.75 kg of CO_2 per Watt Peak (Wp) and per year. By including the displacement from lead-acid battery recharged by grid or gensets, the baseline value can reach 10 kg CO_2 /Wp /Yr. But other studies[17] come with much more conservative values, as low as 200kg of CO2 for 50Wp module, i.e. 4 kg /Wp /yr. As baseline for this evaluation we recommend to use the value of **6 kg /Wp /yr**[18].

8.1.3 (B) Assessment of Sustainability of Project Outcomes

The major **benefits** of the UNEP project in Tanzania are the raise of awareness in the whole Iringa region and the emergence of private dealers promoting quality solar products through their network of trained technicians. During the project duration and until the evaluation, all of them have expressed their satisfaction with solar business development and their conviction of rapid growth of solar sales. Acceptable technical skills are there and stocks of PV components are locally available (or quickly available) ensuring somehow a **sustainable delivery chain**.

However, without better **financial support** as credit to either customers or dealers, the profit of dealers will remain very small compared to their other activities such as general electrical or hardware shops. The actual sales of dealers remain limited (10 to 60 systems per dealer in 18 months), except for Burhani which has a dominant position with 76% of the Wp sales. Dealers and technicians seem to be in the "enthusiastic phase" of solar; they put lot of efforts to offer best services to customers, but sometimes lose money in transportation and labour.

There is a concern about the **long term sustainability** of their solar business, i.e. actual solar sales. Hopefully, their core business is not threatened and can allow them to overcome some PV business hazards for a while. During evaluation, it was observed that their customers are extremely scattered (usually 1 or 2 customers in one village) and over very large distances from the dealer's office (many have customers beyond 50km). These are not the appropriate conditions for cost-effective and profitable solar business.

The Terminal Evaluation brought out the fact that the following **key factors** have been addressed in Tanzania but not always properly to ensure long-term sustainability:

- **Continuous awareness and marketing support:** the project through the local consultant (ESD-T) did most of the marketing efforts on behalf of the private sector and has conducted effective but one-shot awareness campaigns. Now the private sector is expecting that sales will grow by themselves but without additional external support for awareness and marketing the long-term outcomes of the project are unlikely to happen. The involvement of local dealers in awareness campaigns, in promotional activities and in developing marketing strategies is a good indicator for long term sustainability but still mitigated in Tanzania.
- **Availability of solar loans for customers**: the lack of credit facility for customers over the whole project period is the major barrier for increasing the sales. Even with intensive awareness efforts and effective network of dealers/technicians, more than 90% of villagers cannot pay cash for solar systems. Far too few efforts and follow-up have been devoted by ESD-T to set up effective financing scheme, either through NMB or other MFIs (see above). The involvement of those institutions in solar business is not as simple as expected and needs more time than the project duration.

[16] Kenya figure is derived from Robert Van der Plas and Mark Hankins, "Solar Electricity in Africa: A Reality," *Energy Policy*, vol. 26, no. 4 (1998), p. 299.

[17] http://www.iea-pvps.org/pvpower/14_03.htm

[18] *Steven Kaufman,* REPP Research report, no. 9 (2000).

- **Densification of the customers:** local transportation cost for solar installation, after-sales services and awareness actions can be considerable if distances are higher than 40km and villages host very few customers. This is the case of most customers in the Iringa region. The penetration rate can be increased with solar loans and the marketing efforts mentioned above.

Based on the Kenyan pure-commercial model, the Governments in all 4 project countries were as little as possible involved in the implementation as well as in the follow-up and monitoring. It is quite obvious that the project has provided assistance to build commercial dissemination networks in each region but the project-end means interruption of this crucial assistance. After only 2 years, the Iringa market is not mature enough to grow by itself (no capital at dealer level and not enough confidence from capital-based suppliers and MFIs) and to ensure continuation of benefits. Here the **Government** should intervene to continue long-term efforts in awareness, monitoring, synergies with other RE programmes and promoting financing mechanisms (loan, subsidies …). The solar energy association TASEA for example is very active in awareness and networking activities and synergies should have been developed. The UNEP project has not established any link with TASEA and TASEA never communicated about the project in its quarterly magazine SunENERGY or one its website.

The challenge is now the **transition** after the end of the project. There are good chances that quality control and standard enforcement will be properly managed by the TASEA and TBS who participate actively to policy workshop and are involved in PV promotion. But to ensure further sustainable commercialisation, the private sector of the region needs to a certain extent assistance from government with regard to the factors mentioned above (support for continuous awareness and for availability of appropriate financing schemes MFI involvement). M&E is also an important activity that could be supported by Government agencies to adapt the efforts permanently and ensure continuity with the project outputs.

The UNEP project clearly targeted the "rich" segment of the Iringa population but one can wonder if the initiative should not have been pushed one step further with the introduction of **smart subsidies** to reach "poorer" households that cannot afford solar system by cash or even with credit. In Tanzania the social tariff for grid connection in rural area is highly subsidised (40 TAS or 0,023 US$/kWh). One of the roles of the Government could have been to facilitate access to *capital subsidy for least cost options* proposed under the Rural Electrification Agency (REF Fund if already effective).

8.1.4 (C) Catalytic Role

The ongoing so-called **SIDA-MEM project** (supported also by GTZ) has similar marketing strategies (awareness & marketing campaigns, business development, networking, policy reforms …) as developed within UNEP project but was launched at national level and for the next 5-years. It is not a direct replication or output of the UNEP project as it effectively started mid 2005, shortly after the UNEP project actually started. Both UNEP and SIDA projects have suffered from long preparatory periods.

The UNEP project as a pilot initiative has voluntarily concentrated efforts in only one region which happens to be the highest income region of Tanzania.

The **lessons learnt** both during project design and during UNEP project implementation have strongly contributed to validate the methodology and to improve the implementation of the SIDA-MEM project and to avoid repeating previous mistakes. Some of the lessons are for example:

- The importance of involving MEM and local government to facilitate meetings, mobilisation and concrete actions.

- Developing micro-financing mechanisms to overcome financial barriers, especially for regions with lower income; involvement of local SACCOs and other MFIs (main challenge for SIDA-MEM project!).
- Allocating more time/budget for follow-up and monitoring
- A better selection of proactive dealers to avoid later on withdrawal
- Building local capacity with Tanzanian trainers speaking Swaheli.
- A higher quality of technical and sales trainings.
- Enforcing quality standards and controls in collaboration with TBS and TASEA

In practice, the synergies between the UNEP project and the new SIDA-MEM project were the following:

- key inputs for the inception report (Jan 05)
- first steering committee meeting held in Iringa town in Sept. 06 to share experience and to learn from field visits at dealer shops and at PV installations
- TASEA association established a branch in Iringa and got about 20 new members (dealers/technicians).
- a Solar Day in the region is planned by TASEA under the SIDA-MEM project

The fact that ESD-T managed both projects was not appreciated by the government (MEM) although it was a good opportunity for better capitalisation and synergies. The team was actually overwhelmed by too much work and this generated some tensions with Government. It was finally decided to subcontract the field operation management of the UNEP project to an external consultant (Arnould Nzali[19]) for the last 6 months.

Today the SIDA-MEM project announces very optimistic results: for example in the **Tanga region** only, about 1000 solar systems mainly for domestic use were sold by 10 dealers in less than 6 months. The total power 5874Wp is made at 80% of 14Wp a-Si modules of approved quality. Those results could not have been reached without the lessons learnt from the UNEP pilot project. More details are provided in the Monitoring report from ESD-T (May 07).

[19] Arnould Nzali was involved at different level in the UNEP project: manager of RESCO Ltd Tanzania ; local UNEP project coordinator ; sales trainers for Tanzania

8.2 Project performances in Uganda

8.2.1 Country Background

8.2.1.1 PV market overview

The PV business in Uganda is rather thriving with more than 20 registered PV companies based for the most part in Kampala, as reported by several papers[20], interviewees and BUDS-ERT website.
Several large government and donor-led solar projects have raised PV awareness amongst rural population and supported private sector development.

8.2.1.2 UNEP-GEF Project

The UNEP-GEF project effectively started in Uganda in June 05 and was implemented by the local consultant **Konserve Consult Ltd (KCL)** (national executing agency). The project was implemented in the **Rakai district**, characterised by a low electrification rate (6% of population) and by a rather high income level (agriculture + civil servants).
The political and economical resemblances between Uganda and Kenya led to believe that the positive experience of the PV commercial dissemination network developed in Kenya between the capital and a high income & demand area (model of "dealer network") could be easily replicated in Uganda.
The UNEP project has also been designed to be complementary to and in continuation of previous PV projects as UPPPRE, PVMTI. The only project that was going on at the same time was the BUDS-ERT[21] programme (WB-GEF funded) and KCL was already involved as a local consultant in that project which created a link between the 2 projects.

8.2.1.3 Baseline conditions in Rakai

Before the project started, the population of Rakai had some awareness about solar electricity but was faced with the main problem of affordability. There were only 2 solar shops in Kyotera, supported by 2 Kampala-based PV suppliers: SEU and Ultratec.
KCL has produced one report on the Solar PV Market giving the PV potential and findings of assessment in each of the 4 counties of Rakai with some data on baseline conditions. It indicates that there were 30 electrical shops and 19 Battery charging stations as potential outlets for stocking PV components. Some of the 26 registered electrical technicians had been involved in previous solar installations (poor quality).
In addition, the report mentions that there were 25 local banks or Saccos in the District, all focusing on poverty and AIDS but not on solar loan yet.
The sales level of PV modules in Rakai before the project started is not known due to lack of sales record data.

8.2.2 (A) Attainment of Objectives and Planned Results

8.2.2.1 Project achievements

The UNEP project in Uganda has achieved major outcomes such as the increase of key stakeholders for PV commercialisation in the region and of PV system sales. To a certain

[20] Solarnet Magazine – Sept. 05
[21] BUDS-ERT programme (Energy for Rural Transformation) and effective linkage with UNEP project are described in § 8.2.2.1.4 on National network

extent, all specific objectives were attained during the 2 year project period as described here after.

8.2.2.1.1 Financing:

- Since the beginning of the UNEP project in Uganda, Konserve Consult Ltd (KCL) identified the dominant problem of the customer's affordability and made effort to sensitize **Micro Finance Institutions** (MFI) in the Rakai district as part of the business development to reach rural population. This microfinance mechanism with solar loans for PV systems was to a certain extent an alternative to the initially planned TREDF business investment loan (US$ 400,000) that never came off.
- Significant efforts seem to have been put in the course of the UNEP project to sensitize and commit local MFIs to provide solar loans and to reduce financial barrier for potential customers (more details on effective involvement of MFI in § 8.2.3 on Sustainability). KCL has sensitized 7 Micro Finance Institutions on solar technology but the best tangible achievements have been obtained with 3 local SACCOs:
    - **Kakuuto Small Business Development** (SACCO based in Kakuuto)
    - **Lwamagwa Rural Microfinance -** (SACCO based in Lwamagwa)
    - **Kaaro Sacco** associated with VESCO company selling large PV systems. Kaaro got a grant support worth $ 45,000 from UNDP thanks to KCL assistance.
- On the other hand, 2 larger banks (Victoria Basin Microfinance Ltd and Century Rural Development Bank) sold very few PV systems (<10) due to lack of confidence from suppliers. Two other MFIs (Sembabule Microfinance Institute and Mateete Microfinance) have not been successful despite KCL efforts to convince them and to assist them.
- The international financial institution Finca[22] has shown interest to support solar but their credit scheme was found by KCL much too bureaucratic and inefficient for the project. E+Co[23] and Grofin have also started later to invest in PV activities in Uganda.
- However, all the PV sales during the UNEP project were achieved without MFI or bank involvement or project financial support; to build an effective financial network takes longer time than project duration. One PV supplier (SEU) achieved 85% of the PV sales during the project because he managed to offer his own solar loan to his customers (without any interest). But this solar credit scheme was limited to 2 years and to 10Wp solar systems only, which generated problems of money collecting and dissatisfaction with system quality and performances.
- Therefore the expected **co-investments** (leverages) came from the customers themselves and even exceeded the target: **386** solar systems have been sold by Rakai-based dealers. In addition the total amount of sales should include the other **28** PV sales generated by other projects that are a spin-off from the UNEP-GEF PV project. In the end the total leverage in Uganda is estimated at **US$ 91,700**. (cf. table in § 8.2.2.1.7 on Sales)
- In Uganda, various **commercial supply chain models** were experimented in the Rakai district with different financing schemes and solar loan products. Each of the 4 companies involved in Rakai has developed its own marketing approach and local networks of intermediaries.
- Many lessons were learnt during the UNEP project and now, one could think that the "**fee-for-services**" scheme associated with a larger PV system size, as experimented in Eritrea, could be more effective and could impact more households in the villages, despite the higher service cost.

[22] FINCA International provides financial services to the world's lowest-income entrepreneurs so they can create jobs, build assets and improve their standard of living www.villagebanking.org
[23] E+Co: investor in Clean Energy Entrepreneurs

8.2.2.1.2 Regional linkage:

- Despite the fact that none of the UNEP project workshops or meetings was held in Uganda (contrarily to Ethiopia, Tanzania and Kenya), many national representatives have participated to the different events abroad. 13 Uganda participants (7 from private solar companies) attended the Kick-Off workshop in Nairobi (June 05), 6 the Financial workshop in Dar-es-Salaam (March 06), 7 the Policy workshop in Addis (June 06) and 1 joined the study tour in Bangladesh.
- During Policy workshop, Uganda, Kenya and Tanzania have strengthened their efforts to harmonise PV standard in the region and have encouraged Ethiopia to catch the train. This seems to be the only effective linkage left between countries. Most PV stakeholders haven't even heard about the project progress in other countries since June 06.
- Only one organisation from Uganda (the microfinance institution FINCA) participated to the study tour in Bangladesh (Sept. 06) because a similar trip in Sri Lanka had been organised 2 months before (July 2006) for several Uganda MFI and PV firms under ERT/WB project. Little information was exchanged through a special issue of SolarNet magazine.

8.2.2.1.3 International involvement:

- Only one private PV supplier (Ultratec) participated to the first trade fair in Kenya because he had a branch in Nairobi and none of them joined the other commercial trade fairs. This means a lost opportunity of linkage with the numerous foreign PV companies present at those trade fairs. Nevertheless the major importers as Dembe and Ultratec had already strong commercial agreements with international suppliers.
- In Uganda there are some international PV companies working closely with local partners and having exclusive contract. E.g. Shell Solar and UltraTec, with the assistance of the Shell Solar Foundation, had already introduced in the Rakai district a new business model called UltraSolar based on franchises.

8.2.2.1.4 National network:

- The **Market assessment** conducted for 1 month in the Rakai region has demonstrated the large potential for promoting PV in Rakai and developing a reliable network of actors. A detailed report has been issued by KCL and presents all local potential stakeholders.
- During the UNEP project, the number of PV players has strongly increased in the Rakai district, as well as in Uganda, not only private importers/dealers/retailers but also MFIs. This is an indirect outcome of projects as UNEP and promotional efforts of KCL.
- As mentioned above the national **BUDS-ERT programme** was running parallel with the UNEP project and its solar component had similar objectives with support for PV private sector (performance-based grant incentives with 2.5$ rebate on each Wp sold) and key activities on awareness and local training. Some linkages with UNEP project were realised by KCL through organising technical trainings (see further § on Capacity Building) and helping 2 PV companies to access the ERT incentives. But on the other hand the new BUDS-ERT project director[24] from the Private Sector Foundation (PSFU) has never been informed about any linkage or UNEP project status and progress although the BUDS-ERT director attended the KO meeting in Nairobi and the coordinator the Policy workshop in Addis. This denounces the poor communication between the 2 programmes and probably a lack of confidence in the UNEP project.

[24] PSFU has changed 3 times his solar project manager over the last 3 years.

- Indeed KCL played a key role to assist all interested private PV suppliers to develop their business in Rakai and to access financing either through MFI/SACCOs or through sales-based grant incentives from BUDS-ERT programme. Under the UNEP project, 3 Kampala-based PV companies (Girasolar, Vesco and Solar Sense Ltd) started local PV business in the Rakai district. 5 other companies were already active before project started.
- It is interesting to note that most Uganda PV suppliers - as well as local dealers in Rakai - were actively seeking financial support to develop their business, making the situation and linkages rather complicated and unclear at the time of the evaluation survey.
- The **national suppliers** (Kampala-based) involved in the Rakai district are:
    - **Dembe Trading Enterprises**
        - Dembe is today the largest PV importer in Uganda; distributor for FEE and dealer for Shell Solar and many other components.
        - Dembe has developed good acquaintance with **Kakuuto** Sacco during UNEP project (Memoradum of Understanding – MOU) but no PV sales were recorded during the UNEP project.
        - Dembe is now the main supplier for the GTZ project with many PV sales in Rakai and has developed adapted solar packages with credit scheme for the SACCO members.
        - Dembe has organised several "road show campaigns" with the assistance of KCL (not much impact on sales but creating awareness on solar among rural population).
        - Still seeking for local agent(s) to take care of Depot(s) in Rakai.
    - **UltraTec (U) Ltd**
        - Major PV importer involved in Rakai but no PV sales recorded during the UNEP project.
        - It has developed a "franchising solar business model" called UltraSolar concept: standard solar PV packages and services are sold in a solar shop by a business person (Franchisee with initial investment of 5,700 USD) under a pre-defined agreement. One of his assignments is to assist and to push the technicians to sell more PV systems. There are already 12 franchises in Uganda benefiting stock, assistance and supervision.
        - UltraTec initially co-invests in the franchise but as soon as possible a local MFI or village bank should take over the financing of business development, stocks, monitoring, …
        - UltraTec works with different MFIs in different areas of the Rakai district:
            - with **Lwamagwa** Rural Microfinance,
            - with Uganda Microfinance Ltd (**UML**) for solar lanterns in Lyantonde and Kayouga
            - with **FINCA** for pre-finance of franchisee in Masaka but rather heavy burocracy
            - with **E+Co** for loans to buy PV equipment (4 years at 8-10%/year)
    - **Solar Energy Uganda** (SEU)
        - SEU is not mentioned in the KCL final report as if it was not actively supported by KCL activities. Yet SEU provided more than 85% of the PV systems in Rakai (Sanje, Kakuuto, Dwaniro counties) under UNEP project thanks to an attractive financing scheme.
        - Some of the success factors which allowed SEU to reach a large number of sales and installed PV systems in the Rakai district, are the possibility of acquiring very small PV systems (10Wp), flexible payment terms (max. 2

years) and the innovative concept of the "Home Owner Association" centre (resident technician + mobilizers + cluster of customers).
        - Rapid sales occurred in the first 3 centres in Rakai but this approach with cheap components and rustic installation resulted in the lower quality of PV systems and thus in a lower satisfaction of end-users. This probably accounts for the progressive lowering of sales from SEU in Rakai at the end of the UNEP project.
        - SEU faced many other problems during the UNEP project (collection rate, user's complaints, fees for technicians, local stock management, heavy awareness and registration process, credit pre-financing (no external source was used for the credit scheme) …). In the new GTZ project, SEU has taken into consideration all these issues to improve the quality and satisfaction of users.
    - **GiraSolar (EA) Ltd**
        - GiraSolar started business in Rakai (Sembabule, Mateete, Kasagama) thanks to KCL assistance under UNEP but effective PV sales only started close to the end of UNEP project.
        - GiraSolar set up 2 brand-new solar shops/branches in Kasagama and Sembabule but very little sales probably due to too high prices and poor commitment of local MFIs.
        - Under GTZ project, the Sembabule branch has been moved to Mateete with a more promising agreement with **Mateete** Microfinance. However very few sales occurred over the last 4 months partly due to unreadiness of the solar loan.
        - GiraSolar also got access to incentives from **ERT** thanks to KCL and separately to low-cost financing worth $ 50,000 from **E+Co**.
    - **Victoria Electricity Supply Company** (VESCO)
        - VESCO recently started business in Rakai (Nyaboshozi) thanks to KCL assistance under UNEP and sold few systems during the UNEP project.
        - VESCO got also access to incentives from **ERT** thanks to KCL
        - VESCO has associated with local Sacco in Nyabushozi (Kaaro).
- In the Rakai district, different models of supply have been developed and they now properly cover the geographical area. Several local **solar dealers** are found in rural towns with different profiles:
    - freelance retailers of solar shops (cf. Zopie Electronic shop)
    - local manager of Depot of PV component (cf. Dembe)
    - Franchisee with solar shop (cf. UltraTec)
    - Mobilizer for Home Owner Association (cf. SEU)
    - even local SACCO (cf. Kakuuto and Lwamagwa).
- Those "solar dealers" purchase most of their PV components from their associated Kampala-based companies and usually concentrate their sales in their own county or sub-counties limiting the competition effect. Cash sales are still the most common approach until local MFIs decide to invest in solar loan.
- Those solar dealers in Rakai now utilise the local and available **solar technicians** and **sales agents.** Most of them have been trained by UNEP and/or ERT and/or GTZ[25], showing a good example of linkage between what has been provided by projects and what is finally used by the private sector.

[25] the ongoing GTZ-ETC project is described in "Catalytic role" section C.

- The trained technicians are usually fully independent, having core business in electricity and getting trained in solar (PSFU, UNEP, GTZ). They are reachable only by mobile phone and own basic tools and even a meter but no compass. However most of them have installed less than 5 systems over the last year because "dealers didn't bring them more business". They complain about the lack of PV stock in town and demand a motorcycle for village visits, as well as brochures and business cards. Their "wait & see" attitude and their lack of sales capability are the real bottleneck. Although they are convinced by the huge demand around, they don't do proactive marketing to identify and list the potential buyers and to convince them to buy.
- KCL led different **awareness** & **promotional activities** to promote local business in Rakai during the project implementation as:
    - production of promotional material and adapted tools to local needs and conditions as banners, brochures (for businesses and end-users), radio programme
    - several consultative meetings with local MFIs, SACCOs, NGOs, CBOs[26], technical organisations …
    - a special seminar in March 2006 with various stakeholders (48) from the Rakai district to present the findings of the market assessment
- There is no separate report on their promotional/awareness campaigns but some information is provided in the final report[27] of KCL.

8.2.2.1.5 Quality PV systems & installations:

- The evaluation done by UNEP & ESDA at the end of the UNEP project in December 2006 has pointed out the poor quality level of PV components and installations and the risks to hamper the promotion of solar PV in the country. Indeed main PV suppliers have recognised themselves the lack of proper design (poor quality and mismatch of components) and quality control of their technicians before the UNEP/ESDA evaluation.
- As for other countries one of the main reasons seems to be on the one hand the pressure to achieve PV sales target before the end of the project and on the other hand the lack of appropriate workmanship and stock of components. Despite being trained 2 or 3 times by different projects it seems that many technicians have still not reached the minimum standards for PV installations and they need to be supervised and their work to be controlled. A minimum requirement level does not seem to have been clearly defined and presented by trainers; moreover the trainees didn't get enough practices and supervision.
- Some progress in installation standards were noticed during the Terminal Evaluation between the earliest and latest installations, but efforts are still needed to reach acceptable installation quality; in particular, better matching of PV components, improved installation of solar panels (orientation, tilt, anchorage, shading) and safer installation of batteries.
- ESDA has requested the national coordinator KCL to rectify rapidly the installations on the basis of the evaluation findings.
- Consequently KCL has proposed to conduct in Feb 2007 an additional "Clean-Up activity" to remedy the shortcomings stressed by the Evaluation. For about USD 6,000 the proposal covered the improvement of module mounting systems and battery boxes (70%) as well as the provision of additional hands-on trainings and tools (30%).
- But few corrections were finally done in the field; only a couple of panels have been re-oriented to comply with basic PV installation standards. This is partly due to due to lack of budget to properly rectify those installation but also to the fact that KCL was more

[26] CBO : Community-based Organisation
[27] Final report by KCL: "Commercialisation of Solar PV in Eastern Africa : the Uganda Experience"

concerned about promoting marketing to create the demand and to provide the work for technicians than ensuring quality and supervision.

- The Terminal Evaluation in May 2007 has visited some of the solar installations previously inspected by UNEP/ESDA confirming the shortcomings made: solar panel installation, battery safety, wiring layout, socket appropriateness, lack of O&M training and spare parts. But the evaluator has not seen any correction or improvement; even technicians seem not to be informed about the necessity to improve the quality according to minimum technical standards. Urgent update of technicians is needed to avoid further poor installations.

8.2.2.1.6 Capacity building:

- Under the ERT programme in Uganda, PSFU organised PV trainings for rural technicians in 2005-6 in all the country districts. Solar PV was taught as part of the curriculum in several technical institutions in Uganda. The ERT PV training was valuable but the main problem was that it was an "introduction" for most of the technicians and there was actually no field work behind to practice. Additionally PSFU training was mainly technical and was not enough aimed at promoting sales.
- The more recent trainings in the framework of UNEP and GTZ projects provided an opportunity to refresh the knowledge of those technicians toward a better understanding of PV (raising more interest and relevant questions from technicians) but still the practice remains limited and the final quality of installations is low.
- 2 engineers from GiraSolar (Richard and James) participated to the Technical Training of Trainers (TOT) (Oct 05) and 2 other staff from GiraSolar and UltraTec to the Sales TOT (Feb. 06).
- Afterward KCL organised both technical and sales training to local stakeholders. In the meantime KCL was struggling to increase confidence and improve cooperation or collaboration between rural technicians and capital-based PV companies.

Technical training:

- A detailed **report** on training has been provided by KCL with the list of trainees and the evaluation process and scores. But no detail on the course material was provided and no information on after-sales services and end-user's training after installations.
- technicians with basic PV knowledge were selected from Rakai out of 30 candidates (2 from GiraSolar and 7 freelance technicians already selling or installing PV products in Rakai)
- 3 training sessions of 5 days were organised by KCL in Nov-Dec 05 outside Rakai district (Luwero + Pallisa + Kumi) in synergy with the training programme from PSFU as KCL was closely involved in those ERT trainings.
- The technical training focused on theory and practical works including basic installation with reference to UNBS standards and codes but only practical board and module mounting systems (no in-house installation) were considered.
- During the field visits, the Evaluator interviewed 3 of the trained technicians in Kyotera active in PV business and he found that neither tool nor testing equipment was provided by the project but technicians were requested to bring their own equipment which was not always appropriate.

Training on sales

- The sales training was supervised by Mr. Bobby (KCL) who has excellent marketing skills and knowledge. He mentioned that his training focused on "how to sell?" with practical exercises and "how to get finance support?" from MFIs.

- **6 participants** having technical or electrical background and interested in PV business in Rakai were trained. 2 of them participated to the technical training. Training was tied to the market promotional campaigns.
- After training, some linkage with PV suppliers in Kampala were established or strengthened. E.g. Dembe Trading Enterprises seeks sales agents to manage their depot in Rakai district towns.
- Unfortunately the Sales Training **report** is extremely poor (2 pages only, hard copy received directly from KCL) and doesn't describe the actual trainers, training content, activities, date and location of training …; only the participant profile is given.

8.2.2.1.7 PV Sales achievement & Costs

- In spite of noticeable efforts from KCL to get back from suppliers/dealers/sales agents the list of actual sales, on the whole the information provided lacks details or is not updated. The next table provides the estimated sales in Rakai district during the project period (until 31 Dec. 2006) based on information collected from suppliers. Those numbers were partly confirmed by the field interviews during evaluation.
    - A total of **386 PV systems** provided by 4 Kampala-based companies were installed.
    - Another **28 PV systems** installed under GTZ project could also be considered as indirect outcomes of the UNEP project.

Total Sales to Date in Rakai district & any spill-off to other regions [28]		
Service Provider	**No.**	**USD (Estim)**
Project Region *– as at 31 Dec 2006*	***386***	
Solar Energy Uganda (SEU)	330	49,500
Girasolar (EA) Ltd	20	9,000
VESCO	25	10,000
Solar Sense	11	11,600
Spill-Offs *– as at 31 Dec 2006*	***28***	
UltraTec (in Masaka & Lyantonde)	10	5,000
GiraSolar (in Masaka)	8	3,600
Kakuuto Microfinance Ltd	10	3000
		91,700

- SEU has provided an updated list of 330 PV systems installed in Kakuuto, Dwaniro and Sanje during UNEP project (before 31/12/06) but they claim that about 400 systems have been installed in Rakai district. All PV systems from SEU are 10Wp systems and are sold at 154$ (15.4$/Wp).
- Solar Sense also provided a list of 11 PV systems; the average size is about 75Wp and the average installed price is $14/Wp.
- Other suppliers have not provided detailed and updated list of their sales but have communicated the numbers mentioned in the table. For a 14Wp lighting system, the installed price (without transportation) varies between 12.6 $/Wp (SEU), 15 $/Wp (UltraTec) and more than 20 $/Wp (GiraSolar).
- Compared with the performances of SEU with its attractive credit for small PV systems, the sales record in Rakai for other dealers (usually cash sales) is limited showing clearly the need for lower cost and/or appropriate financing scheme for customers.

[28] This is the sales of SHSs to-date since the start of the project. The sales should include any other sales generated by other projects that are a spin off from the UNEP-GEF PV project

8.2.2.2 Project outcomes

The medium and long term effects of the accomplished activities described above have been assessed during the Terminal Evaluation as follow:

8.2.2.2.1 Operational commercial delivery route between capital and selected rural district

The UNEP project has clearly established an operational linkage between Kampala and Rakai district, increasing by the end of 2006:

- the number of Kampala-based suppliers involved in Rakai **from 5 to 8** as per target;
- the number of Rakai -based dealers **from 2 to more than 7** (target was 2 per district)
- the skill level of **9 trained technicians** already involved in solar before (target was 10 per district)
- the number of trained sales agent **from 0 to 5** (target was 5 sales agents per district)

8.2.2.2.2 Educated PV businesses in cities seeking to develop commercial rural markets

Uganda is probably the most active UNEP project's country in terms of private business development both in Kampala and in the Rakai district. It took some times to KCL to overcome the initial reluctance of Kampala-based companies to work closely with local dealers as it was perceived as not cost-effective. Finally, the UNEP project has managed to create or to strengthen the links. Respectively 4 and 6 private PV firms have auto-financed their participation to the Kick-Off workshop (Nairobi) and Financial workshop (Dar Es Saalam).

There are today more than 7 solar agents in Rakai established as private dealers (solar shops or depots) or Saccos and proactive in developing their solar business and searching for financing as described above.

8.2.2.2.3 Network of influential policy makers promoting PV in RE plans

There is no major outcome from the UNEP project as far as Uganda policy makers are concerned. Despite a significant involvement of the different government institutions (MEMD, UNBS, UREA, REA-U, BUDS-ERT[29]) in the solar PV programmes/activities and their participation to the 3 UNEP workshops, there is no clear evidence of the impact of the UNEP project on the ongoing rural electrification policies and strategies. The apparent lack of linkage with the BUDS-ERT programme and the absence of dialogue with other institutions confirm this observation. The custom duties for solar equipments (module, batteries) were already exempted in 2003 before the UNEP project started but not the import VAT taxes (18%). Progress on setting and enforcing quality control, PV standards and code of practices was also well advanced in Uganda compared to other partner countries.

8.2.2.2.4 Increased participation of international companies in national PV markets

No major changes are noticeable after the UNEP project in the inter-relations and agreements between international suppliers and national importers. As in Kenya, some importing firms have exclusive contract with international suppliers (D&S, Sollatek, Sundaya, Shell Solar …). With the support from Shell Solar Foundation, UltraTec has recently developed a new business model with franchises and financial support (cash sales).

[29] MEMD-Ministry of Energy and Mine Development ; UNBS-Uganda National Bureau of Standards ; UREA-Uganda Renewable Energy Association ; REA-Rural Electrification Agency

8.2.2.2.5 Increased access for local companies to commercial financing

Thanks to significant efforts from national consultant KCL under the UNEP project, there are today several MFIs and SACCOs proposing in partnership with private companies solar products and loans (with brochures and price lists) to their customers/members in Rakai and elsewhere. Due to the short project period, the solar loans and financing schemes were not appropriate but the GTZ project provides them assistance to improve their products and business.

8.2.2.2.6 Increased sales and installation of solar PV systems

A total of **386 PV** systems with an average size of less than 15Wp were sold in about 12 months in Rakai district. The total installed capacity is estimated at **5.8 kWp.**

Assuming that the 4 main PV suppliers involved in Rakai can reach the SEU performances every year with better access to finance schemes, then the projection for 5 years after the project-end can be estimated at 6-8000 SHS with an average size of 25 Wp, i.e. **30-40 kWp/year**.

By using the recommended value of **6 kg /Wp /yr**[30]**,** the reduction of Carbon emission during the project phase in Uganda can be estimated at **36 tons of CO_2 per year**. And based on previous project 5 years after the project-end, the direct post-project abatement could reach **240 tons of CO_2 per year**.

8.2.3 (B) Assessment of Sustainability of Project Outcomes

- The implementation of the UNEP project in Uganda has brought several **major benefits** for the Rakai district that are among the achievement described above and that can be summarised as:
    - Effective network of PV **suppliers and dealers** well sensitised on solar and promoting solar products in the whole Rakai district.
    - Several **MFI institutions** (international, national and local) involved and committed at various stages to support private initiatives and PV development for rural population.
    - Strengthening the skills of **solar technicians** that were previously trained by the BUDS-ERT programme.
    - The **district area** has been rather naturally divided up among solar dealers; each dealer being active in a reasonable geographical area (within 50km radius) that should allow profitable business.
- The **sustainability** of the UNEP project in Rakai seems rather good given the fact that all serious issues as awareness, training, availability of after-sales services and stock, financing have been addressed by KCL during the project. However there are some shortcomings that may impede the sustainability of the outcomes in the long term. The critical issues to be considered at the end of the UNEP project are:
    - The need for **continuous awareness efforts** for both private sector to invest in PV business and potential customers in remote villages. Indeed, the national consultant KCL has made fewer efforts on end-user awareness campaigns (radio, newspapers, theatre shows, village meetings …). The sales volume is important to ensure enough solar business to local dealers and technicians.
    - The need for **continuous support and supervision** of the fragile linkage between PV firms, dealers and MFI institutions. More confidence between capital-based and district-based stakeholders is essential for long term development

[30] Cf. Tanzania section

  - The need for **appropriate technical trainings** and **quality control** with relevant minimum standards for PV system design and installation. It is astonishing that despite repetitive training (ERT + UNEP) the quality of PV installations under the UNEP project was not up to standard expectations. It seems that the national trainers themselves were not up to the level of requirements, and the limited number of field installations combined with a lack of control/supervision didn't help the trainees to improve.
  - The need for **effective and appropriate financing schemes** (capital financing for dealers and credit for customers). Convincing MFI to develop such schemes for solar business and bringing them to concrete achievements usually takes more time than the project duration. However several financial schemes and solar loans were experimented during the project duration but none was fully appropriate or mature enough (compromise between affordability of PV systems by customers and risk level taken by MFI to lend money).
- The 2 years' project period was clearly too short to establish a **sustainable delivery chain** and to reach effective sales; this period did create awareness and develop confidence with other stakeholders in that district but it requires considerable efforts to change the mentality and behaviour of all rural actors (shopkeepers, micro-financers, end-users). Furthermore the strategy for marketing PV has to be adapted to each local condition, depending on the stakeholders' profile. E.g. a good MFI or SACCO manager as in Kakuuto can drastically change the progress of the dissemination. The very positive point for the UNEP project in Uganda is that all those lessons and critical shortcomings to ensure continuation of benefits as given above have been considered under the **ongoing GTZ project** that should fill the gaps in the Rakai district and increase the chance of long term sustainability.
- It was worthwhile to initiate such regional project on pure-commercial basis with as little as possible **involvement of government** in the implementation as in Kenya. But the reality is that many activities have required huge efforts from national consultant as well as from PV firms when committed. Many of those activities can not be cost-effectively covered by the private sector. Therefore the question raises of the **transition** after the UNEP project end and its sustainability.
- Uganda benefits from well-established **government infrastructures** involved in solar business and dealing with PV promotion, financial incentives & subsidies, quality control, standard enforcement, general awareness, specific trainings, M&E … But none have actually been involved in the UNEP project!
- It is expected that through the GTZ project some "non-profitable" activities as awareness, quality control, monitoring will be shared with relevant government institutions.

8.2.4 (C) Catalytic Role

- The previous chapter on Sustainability has presented the main lessons learnt from the UNEP project in Uganda and the shortcomings to ensure long term sustainability of the project outcomes.
- Fortunately, in the continuation of the UNEP project, ETC and KCL have initiated a **new project with GTZ** and the Uganda Government support (through MEMD). The project is based on a lot of lessons from the UNEP project, adapted and implemented by KCL not only in Rakai but also in 3 other districts (Masaka, Sebabule, Kayunda) where basic structures already exist thanks to previous project (UNDP, ERT, UNEP).
- The project started officially in Sept. 06 but effectively this year 2007 and targets to sell **10,000 SHS** by 2008 (possible extension 2011) in 4 districts. Some of the key PV firms involved are UltraTec, Dembe, SEU, UML … that have adapted their commercial model.

- The pilot UNEP project is considered in Uganda as a necessary **learning step** for further effective commercialisation. It has in particular shown the difficulty to convince MFIs and to change the behaviour of local/rural actors with frequent visits, discussion, recommendations. The new GTZ/ETC project has strongly drawn lessons from the UNEP project when establishing the network of actors and the KCL coordinator has a deeper knowledge of the main difficulties, mistaken, weaknesses, dos & don'ts to organise and to promote commercial PV sales.
- One of the major changes compared to the UNEP project is the **Bottom-Up approach**. KCL expected that such participative approach will set up a reliable and well-organised structure on the ground before starting implementation and that the local structures (private companies, MFIs …) will be better committed and actively participate in the PV system and solar loan design. It is expected to lead to more sustainable outcomes in the long-term. But from discussion during the Terminal Evaluation, there are strong indication that this new approach will require even more efforts and involvement from the KCL project manager to convince stakeholders, to reach general consensus on project preparation and implementation.
- Other **key actions** considered in the new GTZ project are:
    - KCL will put more effort in supporting, supervision and monitoring
    - regular awareness activities in all districts
    - KCL will merge technicians and sales agents and improve local marketing capacity and skills
    - KCL will support MFIs to develop new solar loan products more attractive for end-users:
        - reduce the interest rate (initially 3-4%/months)
        - extend repayment period (initially 6 months)
        - alleviate collateral
        - solar loan is in-kind and not in cash money to the customer
    - improving quality of PV installation for full satisfaction of beneficiaries
    - increase confidence of customers/members on quality, prices, ability and seriousness of SACCO

8.3 Project performances in Ethiopia

8.3.1 Country Background

8.3.1.1 PV market overview[31]

- The PV industry in Ethiopia is not a fast-growing market as in Kenya, Tanzania or Uganda; the private sector development in Ethiopia is difficult due to lack of support and incentives from government. E.g. heavy taxes and duties still impede the import of PV components and commercialisation. However recent national energy policies (power sector liberalisation) and new strategies for rural development intend to facilitate private sector participation in rural electrification in a technology-neutral fashion. Fiscal reform is still expected.
- The PV market potential is enormous in Ethiopia as confirmed by various market studies. In spite of a relatively low sales volume (< 500 kWp per year), the number of solar importers/dealers has been rapidly increasing the last 4 years. The market is still dominated by a huge telecom programme (several megawatts of systems) but the share for SHS is growing exponentially (from 25kWp in 2000 to about 200kWp in 2004). The domestic and small business consumers - able to pay cash – usually invest in large systems with crystalline module (40-60Wp). Small amorphous modules below 20Wp are not popular yet while the demand seems to be very high (cf. market study).
- 80% of the PV sales are achieved by Top 3 suppliers: Beta, Direct Solar and Sollatek.

8.3.1.2 UNEP-GEF Project

- The UNEP-GEF project effectively started in Ethiopia after a Kick-Off workshop in June 05 and was implemented by the local consultant **Megen Power Ltd** (**MPL** - national executing agency). Its main objective to *stimulate rural sales of quality PV systems and components* fit properly with new national policy to promote renewable energies for rural development and to support private sector in solar commercialisation. The project was implemented in **Jima zone**, renowned for high income level coming mainly from coffee. On the other hand the region is isolated and poorly aware of solar technology.
- The UNEP project was initially designed to replicate the positive experience of commercial dissemination network developed in Kenya between capital and high income – high demand area (model of "dealer network").
- The UNEP project has also been designed and adapted to be complementary to or in continuation of other national activities. It has played a role in strengthening the impacts of 2 previous projects:
    - **IGAD project** in the Awassa region aimed at stimulating awareness and PV activities.
    - The solar PV component of the **Energy Access Project (EAP)** under WB/GEF (approved in June 2002) dealing with barrier removal for PV commercialisation (policy reform, mass promotion …) and with strategies designing.

8.3.1.3 Baseline conditions in Jima

- The solar PV market was clearly not much developed in the Jima zone before the project started mainly. The remoteness of the area, the lack of villager awareness and of access to sales point in this very large region with scattered villages were the main reason. The National Consultant MPL has produced one report on the Solar PV market in Jima giving

[31] SolarNet Magazine – February 2006

the potential demand in each Woreda, findings of assessment as well as few data on baseline conditions. The study also proposes some potential dealers as electronic shops or battery charging stations.

- Before the project started, the solar PV market in Jima zone was characterised by:
  - 0 solar dealer company selling PV components; all PV installations in the region were directly implemented from Addis by main importers (> 200km away). No record of sales is available for that period.
  - 0 solar technicians or sales agents.
  - No information on existing MFI/SACCO in Jima zone before.

8.3.2 (A) Attainment of Objectives and Planned Results

8.3.2.1 Project achievements

The UNEP project in Ethiopia has achieved major outcomes as the increase of key stakeholders for PV commercialisation in the region and PV system sales. To a certain extent, all specific objectives were attained during the 2 years project period as described here after.

8.3.2.1.1 Financing:

- The **finance sector** in Ethiopia is the main bottleneck for PV and other businesses. The Ethiopian law doesn't allow private companies to get credit from foreign resources. Beta Company and associated microfinance institutions lost a major opportunity in 2002-2003 to develop their business with loan and grants from Solar Development Group (SDG-WB).
- Strict fiscal policies in Ethiopia determine that all foreign credits are coursed through the Central Bank (CB). The CB then passes on such loans to third parties but in local currency (Birr) and with CB absorbing the exchange risk. The ensuing credit terms (by CB) become largely unattractive for companies as solar. Such policy effectively wipes out any foreign investments.
- E+Co working with one of the main PV importer/supplier Beta Company based in Addis has found a way around the harsh fiscal policy; they are prepared to re-invest funds of one project into the next loan project. Then it does no longer have to pass through the CB. On the other hand, the money is now more or less fixed in Ethiopia.
- E+Co finally provided in April 2007 a specific financing (US$ 116,000) to purchase larger volume of PV equipments[32]. One full container of Sundaya equipment (7.5 kWp) was purchased for 250 complete systems. They will be installed equally in Jima zone and in Awassa zone. The target is to reach 8000 to 10.000 systems sold in 5 years.
- The regional **Financing Workshop** held in Dar es Salaam was a good opportunity for Ethiopia to find alternative ways of financing PV systems during UNEP project, as e.g. sensitizing MFIs or local SACCOs on solar loan products and potential PV business. But only 5 Ethiopian companies/ institutions (MPL, EPA, RADB, Beta, lawyer)[33] participated to the financing workshop (out of 69 participants) and not any national MFI attended the workshop.
- Beside active initiative of E+Co in Ethiopia, the local MFIs are still at an early stage to develop interest on solar loans. None of them has been actually involved in concrete actions and there is no indication that Megen Power Ltd (MPL) has made enough efforts to mitigate their reluctance.
- The alternative route to use the governmental REF fund from REES secretary for PV investment has not been considered in the frame of the UNEP project. Only Lydetco

[32] E+Co: Loan of US$ 116,000 at 7%/year over 5 years after 1 year grace period without collateral.
[33] Megen Power Limited ; Environmental Protection Autority ; Rural Agriculture Development Bureau

company, Addis-based, is on the way to submit a rural electrification business plan or proposal with 200-300 solar PV systems to REES despite tedious and bureaucratic procedure. They will probably involve both Oromia MFI (OCSSCO as a good potential MFI) and cooperative farms.

- The **co-investments/leverages** achieved within the UNEP project actually come from 2 sources:
  - the 56 customers that have bought PV systems either cash (22 SHS) or with 50% subsidy (34 SHS) (see next table). The total price was US$ 38,408 but without the subsidy, the leverage from the customers is **US$ 24,721**. The average size of systems is about 35Wp and the average installed price is $19 per Wp.

Ethiopia	Promotional	Cash	Total	
UNEP impact	100%	100%	-	
Period	Feb-Apr 06	Apr-Nov 06	-	
Subsidy	50%	0%	-	
# SHS	**34**	**22**	**56**	
tot Wp	1238	746	**1984**	
# technicians	5	?	-	
# villages	17	11-12	-	
Dist. Jima	12-130km	?	-	
Total price (Birr)	211.412	126.579	**337.991**	$38.408
Customer (Birr)	**90.962**	**126.579**	**217.541**	**$24.721**
Subsidy (Birr)	120.450	0	**120.450**	$13.688
Calc. subsidy	57%	0%	-	
Average Wp	36,4	33,9	**35,4**	
US$/Wp	19,41	19,28	**19,36**	

  - E+Co co-financing is **US$ 58,000** because only 50% of the US$ 116.000 will be used for the Jima area (see above).
- In the end the **total leverage** in Ethiopia for the UNEP project is estimated at **US$ 82,721** (not included the subsidies provide for 22 systems).
- The above results are ambivalent (actual leverage in Ethiopia has reached 82.7% of the initial TREDF co-financing) as the major barrier for sustainable dissemination of solar PV systems remains the **high capital cost** for all companies, dealers and customers. Further and continuous efforts are still needed to convince effectively other microfinance institutions to provide adapted solar loans and to remove financial barrier for dealers and potential customers.

8.3.2.1.2 Regional linkage:

- Relevant stakeholders from Ethiopia were invited to the various meetings, workshops, PV trade fairs and study tours and agreed to say that those regional events where an excellent opportunity to exchange experience and to build relation. The 3 workshops (Kick-Off, Financing and Policy) were very positive in terms of discussion and interaction between representatives from different countries and organisations. For example, there were key working sessions on PV financing and standards pushing to work close together and not reinventing the wheel, in particular in Ethiopia.
- The present **tax and duties status** on imported PV products (see next table) is extremely restrictive for the private sector and got even worse during the project with a surtax of 10%. The conditions to be "investment licensed dealer" allowing the 5% import duty instead of 20% are really unclear and part of the PV companies still pays the high tax on their modules.

Ethiopia	Before project	After project	

Component	Duties	VAT	Other	Duties	VAT	Other taxes	Comments
PV modules	20% (5%)	15%	0%	20% (5%)	15%	10%	Duties on CIF prices, 5% on special conditions, recently 10% surtax
electronics, lamps, batt.	30-35%	15%	0%	30-35%	15%	10%	
gensets	5%	15%	0%	5%	15%	10%	
Solar pumping system	5%	15%	0%	5%	15%	10%	

- The last project **workshop on Policy** was organised in Addis Abeba which was a very good opportunity to give the PV technology a good exposure to national media (radio, TV, magazines) and to sensitize the Ethiopian authorities on the critical barriers of the country (fiscal issues …) and to learn about other regional experiences. Unfortunately the list of Ethiopian participants is missing in all reports.
- Key deciders (MoME, EPA, REES …) agree to say that taxes and duties should be waived for solar and other renewable energy products but the government has actually other more urgent priorities to face (major infrastructures, safety, poverty) and no change has occurred yet. Even the National Bureau of Standards is not giving priority to clarify the terminology of solar products that could benefit from tax exemption.
- 2 large Ethiopian micro-financing institutions (AEMFI and OCSSCO) have participated to the **study tour in Bangladesh** (Sept 06) but no national report has been issued and no proposed action has come out.
- Another major problem identified by REES considering WB financing for a large solar programme of 50.000 SHS or more with a large MFI as OCSSCO is that the existing private sector in Ethiopia is much too small (both suppliers and dealers) to carry out large programmes. Only playing with bigger actors as coffee cooperatives can be realistic, based on the Bangladesh model.

8.3.2.1.3 International involvement:

- As in other partner countries, most of the PV importers in Ethiopia have no exclusive link with international suppliers, except Lydetco who has a specific agreement with BP Solar. In the very dynamic and fluctuating international PV business, the national importers prefer to keep flexibility to purchase solar components from different sources, depending in some extend of market prices and delivery conditions.
- As a consequence, there is no indication/evidence that international companies have strengthened their financial support to local importers who commonly suffer from lack of capital. Therefore the project did to some extent experience lack of PV component stock, especially batteries during the project period (see next § 8.3.2.1.5 on Quality).
- In any case the project has definitely contributed to inform both demand side (Ethiopia) and supply side (international) about the market potential and the growth perspectives and to strengthen commercial/ entrepreneurial links. The major international brands found in Ethiopia are BP Solar, Helios, Phaesun, Steca, Phocos, Sundaya, Chloride Exide, NIDA …
- There are today 13 **national suppliers** based in Addis with similar profile dealing with import and distribution of PV products beside other activity but actually 3 of them (see below) have actively participated during the whole UNEP project: they have attended most of the workshops and trade fairs and have sold PV systems to the Jima zone.
    - **Lydetco** (7 years in solar; exclusivity with BP Solar)
    - **Beta** (Generator core business; solar share has increased from 3 to 10% of sales; focus on PV system sales, not component)
    - **Direct Solar** (10 years, in solar only; do their own market awareness)

- Those suppliers were eager to work with local dealers which meant not being involved in installation and after-sales services. During the project they faced randomly stock shortages because the market was uncertain and they usually purchase small volume of PV equipment with high transportation costs (landlocked country).

8.3.2.1.4 National network:

- MPL conducted a **market assessment** in the Jima zone with a very detailed report that showed the serious lack of awareness and the need for private sector support (marketing, financing & training) to establish sustainable commercial network of dealers and technicians. The Jima zone was characterised by a large potential for existing dealers (mainly electronic shops and battery charging stations). Indeed there is a large market segment (businesses, farmers, civil servants …) seeking for electricity and having the capability and willingness to pay either cash or with credit for PV systems. The report shows also that 90% of households strongly expected credit schemes despite their high income and more than 50% would opt for small systems (<20Wp).
- The project has successfully established a commercial link between 3 of the **national suppliers** capital-based (see above) and 3 **solar dealers** in the Jima zone, but actually only one dealer is active in solar PV sales in the whole Jima region that includes 13 districts. Most dealers in Ethiopia, as in other partner countries, aspire to be independent from suppliers and they do their **market-shopping** in the capital (off-the-counter or "purchase on need-basis") based on lowest retail prices and stock availability. They don't have exclusive agreement or signed contract with Addis-suppliers; they receive between 5 and 10% discount when purchasing and eventually 1 to 2 month credit.
    - **Omar**: is by far the most active in the zone. He deals with all addis-based suppliers and also approaches MFIs, government agencies, local cooperatives to develop his solar activity in addition to his core business (car shop and battery charging). Indeed he has a list of 100 potential customers ready to buy with 12 month credit and he prospects for capital support. Only Omar has a stock in the Jima zone: about 20 modules, 20 controllers and 50 lamps. He also has a **solar demo unit** in his shop.
    - **Beta shop**: was not involved in solar sales during the project; only demo unit and promotional activity. All sales were done through Omar.
    - **ERG (Ethio Resource Group**): is selling generators, water pumps, and other machinery as well as high-standard solar equipment. Not involved in UNEP sales.
- MPL has identified and trained 9 **solar technicians** and 9 **sales agents** in Jima zone (see next § on Capacity Building). The so-called sales agents are not so active; the main sales strategy is to convince the customers coming for battery recharge. The dealers are more and more working with trained technicians who also get small commissions on sales if any. Those freelance technicians are paid by the piece and work with whatever dealer (no exclusive link).
- MPL has organised promotional activities and **awareness campaign** in Jima zone. It consisted:
    - in the organisation of a business awareness seminar in the aftermath of the market assessment: presentation of billboards, banners, PV technology demonstrations to sensitize local private sector in rural centres;
    - in the conduction of solar theatre show (drama) in 8 villages (planned 15) of Jima zone to aware potential consumers about solar PV;
    - in the distribution of promotional posters and leaflets at dealers' shops.

- Given the low turnout of the initial business seminar, it was planned to have additional awareness activities during the project as well as workshop for presenting market survey findings but nothing really happened, the campaigns and seminar were not optimally organised and not fully achieved One campaign was clearly not enough for long term impact. Many interviewed customers who bought their systems under the UNEP project have not been informed by the awareness campaign itself.
- MPL has provided project-related brochure, posters, leaflets and video but has not issued any report on that awareness activity, and not any assessment of the campaign impact and effectiveness. There is no indication that financing issues for dealers or customers were addressed during this campaign.

8.3.2.1.5 Quality PV systems & installations:

- In the initial stage of the project, the capital-based suppliers didn't trust those rural technicians trained by the project and continued to send their own **technicians from Addis**, as before. The quality of installations was definitely better but at higher cost.
- The **UNEP evaluation** in June 2006 has highlighted the poor quality of design and installation of many PV systems. This is probably a consequence of the lack of contractual link between suppliers and local dealers and the absence of quality control from the UNEP project management (MPL/ESDA). After training dealers and technicians were "free" to do whatever they believed good and professional. Even dealers in Jima did not control the quality of their technicians.
- Indeed, the lack of PV component stock at Jima dealers combined with the pressure of the project to increase installation rate have led to **mismatched** systems and non-appropriate batteries (oversized, car type). Furthermore most of PV systems have been **poorly installed** (bad PV module orientation and anchorage, poor battery location and protection, bad in-house wiring and cable connections). PV components are usually of acceptable quality.
- The lack of **training of end-users** has also deteriorated the quality of some inspected installations (battery displacement, swindle extension, excessive consumption, lack of maintenance …)
- It is interesting to notice that bad-performing technicians were progressively dismissed by dealers. Only the best ones were kept for installations. Furthermore the quality of installation is expected to improve given the effort of retraining the technicians (but only ½ day and not all of them have been retrained). But **refreshing or more advance technical training** focusing on a state-of-the-art instruction to install properly solar modules and connect batteries is urgently needed.
- After the first ESDA/UNEP evaluation visit in June 06, the national consultant MPL has organised with 2 suppliers (Lydetco and Direct Solar) the **correction** of several PV installations. Many installations visited in June were found by UNEP task manager below acceptable standard and required optimisation: basically PV module orientation, enough gap under module, provide battery box or protection, appropriate in-house wiring and proper wire connection on terminals, etc. The corrections in Jima have finally been financed through the limited remaining UNEP project funds.
- In spite of all those shortcomings, all customers have expressed **high satisfaction** with their solar systems during the evaluation visit.
- The critical issue of **after-sales services** has not been much considered by either dealers or technicians. Up to now, PV suppliers in Addis don't feel much concerned with service assistances. Only Beta presented plans to provide additional trainings and supervision to ensure warranties.

8.3.2.1.6 Capacity building:

- 4 trainers coming from Ethiopia attended the Nairobi UNEP Trainings of Trainers (TOT): 2 as technical trainers from Beta and 2 as Sales trainers from Direct Solar and Lydetco. The 4 trainers participated to the national training in Jima.
- 5-days **technical training** (Feb. 06) of 9 candidates has covered 3 sessions (Theory – Practices – Field installation) and final evaluation. The general background level of the selected technicians was rather low (farmers, traders, repairing; only one was electrician) and the one-shot technical training session for 5-days was clearly not enough for those rural technicians to acquire acceptable installation skills, as revealed by the evaluation visits.
- Training **materials** (guidebook in English and handouts in Amharic) and complete set of tools including compass and multimeter have been provided to all technical trainees. But none of technicians were able to show their set.
- The **sales training** has finally been organised close to the project end (Sep. 2006) to 9 future sales agents; part of them where the trained technicians. The 2-day training has at least provided them with basic tools and skills to convince future customers about solar benefits (selling techniques, calculation of expenditures, meeting the customer needs …).
- An **additional ½ day** after sales training was devoted to provide technicians and sales agents key guidance on minimum technical requirements for PV system installations (standards). This worthwhile initiative of MPL came after UNEP field evaluation and aimed to improve consciousness and skills of technicians for better quality of future installation.
- The national consultant MPL did its best to ensure quality and appropriateness of the 2 training sessions in the Jima zone by assisting and supervising the trainers. Final evaluations of trainees have also been conducted. 2 training reports have been provided by MPL.
- Final **end-user's training** has usually been provided by the technicians with very basic instructions for proper use and simple maintenance. No manual were provided to users. And no information on warranties.

8.3.2.1.7 PV Sales achievement

- Although the UNEP project effectively started with the kick-off in June 05, the **actual sales** and installation in the Jima region started in Feb. 2006 with a promotional sales action (50% subsidy). **34 "promo sales"** PV systems were sold and installed for 2 months by the 3 suppliers and 5 trained technicians. A second phase was launched in April 2006, after the promo sales, to sell cash PV systems. **22 "direct sales"** systems were sold in about 8 months. The impact of subsidy on sales rate is substantial: 17 systems per month with subsidy and less than 3 systems per month without subsidy.
- The total PV sales recorded in the region for the 3 solar suppliers are **56 solar systems** (1984 Wp) sold over the project duration, i.e. 10 months for the active period (cf. summary table in above § 8.3.2.1.1 on Financing). MPL has managed to collect detailed records of PV sales over the project period from the dealers or suppliers, but the task was not easy as the follow-up system had not been properly implemented since the beginning.
- Most of the promo-sales systems were supplied by Lydetco (23 out of 34). The other systems were sold by the 3 dealers without subsidy or even credit to customers having economic activities as shop or small restaurant. A few systems were also paid by relatives based in Addis.

- For both approaches, the PV systems installed were **very scattered** and some are further than 180km from Jima, far from main roads, in other districts. The average number of PV systems per village is only 2 and the average size is 35 Wp.
- No credit scheme has been proposed by dealers to customers first because of their lack of capital but also because of the Ethiopian law under which people can not be forced to pay if they don't satisfy their commitment. As MFIs in Ethiopia belong to the government, their role for providing credit to customers seems much safer.
- It is obvious that the Jima zone benefits now from a more dynamic network of PV sales & services points for further market expansion. Given the scattered profile of villages and households, PV technology is in many cases the **most cost-effective** electrification option in the region.
- The 3 main interviewed suppliers in Addis have clearly confirmed the increase of PV sales to the Jima's dealers during and after the project period but no figures were provided to the evaluator.
- The monopolistic situation of one solar dealer in Jima region combined with the heavy taxes and duties on imported solar products has not contributed to **lower the PV market prices**. Common installed SHS in Jima during the UNEP project cost to customer between 15 and 20 US$/Wp depending on the system size. (See Annex C-10.1 for PV market price comparison – Table F).

Dealer - Supplier	Module size (Wp)	SHS Installed cost (B)	SHS Installed US$/Wp	Module cost (B)	Comments
Oumar	16	2700	19,2		
Oumar	20	3000	**17,0**	2300	
Oumar	50	5500	12,5		With solar battery
Oumar	100	12000	13,6		
Direct solar	20	2600*	**14,8***	1300	*SHS ex work Addis
Direct solar	40	3500*	9,9*		*SHS ex work Addis
Direct solar	50	5200*	11,8*	3200	*SHS ex work Addis
Direct solar	80	7200*	10,2*	4700	*SHS ex work Addis
Lydetco	20	3200	**18,2**	1900	module price for dealer
Lydetco	45		0,0	3200	module price for dealer
Lydetco	80		0,0	5900	module price for dealer
Beta					

8.3.2.2 Project outcomes

The UNEP Project Identification Document (PID) clearly presents the expected outcomes at the end of the project. The medium and long term effects of the accomplished activities in Ethiopia described above can be assessed as follow:

8.3.2.2.1 Operational commercial delivery route between capital and selected rural district

The UNEP project has quite successfully established an operational linkage between Addis and the Jima region, increasing:

- the number of capital-based suppliers involved in Jima from 3 to 5 (target was 3 to 6)
- the number of Jima-based dealers from 0 to 2 (target was 2 per district[34]), but only one dealer is really active.
- the number of trained technicians from 0 to 9 but only 5 are still active (target was 10 per district)

[34] Not that in Project Identification Document, the project considers 1 district per country.

- the number of trained sales agents from 0 to 9 (target was 5 per district)

8.3.2.2.2 Educated PV businesses in cities seeking to develop commercial rural markets

In the Jima zone there is at least one solar dealer (Omar) very active in developing his solar business as described above. This not enough given the large area considered. Some customers and PV systems are located at about 200 km from Jima town making the dealer's business hardly profitable.

8.3.2.2.3 Network of influential policy makers promoting PV in RE plans

Several key policy makers of Ethiopia (*no list available*) participated to the international Policy Workshop hold in Addis and most all of them are involved in promoting PV in rural electrification plans through the different projects mentioned above. The UNEP project has actually failed to induce effective policy changes within the short project period but the Ethiopian government will soon or later release the tax and duties barriers and will support its private sector. The UNEP project has made its contribution to encourage national policy changes.

8.3.2.2.4 Increased participation of international companies in national PV markets

None of the international companies has directly strengthened their involvement in the Jima region, but some did through intermediary companies based in Addis. As mentioned before there is one real exclusive agreement between international and national companies but there is no concrete financial support from any international company to mitigate the difficulty of capital.

8.3.2.2.5 Increased access for local companies to commercial financing

Finally a few months after project end, one commercial financing succeeded to materialise financing agreement between one of the project suppliers (BETA) and one financing institution (E+Co).
One dealer (Omar) combined effort with one Addis-based supplier (Lydetco) to submit soon business plan to access government rural electrification fund (REF) but this is still a work in progress.
Many more efforts and awareness are needed to end up with simple, concrete and appropriate solar loans for other suppliers and dealers.

8.3.2.2.6 Increased sales and installation of solar PV systems

Only 56 PV systems were sold in about 10 months in the Jima region (population of 3 millions) with an average size of 35Wp. The total installed capacity is close to **2,000 Wp** for an estimated market of 1.4 MWp in Jima region.
The PV sales projection for the next 5 years is rather difficult given that the PV market growth will strongly depend on MFI involvement which has not shown much interest yet and on the government policy i.e. decision to release taxes, to support small energy companies, to allow international financing for Ethiopian companies. If everything is set for the private sector, a target of 5000 SHS of about 50 Wp in 5 years after the project-end should be a minimum, i.e. **250 kWp**. The total number of households in the Jima region is estimated at 561,000, i.e. target SHS is only 0.9%.
As the reduction of Carbon emission during the project phase in Ethiopia, it can be estimated[35] at **12 tons of CO_2 per year**. Based on previous projection 5 years after the project-end, the direct post-project abatement can reach **1500 tons of CO_2 per year**.

[35] Cf. assumptions in Tanzania case study

8.3.3 (B) Assessment of Sustainability of Project Outcomes

- The **benefits** of the UNEP project in the Jima region are moderate. The national and regional activities of the project have definitely increased the consciousness of political and financial sector but no concrete achievement during the project implementation. Rural awareness for Solar PV technology has been raised in the Jima region and the private sector promoting solar products has been to some extent strengthened. But the dominant position of one dealer in the whole region does not help to develop competition and to reduce the market prices. The number of trained solar technicians actually active in the region has increased but is still low for such a large area. Their workmanship leaves much to be desired and needs to be reinforced by additional training and supervision. Furthermore the one-shot awareness campaign was conducted in 8 villages only. On the good side, an acceptable stock of PV components is locally available ensuring somehow an effective delivery chain for the limited demand.
- The dealers and technicians said to be satisfied with their solar business development but the **profit is small** (only 56 systems sold in less than a year) and the lack of **financing** remains the main barrier for pre-financing the procurement of PV components, the commercial promotion and the credit to customers. The high-capital PV equipment for low-income household is the major barrier for increasing the sales. A survey of Ethiopian households in Jima region has demonstrated that more than 95% of them can not pay cash for solar systems.
- Given those mitigate results, there is a major concern about the **long term sustainability** of the solar business of dealers, i.e. actual solar sales. Already one Jima's dealer (BETA shop) has decided to stop solar activities and to operate through the main dealer (Omar). Hopefully, their core business (battery charging, automotive spare parts, electronic repairs, genset maintenance …) is not threatened and helps them to overcome for a while frequent PV business hazards. Another limiting factor is the high degree of customers scattered in the region: many villages are more than 50km (up to 200km) from dealer's shop and, without subsidy or credit scheme, only 1 or 2 customers can afford a PV system in one village. These are not the appropriate conditions for cost-effective and profitable solar business.
- There are 4 key success factors that still need to be addressed for Long Term sustainability:
    - **Effective network of dealers and technicians in the Jima zone:** each dealer should geographically restrict its solar activity (e.g. in a radius of 40-50km) and select at least 2 or 3 qualified solar technicians.
    - **Continuous awareness and marketing support:** the project through the local consultant (MPL) did most of the marketing efforts on behalf of the private sector. The PV private sector in Ethiopia has too limited financial capacity to carry on the commercial awareness. Additional external support for awareness and marketing, with the active participation of local dealers, is needed to ensure the long term outcomes of the project.
    - **Availability of solar loans for customers**: Far too little efforts and follow-up have been devoted by the project to set up an effective financing scheme, either through local banks or other MFIs. The involvement of those institutions in solar business is not as simple as expected and takes longer time than the project duration.
    - **Densification of Dealer's zone:** by increasing the number of dealers for the Jima region to better cover the geographical area (smaller active zone) and by increasing the penetration rate in villages with solar loans and marketing efforts as mentioned above.

- The challenge for Ethiopia is now the **transition** after the project end. It is a fact that the UNEP project provided assistance during less than 2 years to build commercial PV dissemination network in the Jima region but the project achievements are actually rather low and the solar business development after project-end is not expected to happen without serious assistance of Government agencies and/or other future RE programmes/projects (long-term efforts in awareness, monitoring and promoting financing mechanisms).
- After project end, Government may have a key role through awareness campaign, additional capacity building and progress monitoring to ensure further sustainable PV commercialisation in Jima area.
- The UNEP project clearly targeted the "rich" segment of the Jima population but the cash sales remained very limited and very slow. The promotional sales with 50% of subsidies led to much better results and faster sales. This subsidy approach seems to be really needed for Ethiopian rural population and "poorer" households that can not afford solar system by cash or even with credit. In Ethiopia the social EPCO tariff for grid connection in rural area is pretty well subsidised (0.45 Birr = 0.051 USD/kWh). One of the roles of the Government could be to facilitate fund or capital subsidy access to small private entrepreneurs through the Rural Energy Fund (REF) managed by the Rural Electrification Executive Secretariat (REES). As mentioned above there was no link established between the UNEP project commercially-oriented and government agencies as REES.

8.3.4 (C) Catalytic Role

- Given the political and financial context in Ethiopia, there is not much to expect in terms of PV sales growth in the short term after the UNEP project end.
- If the situation improves and if a major PV project is launched in the near future (as the REES programme for 50,000 SHS with WB support), it will definitely draw lessons from the UNEP project as a pilot initiative for PV commercialisation. For example, some of the **key lessons** that need to be considered for further PV business development are:
    - Importance of working close to government institutions to adapt political and financial frameworks for better private sector development and renewable energy promotion.
    - Concentrate efforts on development of micro-financing mechanisms to overcome financial barriers, especially in regions with a lower income; involvement of MFIs and local SACCOs. E.g. start demo or pilot financing project to create better confidence in the financial sector.
    - Allocate more time/budget for follow-up and monitoring
    - Increase the number of dealers and technicians in such region that has so many districts, villages and households. Better selection of dealers to be proactive (project champions)
    - Building local capacity with national trainers speaking local language(s).
    - Increase quality control for PV design, PV components and PV system installations. Include watchdog mechanisms for after-sales services.
    - Enforcement of quality standards and controls in collaboration with National Bureau of Standards.

8.4 Project performances in Eritrea

8.4.1 Country Background

8.4.1.1 Eritrea context and PV market overview

- The political context in Eritrea is particularly not appropriate to build commercial businesses, solar or whatever. The market economy is strongly regulated and "state-owned" businesses oriented; it also controls travels of nationals and access to foreign exchange (forex). There is a very weak commercial sector and a low spirit of entrepreneurship.
- Therefore commercial business, and in particular PV sector are not likely to develop in this difficult economical climate. No information has been collected on the PV market growth or total sales over the last few years.
- Based on the particular social and economical organisation of rural villages, the main approach developed in Eritrea is the Fee-for-Services (FFS). Indeed low income groups are willing and able to pay a monthly fee for reliable PV system.

8.4.1.2 UNEP-GEF Project and other projects

- The UNEP project was initially designed to replicate the positive experience of commercial dissemination routes developed in Kenya between capital and high income – high demand area (model of "dealer network").
- The government was obviously favourable to the main objective of the project "*stimulate rural sales of quality PV systems and components"* but the political situation of the country has actually degraded since the project was initiated.
- For about 1 year after the kick-off workshop, the Ministry of Energy was kept abreast of the project objectives and activities. Polite interest was expressed but once it was clear that the project focused on the private sector and that the total cash input into the country could be just US$15,000 of "demonstration" equipment the interest waned fairly fast. The Government position is determined by relevant proclamations with regard to forex, importation etc. and only looks for projects having an impact on these latter, which is not the case of the UNEP project.
- The UNEP-GEF project was finally an opportunity to continue previous activities and to strengthen PV experiences with FFS scheme. The **project target region** for Eritrea is Mendefera and surrounding villages in the Emni Haili, Durko and Ksad Daro areas. Given the specific constraints of the country, it is was decided to select an area close enough to the capital Asmara for local dealers not to be required at initial stage. In these villages a considerable amount of PV activity already exists in the form of community solar systems and individual solar home systems (SHS) purchased for cash, as well as with fee-for-service (FFS) schemes.
- The main PV player in the country is the **Phaesun Asmara Plc** (solar company) that was involved in the project both as national executing agency for Eritrea and also as the only supplier/dealer in the selected area of the project (Mendefera).
- There are no major PV projects planned for the short or medium term in Eritrea but Phaesun is pursuing his effort to develop solar business. About 2000 applicants for FFS are waiting in the same area but limited financing and forex prevent Phaesun to provide more 200 SHS.

8.4.1.3 Baseline conditions in Mendefera

- In the Mendefera region, 140 SHS systems were previously installed in 3 phases (50+50+40) and financed (soft loan) by USA and UK projects. The success of the scheme is the excellent recovery rate and user's willingness to pay for the service. A certain number of cash sales of SHS were also recorded in this area, mainly with the financial support of Eritreans living overseas, as well as larger community systems.
- Prior to project beginning in April 2005, as stated in the Market survey, dealers or trained technicians in the area were non existent and all supply & services were from Asmara. Only resident "Energy Agents" in each village were in charge of fee collection (4.5 $/month).
- In Asmara, there were 3 "solar" companies involved in the project area but only one was specialised in PV system supply (Phaesun). The situation didn't change during the project implementation. The existence of MFI institutions interested by solar PV activity has not been mentioned in any report.

8.4.2 (A) Attainment of Objectives and Planned Results

8.4.2.1 Project achievements

The UNEP project main objective to *build sustainable commercial dissemination networks* was extremely ambitious for a country as Eritrea. The reality is that the project has not achieved expected outcomes besides some capacity building and increase of PV sales. The attainment of the specific objectives of the project is discussed here after:

8.4.2.1.1 Financing:

- As mentioned above, Foreign Exchange is totally controlled and none is made available to private sector companies. Any loan taken out in Foreign Exchange by a private company could not be repaid outside of Eritrea in hard currency. Furthermore, any security or collateral offered by a local private company would not be convertible into foreign exchange.
- This situation generated difficulties with Triodos Bank who was initially supposed to provide US$ 400,000 loan for investment in PV businesses in the 4 countries.
- By the time of project approval, there was a big change in the project co-financing scheme for investments in PV companies. The long maturation period before project actually started has in fine led to withdrawal of Triodos/TREDF.
- In Eritrea no alternative financing mechanism[36] was investigated but the 15.000$ subsidy from the UNEP project was used to pre-finance 60 additional SHS in the project area, nearby Asmara capital, on the same FFS basis.
- The **Fee-for-service** model developed by Phaesun in Eritrea foresees repayment conditions as follow:
    - 10 years fee payment;
    - subsidy level = imported component (value=250 $/15Wp = 16.7 $/Wp)
    - customer contribution = transport + installation;
    - monthly fees = 4.5 $ x 120 months = 540 US$[37]

[36] FFS - 100 house scheme – July '04+ '05 from US$10K soft loan, Eritrea Technical Exchange, USA.
FFS - 40 house scheme – Sept '05 from GBP5K grant, Ashden Trust, UK.
FFS - 60 house scheme – June '06 from UNEP/GEF project promotional fund (15.000 USD).

[37] This is somehow equivalent to 8%/year interest rate over 10 years but with all services and warranties provided

- In addition Phaesun is developing another innovative approach of financing solar PV in Eritrea through a carbon credit exchange mechanism (household can acquire a PV system from Government against carbon credit accrued from building at least 10 improved stoves).
- The microfinance institutions in Eritrea have not shown any interest in the PV activities of Phaesun despite the positive experience with FFS. With a lack of stocks and no regular supply chain, product promotion and advertising is rare. Only one NGO (ACORD) was initially active in the project area and was likely to pre-finance solar activities but it has since then been closed down.
- For the **Cash Sales** until mid 2006, the PV systems or components were paid either locally in Nakfa or with hard currency remittance from abroad. But since June'06 proclamation, hard currency remittance has no longer been allowed; only purely local Nakfa sales are allowed.
- Special attention has been turned to prevent the project from affecting the cash sales market. No credit or pre-finance was proposed.
- The expected **investments/leverages** that were expected from Triodos bank have not been obtained through alternative financing. The subsidy level was 100% of the investment, as mentioned above. Only initial contribution of consumers and monthly fees (without subsidy) can be considered as collateral. The total equivalent leverage value is only **USD 18,900** for 60 SHS of 15Wp each (900 Wp):
    - 10% of 15,000 US$ for transport and installation = 1500 US$
    - 540-250 = 290 US$ x 60 SHS = 17,400 US$

8.4.2.1.2 Regional linkage:

- Most of the activities of the UNEP project had a strong regional dimension as many key stakeholders from different sectors and different countries (Eritrea, Ethiopia, Uganda, Tanzania and Kenya) had been invited to the various meetings, workshops, PV trade fairs and study tour held in different countries (Ethiopia, Tanzania, Bangladesh, Kenya).
- However there was no attendance of any Eritrean delegates to the workshops; only Phaesun participated to the kick-off workshop and none else (private or Govt) came to the other Financing and Policy workshops or study tour.
- The political problem of sending Eritrean delegates to a workshop held in Ethiopia was already mentioned at the pre-project stage. The major reasons for non-attending the other workshop in DAR were the difficulty mobilise influential attendees from Eritrea (banking sector, Ministry of Energy, policy making Ministry …) to obtain exit visa to travel and to get external financing.
- Therefore no specific regional linkage has been established between Eritrean and regional partners. It should be noted that the banking sector works according to laid down policy so their hands are tied.
- The government of Eritrea is however especially supportive of renewable technologies and as such encourages any initiatives from private sector. The import duties and VAT tax status in Eritrea have not been changed over the last 5 years and are as follow:
    - The import duty is 2% and the sales tax is 0% for **DC Generators** that sometimes includes **solar panels**
    - The import duty is 2% and the sales tax is 5% for **charge controllers**, voltage regulator and **cables**
    - The import duty is 10% and the sales tax is 5% for **inverters, batteries, solar lanterns, lights**, fridges, fans and sometimes **PV cells and modules**.
- The Eritrean **Bureau of Standards** has not been involved in the UNEP project.

8.4.2.1.3 International involvement:

- The activities of the UNEP project have included the organisation of 3 major international workshops combined with commercial trade fairs. Important number of international manufacturers/suppliers was participating as described in terminal report.
- But given the absence of Eritrean participants, except Phaesun at the first event in Nairobi, those trade fairs and opportunities to build international relationship were without effect.

8.4.2.1.4 National network:

- The UNEP project main objective to *develop market linkages between commercial centre and rural project area* was a big challenge for Eritrea, given the current political and stagnant economical situation. The private sector could hardly diversify and grow in such environment. This critical situation was clearly mentioned in the Market assessment report.
- Every activity in the private solar PV market sector is based upon financing from any of the following three main hard currency sources:
    - remittances from Eritrean living in the Diaspora to their relatives,
    - a limited number of approved NGOs active in the country
    - multi or bilateral aid channelled through the Government.
- Therefore the network of **national suppliers** (import and distribution companies) based in Asmara is dominated by one company specialised in PV and 2 others active in solar as a secondary activity:
    - **Phaesun Asmara**, since 2002: authorised distributor for BP Solar, importer of Sundaya, Suntech, Outback
    - **Asmara Electric** (SIEMENS): involved in the sales training – no stock
    - **Hydro Construction** : mainly water pumping – no stock
- All of the companies active in solar energy in Eritrea have been made aware of the business opportunities as a result of the UNEP project activities.
- The company Phaesun Asmara that the project has chosen to work with has **increased its activities** in its Fee for Service schemes as a direct result of this project. The fact that this company was simultaneously the national consultant for the UNEP project as well as the private supplier of the PV systems had been made clear to all concerned since the beginning and it was agreed that it was the only logical option to overcome the barrier of forex control and to implement the project in Eritrea. Moreover it was a better way to monitor the PV sales.
- As a direct result of the situation described above, the knock on effect is that the rural areas are not well served by private companies. This project has helped to **increase the number of trained technicians** active in the target region of Mendefera. Since this area is just 50kms away from Asmara, it is unlikely that dealers will start to stock solar SHS equipment at this time - especially when the amounts imported by companies in Asmara are very limited.
- In spite of the number of cash sales and fee-for-service systems that have been installed in this area since 2002, there are **no dealers, so-called solar technicians and sales agents** based there. The reasons are that (i) only one company is really active in the PV business in Asmara, (ii) Mendefera region is nearby Asmara and (iii) the difficult commercial atmosphere.
- The only local resource based in Mendefera is the 2 '**Energy Agents**' involved in the fee collections in the 2 FFS areas. There is no competition and no effect on market prices.
- As detailed in the Market Assessment report, **Awareness campaign and promotion** of PV technology in the Mendefera region was not given a priority owing to the difficult economic conditions prevailing in the country and to the confusion and indecision over the

continued inclusion of Eritrea in the project. Indeed increasing massively the demand was not thought to be appropriate in the context of lack of equipment for retail sales in the country. It was found more relevant to support private sector (marketing, financing & training) and to establish commercial linkage with the capital.

- Therefore an adapted **promotional campaign proposal** was submitted by Phaesun and accepted by ESDA. It included:
    - campaigns to improve existing and potential customer knowledge and awareness of PV systems
    - making an educational video in local language targeting a wide range of audiences both in the region and overseas. The objectives to educate those who already have a PV system in its operation, maintenance and long-term use and to sensitise those who are considering purchase or signing up for a FFS system as well as the Eritrean diaspora to finance systems for relatives.
- However owing to the uncertainties on the project, all activities petered out after July 2006 and the promotional & awareness activities were never carried out under UNEP budget, according to Phaesun manager.

8.4.2.1.5 Quality PV systems & installations:

- The Eritrean PV supplier Phaesun has provided the same standard PV package to all 60 new FFS customers. The SHS is made of 15Wp crystalline solar panel with Sundaya components and a sealed battery. According to the detailed list of components, the system seems well designed, with good quality components and proper matching. The same components have been used since 2002 showing good performances and reliability (batteries last longer than 3 years), except old version of Sundaya lamps.
- All installations have been done by Phaesun technicians from Asmara. Energy agents have been trained to ensure basic after-sales services. Additional visits of technicians are planned regularly.
- The ESDA evaluation visit in July 2006 doesn't mention any quality assessment of components, systems or installations.

8.4.2.1.6 Capacity building:

- 2 specific **Trainings of Trainers** (TOT) were conducted in Kenya to cover successively technical and sales issues (design, selection, procurement, installation) in order to ensure quality systems and installations in each country. 1 employee from Phaesun and 2 employees from Asmara Electric respectively participated to the technical and sales trainings of trainers in Nairobi.
- The 5-days **technical training** (Jan 06) of 5 rural technicians from the target area has significantly increased technical ability to design and install solar systems. These technicians (from electronical shops, maintenance & repair services, FFS fee collection) are now used regularly by Phaesun Asmara to install solar systems all over Eritrea as well as the target region. A training report has been issued with final evaluation results but training materials are not described; neither tool nor testing equipment provided is mentioned.
- The **sales training** in Eritrea has been a critical subject of discussion between ESDA and Phaesun as this activity "training rural agents on sales" was considered inappropriate by the national consultant given the restrictions on commercialisation set by the Eritrean Governmentt through its strongly regulated fiscal policies. The decision was finally to go ahead with a 2-days sales training executed by the 2 Asmara Electric employees and targeting 5 trainees in Mendefera. The training came actually very late (June 06) due to the

unclear position regarding the continuation of the UNEP project in Eritrea. A very brief training report has been issued but final evaluation results and training materials are not described. It seems that the 5 trainees are staff of the 3 Asmara-based companies active in solar energy promotion.

8.4.2.1.7 PV Sales achievement

- To overcome the unavailability of foreign exchange impeding the development of an efficient supply chain, Phaesun proposed to disseminate PV systems through 2 models: (i) **Fee-For-Services** (FFS) and (ii) financing of PV systems by Eritrean relatives living abroad. Even without more awareness, the applications for FFS PV systems in the region exceed by far the supply capacity.
- The number of **SHS sales** into Mendefera region has increased steadily over the past four years to over 500 owing to the development efforts and active marketing of Phaesun to offer affordable PV packages, installation and maintenance services.
- A total of **258 SHS** have been installed during the UNEP project period (Aug. 05 to Dec. 06), totalling 5.83kWp (more details are given in next table). 2 approaches were promoted:
    - FFS sales approach: a total of 150 SHS were installed in 3 phases in 4 villages, but only the last phase with 60 SHS of 15Wp each (i.e. 900Wp) has been directly pre-financed by the UNEP project under the US$ 15.000 subsidy budget. Additional 50 SHS were installed before the project in July 2004.
    - Cash sales approach to consolidate the existing market: a total of 108 SHS were sold and installed in 41 villages with an average peak power of 36Wp per system, totalling 3.85kWp.
- The UNEP project has served to support these initiatives by supplying valuable training and marketing support and by raising the profile of these activities within relevant Government Departments and stakeholders.

	Number of SHS - 2005					Number of SHS - 2006												
	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOT
Cash sales SHS:	2	7	6	14	10	4	5	5	2	0	2	2	10	16	7	8	8	108
Tot. Wp	36	124	343	339	816	84	133	177	32	0	95	87	210	555	136	312	372	3851
Average Wp	18	18	57	24	82	21	27	35	16	0	48	44	21	35	19	39	47	36
Average $/Wp	33,7	35	24,4	30,8	26,1	29,2	27,9	28,5	37,7	0	15,9	36	39,8	32,7	37,5	30,1	27,1	31,2
FFS SHS		50	40								60							150
Tot. Wp		600	480								900							1980
Average Wp		12	12								15							
Average $/Wp		16,7	18,1								16,7							17,1

- The above table of PV system sales in Mendefera region shows that the **purchase price** of the last 60 SHS for the FFS scheme was 16.7 $/Wp + 7.5$ for transport and installation (+ subsidy from Phaesun), i.e. about **17.2$/Wp** for installed systems.
- Before the strict forex rules came in, the parallel market price was around **17.5$/Wp** in Asmara shops (or 13.7€/Wp) without transportation and installation.
- The market **selling prices** for cash sales at the time of the project range from about **20 to 40 $/Wp** if paid in local currency (Nakfa) depending mainly on system size! Installation is usually 10% extra-charge and transportation depends upon distance in km. The absence of competition and the complex financial situation can explain those very high market prices. (See Annex C-10.1 for international PV market price comparison – Table F).

8.4.2.2 Project outcomes

The UNEP Project Identification Document (PID) clearly presents the expected outcomes at the end of the project. The medium and long term effects of the accomplished activities in Eritrea described above can be assessed as follow:

8.4.2.2.1 Operational commercial delivery route between capital and selected rural district

Given the very critical economical condition in Eritrea, the project was not able to establish a commercial and operational linkage between Asmara and the Mendefera region as planned by the project:

- the number of capital-based suppliers has not been increased; only one is actually active (target was to move from 3 to 5)
- no solar dealer has appeared in Mendefera (target was 2 per district[38])
- the number of trained technicians has increased from 0 to 5 but only 4 seems to be "active" (target was 10 per district)
- the number of trained sales agents has increased from 0 to 5 (target was 5 per district)

8.4.2.2.2 Educated PV businesses in cities seeking to develop commercial rural markets

In project area, only a few of the 10 trained technicians and sales agents could be considered as PV businesses as such. No information on their involvement and commitment to develop the rural PV market.

8.4.2.2.3 Network of influential policy makers promoting PV in RE plans

The tiny initial interest shown by the Ministry has quickly vanished and none of the policy makers of Eritrea has ever participated to the UNEP project events (international Workshops, trade fairs …).

8.4.2.2.4 Increased participation of international companies in national PV markets

None of the international PV companies has benefited from the project in Eritrea, except the brands that were already associated with Phaesun Asmara before the project started.

8.4.2.2.5 Increased access for local companies to commercial financing

Only Phaesun Asmara has developed innovative financing approaches to overcome national barriers. But these initiatives are not a direct output of the UNEP project an&d would have come even without it. There is no indication that MFIs have been informed and sensitised on PV by the project but their lack of interest is clearly justified by the economic stagnation in the country.

8.4.2.2.6 Increased sales and installation of solar PV systems

As mentioned above a total of 258 PV systems (total **5,831Wp**) was sold in 15 months in the Mendefera region. At this rate (about 200 SHS/year), in 5 years the total sales could reach 1000 SHS of 50Wp = 50kWp. Given the 52,500 households in the region, this corresponds to 2% of the households. But there is no other realistic assumption to make sales projection for the next 5 years.

Therefore the reduction of Carbon Emission[39] during the project phase in Eritrea can be estimated at 35 tons of CO_2 for 15 months, i.e. **28 tons per year**.

[38] Not that in Project Identification Document, the project considers 1 district per country.

[39] As baseline for this evaluation we recommend to use the value of **6 kg /Wp /yr.** (Cf. more details in Tanzania section)

8.4.3 (B) Assessment of Sustainability of Project Outcomes

- The **benefits** of the UNEP project in Eritrea are very limited. None can say that the slim outputs would not have come without the project intervention. However one can mention that project helped:
    - one private company Phaesun Asmara to **increase its activities** in its Fee-for-Service approach.
    - to **increase the number of trained technicians** active in the target region of Mendefera and **the awareness** in potential finance supporting organisation as NGO and individuals of the Eritrean diaspora.
- The most positive aspect of the PV development in Eritrea supported by the UNEP project is the fact that, thanks to the FFS approach, the "poorer" households that can not afford solar system by cash have been reached and a **high penetration rate** has been achieved in the targeted villages.
- In the specific Eritrean context, the issue of **sustainability** is not relevant as the UNEP project had very little impact on what was going on before. The project interruption is not going to affect the PV market development and the proactive work of the main PV company in Eritrea. It seems that at this stage of development the tiny and slow-growing market of PV systems installed by Phaesun at proximity of Asmara is a sustainable business. Without competition, the company has been able to implement a sustainable supply chain with appropriate stock, maintenance and assistance services for at least 10 years (duration of FFS contract with customers). It is certainly to reduce the risk and to ensure long term sustainability of its business that Phaesun has decided to concentrate efforts and activity in one region only and close to Asmara, reducing the costs of transport and intervention labour.

8.4.4 (C) Catalytic Role

- The UNEP project was designed as a pilot initiative that should end up with replicable or catalytic outcomes. But given the general unfavourable context in Eritrea and the very low chance to get positive outcomes at the end of the project, it was really unlikely to expect scaling-up of PV sales or replication through other future project.
- However, if the project had **selected another region** than the easy one in Mendefera (already "occupied" by Phaesun before and very close to capital), the outcomes of Phaesun efforts could have created a higher potential of replication. The implementation of the FFS scheme in a more remote area with a real need to set up local dealers with stock and technicians would have been much more relevant and challenging. In case of success it would have given much more confidence to Phaesun (and other potential PV companies) that PV business can also develop outside Asmara outskirts with their proposed models.

8.4.5 Special Concern about Eritrea

- While the UNEP project proposal waited for approval over several years, the political situation on the ground had altered significantly by the time it was actually implemented. However, one wonders whether a closer examination of the commercial climate in Eritrea prior to project approval wouldn't have either excluded Eritrea from the project or altered the overall project objectives.
- It seems that the worry about the UNEP project in Eritrea and the threat to halt the transfer of money had already been strongly expressed during the 2nd Steering Committee meeting in March 2006 where the national consultant was unfortunately absent.
- The decision to **stop the project in Eritrea** was discussed for a long time by UNEP and ESDA. But no formal decision was ever announced to the national consultant Phaesun who

did the 60 SHS installation in June 06, followed by the delayed Sales training. End of June, an evaluation mission was conducted to discuss with Government representatives potential solutions regarding their hindering policy towards forex access but no effective solution came out except that the government proclamation that restrict access to foreign exchange was temporary!

- So, despite the early signal in March 2006, there was no clear decision until the project-end to stop the Eritrean activities. Therefore Phaesun finally stopped their activities around July 2006 and had consumed 66% of their initial budget.

9 Annex B: Project Evaluation

9.1 TOR for Terminal Evaluation

TERMS OF REFERENCE

Terminal Evaluation of the UNEP GEF project
"Building Sustainable Commercial Dissemination Networks for Household PV Systems in Eastern Africa"
Project Number GF/4040-04-22

1. PROJECT BACKGROUND AND OVERVIEW

Project rationale from the project document

Among companies, consumers, decision-makers and other stakeholders, a lack of understanding of the role solar PV in rural electrification and the dynamics required for a successful commercial market are major barriers to the development of the industry. The project seeks to demonstrate how properly developed linkages between companies, consumers and communities can result in self-perpetuating markets for solar technology. This will be achieved by strengthening private sector ability to supply PV systems through increased consumer awareness and by sharing experiences between commercial markets and projects in the region.

The project will build linkages between regional and country businesses, consumers and institutions as well as facilitate the increased involvement of international PV companies in the region by building awareness of potential markets, linking them with local players. Through promotion and training activities focused in target regions, the project will assist stakeholders to develop sustainable commercial supply chains linking major cities and rural consumers. Most critically, the project will leverage the much needed investment using new and existing financing avenues to growing companies to enable them to become sustainable enterprises.

The overall objective of the project was stated as *'stimulate increased rural sales of PV by increasing consumer awareness and by sharing experiences between commercial markets and projects in region.*' For more information please refer to the projects' website: www.esda.co.ke/gef-pvproject/index.html

Relevance to GEF Programmes

The project falls under GEF Operational Program 6: Removing barriers and Reducing Implementation Costs to adoption of Renewable Energy. The project will share successful commercial experiences and experiences of GEF PV projects (including UPPPRE Uganda, ERT World Bank Uganda, PVMTI Kenya, UNDP-GEF Tanzania and WB-GEF Ethiopia).'

Executing Arrangements

Energy for Sustainable Development, Africa implemented the project in conjunction with selected local consultants in each country. A project steering committee was formed to guide the project. It included representatives of Triodos Renewable Energy Development Fund, country representatives from the PV private sector, project management and Government officials. The steering committee received quarterly reports of project progress and was copied all monitoring and evaluation outputs. A full-time manager based at ESDA in Nairobi carried out day-to-day project management. This manager delegated work to consultants in each country. Consultants in each country were chosen based on competitive tender.

Project Activities

The project duration was initially 20 months starting October 2004 and ending June 2006. which was later revised and extended to be completed in December 2006, making a total duration of 26 months.

The project had a number of components and activities including:

a) Management and Technical Support
b) PV SHS Trade Fair and Project Kick Off Meeting
c) Market Assessment in Target Regions of each Country
d) Business Opportunity Awareness Raising, Business Assistance and Investments in Companies
e) Technician and Sales Training
f) Country PV Trade Fairs and Seminars
g) Inter-Country Exchange Visits & Information Exchange
h) Region-Based Awareness Raising and Promotional Campaigns
i) Policy Workshops
j) Finance Workshops
k) Monitoring and Evaluation

Budget

The total budget was US$ 1,233,230 with US$ 693,600 funded by the GEF Trust Fund and in-kind co-funding from; Triodos Renewable Energy for Development Fund US$449,450 University of Hawaii US$ 75,000, Company contributions US$ 90,180.

TERMS OF REFERENCE FOR THE EVALUATION

1. Objective and Scope of the Evaluation

The objective of this terminal evaluation is to examine the extent and magnitude of any project impacts to date and determine the likelihood of future impacts. The evaluation will also assess project performance and the implementation of planned project activities and planned outputs against actual results. The evaluation will focus on the following main questions:

Has the project*:*

- Helped establish an operational commercial delivery route between the capital city and one rural district of each country? - including:
  • at least one national importer?,
  • several dealers in the target district?,
  • at least ten technicians and sales agents in the target district?,
  • interested community development NGOs?
  • interested micro-finance groups? and
  • hundreds of potential PV customers?
- Educated PV businesses in cities of each countries that are actively seeking to develop commercial rural markets?
- Created a network of influential policy makers who are aware of the necessity of including PV in rural electrification plans and will actively lobby for such plans.
- Increased participation by international PV companies in the PV markets of Uganda, Tanzania, Eritrea and Ethiopia?
- Promoted, as a direct result of project activities, installation of more than 750 PV solar home systems in the targeted districts, and a measurable growth in the rural PV sales in Uganda, Tanzania, Eritrea and Ethiopia. Five years after the project, we expect that 3000 systems will have been installed in the 5 districts?

2. Methods

This terminal evaluation will be conducted as an in-depth evaluation using a participatory approach whereby the UNEP/DGEF Task Manager, key representatives of the executing agencies and other relevant staff are kept informed and regularly consulted throughout the evaluation. The consultant will liaise with the UNEP/EOU and the UNEP/DGEF Task Manager on any logistic and/or methodological issues to properly conduct the review in as independent a way as possible, given the circumstances and resources offered. The draft report will be circulated to UNEP/DGEF Task Manager, key representatives of the executing agencies and the UNEP/EOU. Any comments or responses to the draft report will be sent to UNEP / EOU for collation and the consultant will be advised of any necessary revisions.

The findings of the evaluation will be based on the following:

1. A desk review of project documents including, but not limited to:
   (a) The project documents, outputs, monitoring reports (such as progress and financial reports to UNEP and GEF annual Project Implementation Review reports) and relevant correspondence.
   (b) Review of specific products including the final reports from country executing agencies, workshop proceedings, etc
   (c) Notes from the Steering Group meetings.

(d) Other project-related material produced by the project staff or partners.

2. Interviews with project management and technical support staff. Field visits to Jimma (Ethiopia), Rakai (Uganda), Iringa (Tanzania) will be undertaken in this connection.

3. Interviews and Telephone interviews with intended users for the project outputs and other stakeholders involved with this project, including in the participating countries and international bodies. As appropriate, these interviews could be combined with an email questionnaire.

4. The Consultant shall seek additional information and opinions from representatives of National Standards Bureaus, National and/or local Micro Finance Institutions, relevant (rural electrification) Gov't agencies by e-mail, through telephone communication, or by actual meetings.

5. Interviews with the UNEP/DGEF project task manager and Fund Management Officer, and other relevant staff in UNEP dealing with Climate Change related activities as necessary. The Consultant shall also gain broader perspectives from discussions with relevant GEF Secretariat staff.

Key Evaluation principles.
In attempting to evaluate any outcomes and impacts that the project may have achieved, evaluators should remember that the project's performance should be assessed by considering the difference between the answers to two simple questions ***"what happened?***" and ***"what would have happened anyway?"***. These questions imply that there should be consideration of the baseline conditions and trends in relation to the intended project outcomes and impacts. In addition it implies that there should be plausible evidence to attribute such outcomes and impacts to the actions of the project.

Sometimes, adequate information on baseline conditions and trends is lacking. In such cases this should be clearly highlighted by the evaluator, along with any simplifying assumptions that were taken to enable the evaluator to make informed judgements about project performance.

3. Project Evaluation Parameters

1. Attainment of objectives and planned results:
The assessment of project results seeks to determine the extent to which the project objectives were achieved, or are expected to be achieved, and assess if the project has led to any other positive or negative consequences. While assessing a project's outcomes the evaluation will seek to determine the extent of achievement and shortcomings in reaching the project's objectives as stated in the project document and also indicate if there were any changes and whether those changes were approved. As the project did not establish an elaborate baseline (initial conditions), the evaluator should seek to estimate the baseline condition so that achievements and results can be properly established (or simplifying assumptions used). Since most GEF projects can be expected to achieve the anticipated outcomes by project closing, assessment of project outcomes should be a priority. Outcomes are the likely or achieved short-term and medium-term effects of an intervention's outputs. Examples of outcomes

could include but are not restricted to stronger institutional capacities, higher public awareness (when leading to changes of behaviour), and transformed policy frameworks or markets. The evaluation should assess the extent to which the project's major relevant objectives were effectively and efficiently achieved or are expected to be achieved and their relevance.

- *Effectiveness:* Evaluate how, and to what extent, the stated project objectives have been met, taking into account the "achievement indicators" specified in the project document and logical framework[40]. In particular, the analysis of outcomes achieved should include, *inter alia*, an assessment of whether and to what extent the results of this project have informed national, regional or international processes such as greenhouse gas inventories, the IPCC or others.
- *Relevance:* In retrospect, were the project's outcomes consistent with the focal areas/operational program strategies and country priorities? The evaluation should also assess the whether outcomes specified in the project document and or logical framework are actually outcomes and not outputs or inputs.
- *Efficiency:* Cost-effectiveness assesses the achievement of the environmental and developmental objectives as well as the project's outputs in relation to the inputs, costs, and implementing time. Include an assessment of outcomes in relation to inputs, costs, and implementation times based on the following questions: Was the project cost-effective? Was the project the least cost option? Was the project implementation delayed and if it was then did that affect cost-effectiveness? The evaluation should assess the contribution of cash and in-kind co-financing to project implementation and to what extent the project leveraged additional resources. Comparisons of the cost-time vs. outcomes relationship of the project with that of other similar projects should be made if feasible.

2. Assessment of Sustainability of project outcomes:

Sustainability is understood as the probability of continued long-term project-derived outcomes and impacts after the GEF project funding ends. The evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits after the project ends. Some of these factors might be outcomes of the project, e.g. stronger institutional capacities or better informed decision-making. Other factors will include contextual circumstances or developments that are not outcomes of the project but that are relevant to the sustainability of outcomes. The evaluation should ascertain to what extent follow-up work has been initiated and how project outcomes will be sustained and enhanced over time. In this case, sustainability will be linked to the continued use and influence of scientific models and scientific findings, produced by the project.

Four aspects of sustainability should be addressed: financial, socio-political, institutional frameworks and governance, and ecological (if applicable) The following questions provide guidance on the assessment of these aspects:

[40] In case in the original or modified expected outcomes are merely outputs/inputs then the evaluators should assess if there were any real outcomes of the project and if yes then whether these are commensurate with the realistic expectations from such projects.

- *Financial resources.* To what extent are the outcomes of the project dependent on continued financial support? What is the likelihood that any required financial resources will be available to sustain the project outcomes/benefits once the GEF assistance ends (resources can be from multiple sources, such as the public and private sectors, income generating activities, and market trends that support the project's objectives)? Was the project was successful in identifying and leveraging co-financing?
- *Socio-political:* To what extent are the outcomes of the project dependent on socio-political factors? What is the likelihood that the level of stakeholder ownership will allow for the project outcomes/benefits to be sustained? Is there sufficient public / stakeholder awareness in support of the long term objectives of the project?
- *Institutional framework and governance.* To what extent are the outcomes of the project dependent on issues relating to institutional frameworks and governance? What is the likelihood that institutional and technical achievements, legal frameworks, policies and governance structures and processes will allow for, the project outcomes/benefits to be sustained? While responding to these questions consider if the required systems for accountability and transparency and the required technical know-how are in place.
- *Ecological.* Are there any environmental risks that can undermine the future flow of project environmental benefits? The TE should assess whether certain activities in the project area will pose a threat to the sustainability of the project outcomes.[41]

As far as possible, also assess the potential longer-term impacts considering that the evaluation is taking place upon completion of the project and that longer term impact is expected to be seen in a few years time. Frame any recommendations to enhance future project impact in this context. Which will be the major 'channels' for longer term impact from the project at the national and international scales? The evaluation should formulate recommendations that outline possible approaches and necessary actions to facilitate an impact assessment study in a few years time.

3. Catalytic role

The terminal evaluation will also describe any catalytic or replication effect of the project. What examples are there of replication and catalytic outcomes that suggest increased likelihood of sustainability? Replication approach, in the context of GEF projects, is defined as lessons and experiences coming out of the project that are replicated or scaled up in the design and implementation of other projects. Replication can have two aspects, replication proper (lessons and experiences are replicated in different geographic area) or scaling up (lessons and experiences are replicated within the same geographic area but funded by other sources). If no effects are identified, the evaluation will describe the catalytic or replication actions that the project carried out. No ratings are requested for the catalytic role.

[41] For example, construction of dam in a protected area could inundate a sizable area and thereby neutralizing the biodiversity related gains made by the project or, a newly established pulp mill might jeopardise the viability of nearby protected forest areas by increasing logging pressures.

4. **Achievement of outputs and activities:**
    - Delivered outputs: Assessment of the project's success in producing each of the programmed outputs, both in quantity and quality as well as usefulness and timeliness.
    - Assess the soundness and effectiveness of the methods and approached used by the project.

5. **Assessment of Monitoring and Evaluation Systems:**
    - **M&E design.** Did the project have a sound M&E plan to monitor results and track progress towards achieving project objectives? The Terminal Evaluation will assess whether the project met the minimum requirements for project design of M&E and the application of the Project M&E plan (Minimum requirements are specified in Annex 4). The evaluation shall include an assessment of the quality, application and effectiveness of project monitoring and evaluation plans and tools, including an assessment of risk management based on the assumptions and risks identified in the project document. The M&E plan should include a baseline (including data, methodology, etc.), SMART (see Annex 4) indicators and data analysis systems, and evaluation studies at specific times to assess results. The time frame for various M&E activities and standards for outputs should have been specified.
    - **M&E plan implementation.** Was an M&E system in place and did it facilitate tracking of results and progress towards projects objectives throughout the project implementation period. Were Annual project reports complete, accurate and with well justified ratings? Was the information provided by the M&E system used during the project to improve project performance and to adapt to changing needs? Did the Projects have an M&E system in place with proper training for parties responsible for M&E activities to ensure data will continue to be collected and used after project closure?
    - **Budgeting and Funding for M&E activities.** Were adequate budget provisions made for M&E made and were such resources made available in a timely fashion during implementation?
    - **Long-term Monitoring.** Is long-term monitoring envisaged as an outcome of the project? If so, comment specifically on the relevance of such monitoring systems to sustaining project outcomes and how the monitoring effort will be sustained.

6. **Assessment of processes that affected attainment of project results.**

The evaluation will consider, but need not be limited to, consideration of the following issues that may have affected project implementation and attainment of project results:

i. **Preparation and readiness.** Were the project's objectives and components clear, practicable and feasible within its timeframe? Were capacities of the executing institutions and counterparts properly considered when the project was designed? Were lessons from other relevant projects properly incorporated in design? Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to implementation? Was availability of counterpart resources (funding, staff, and facilities), passage of enabling legislation, and adequate project management arrangements in place at project entry?

- Ascertain to what extent the project implementation mechanisms outlined in the project document have been closely followed. In particular, assess the role of the various committees established and whether the project document was clear and realistic to enable effective and efficient implementation, whether the project was executed according to the plan and how well the management was able to adapt to changes during the life of the project to enable the implementation of the project.
- Evaluate the effectiveness and efficiency and adaptability of project management and the supervision of project activities / project execution arrangements at all levels (1) policy decisions: Steering Group; (2) day to day project management: (3) GEF guidance: UNEP DGEF.

ii. **Country ownership/Drivenness.** This is the relevance of the project to national development and environmental agendas, recipient country commitment, and regional and international agreements. Examples of possible evaluative questions include: Was the project design in-line with the national sectoral and development priorities and plans? Are project outcomes contributing to national development priorities and plans? Were the relevant country representatives, from government and civil society, involved in the project? Did the recipient government maintain its financial commitment to the project? Have the government approved policies or regulatory frameworks been in-line with the project's objectives? Specifically the evaluation will:

- Assess the level of country ownership, and whether the project was effective in providing and communicating information and tools that assisted governments in promoting household PV systems.
- Assess the level of country commitment to promoting the use of household PV systems.

iii. **Stakeholder involvement.** Did the project involve the relevant stakeholders through information sharing, consultation and by seeking their participation in project's design, implementation, and monitoring and evaluation? For example, did the project implement appropriate outreach and public awareness campaigns? Did the project consult and make use of the skills, experience and knowledge of the appropriate government entities, NGOs, community groups, private sector, local governments and academic institutions in the design, implementation and evaluation of project activities? Were perspectives of those that would be affected by decisions, those that could affect the outcomes and those that could contribute information or other resources to the process taken into account while taking decisions? Were the relevant vulnerable groups and the powerful, the supporters and the opponents, of the processes properly involved? Specifically the evaluation will:

- Assess the mechanisms put in place by the project for identification and engagement of stakeholders in each participating country and establish, in consultation with the stakeholders, whether this mechanism was successful, and identify its strengths and weaknesses.
- Assess the degree and effectiveness of collaboration/interactions between the various project partners and institutions during the course of implementation of the project.

- Assess the degree and effectiveness of any various public awareness activities that were undertaken during the course of implementation of the project.

iv. **Financial planning.** Did the project have the appropriate financial controls, including reporting and planning, that allowed management to make informed decisions regarding the budget and allowed for timely flow of funds. Specifically, the evaluation should:

- Assess the strength and utility of financial controls, including reporting, and planning to allow the project management to make informed decisions regarding the budget and allow for a proper and timely flow of funds for the payment of satisfactory project deliverables throughout the project's lifetime.
- Present the major findings from the financial audit if one has been conducted.
- Did promised co-financing materialize? Identify and verify the sources of co- financing as well as leveraged and associated financing (in co-operation with the IA and EA).
- Assess whether the project has applied appropriate standards of due diligence in the management of funds and financial audits.
- The evaluation should also include a breakdown of final actual project costs by activities compared to budget (variances), financial management (including disbursement issues), and co- financing. This information will be prepared by the relevant DGEF Fund Management Officer of the project for scrutiny by the evaluator (table attached in Annex 1 Co-financing and leveraged resources).

v. **UNEP Supervision and backstopping.** Did UNEP Agency staff identify problems in a timely fashion and accurately estimate its seriousness? Did UNEP staff provide quality support and advice to the project, approved modifications in time and restructure the project when needed? Did UNEP and Executing Agencies provide the right staffing levels, continuity, skill mix, frequency of field visits?

vi. **Co-financing and Project Outcomes & Sustainability.** If there was a difference in the level of expected co-financing and actual co-financing, then what were the reasons for this? Did the extent of materialization of co-financing affect the project's outcomes and/or sustainability, and if it did affect outcomes and sustainability then in what ways and through what causal linkages?

vii. **Delays and Project Outcomes & Sustainability.** If there were delays in project implementation and completion, the evaluation will summarise the reasons for them. Did delays affect the project's outcomes and/or sustainability, and if so in what ways and through what causal linkages?

The ***ratings will be presented in the form of a table*** with each of the categories rated separately and with **brief justifications for the rating** based on the findings of the main analysis. An overall rating for the project should also be given. The rating system to be applied is specified in Annex 1:

4. Evaluation report format and review procedures

The report should be brief, to the point and easy to understand. It must explain; the purpose of the evaluation, exactly what was evaluated and the methods used. The report must highlight any methodological limitations, identify key concerns and present evidence-based findings, consequent conclusions, recommendations and lessons. The report should provide information on when the evaluation took place, the places visited, who was involved and be presented in a way that makes the information accessible and comprehensible. The report should include an executive summary that encapsulates the essence of the information contained in the report to facilitate dissemination and distillation of lessons.

Evidence, findings, conclusions and recommendations should be presented in a complete and balanced manner. The evaluation report shall be written in English, be of no more than 50 pages (excluding annexes), use numbered paragraphs and include:

i) An **executive summary** (no more than 3 pages) providing a brief overview of the main conclusions and recommendations of the evaluation;
ii) **Introduction and background** giving a brief overview of the evaluated project, for example, the objective and status of activities;
iii) **Scope, objective and methods** presenting the evaluation's purpose, the evaluation criteria used and questions to be addressed;
iv) **Project Performance and Impact** providing factual evidence relevant to the questions asked by the evaluator and interpretations of such evidence. This is the main substantive section of the report and should provide a commentary on all evaluation aspects (A − F above).
v) **Conclusions and rating** of project implementation success giving the evaluator's concluding assessments and ratings of the project against given evaluation criteria and standards of performance. The conclusions should provide answers to questions about whether the project is considered good or bad, and whether the results are considered positive or negative;
vi) **Lessons learned** presenting general conclusions, based on established good practices that have the potential for wider application and use. Lessons may also be derived from problems and mistakes. The context in which lessons may be applied should be clearly specified, and lessons should always state or imply some prescriptive action. A lesson should be written such that experiences derived from the project could be applied in other projects or at portfolio level;
vii) **Recommendations** suggesting *actionable* proposals for stakeholders to rectify poor existing situations as well as recommendations concerning projects of similar nature.. In general, Terminal Evaluations are likely to have very few (only two or three) actionable recommendations;
viii) **Annexes** include Terms of Reference, list of interviewees, documents reviewed, brief summary of the expertise of the evaluator / evaluation team, a summary of co-finance information etc. Dissident views or management responses to the evaluation findings may later be appended in an annex.

Examples of UNEP GEF Terminal Evaluation Reports are available at www.unep.org/eou

Review of the Draft Evaluation Report

Draft reports submitted to UNEP EOU are shared with the corresponding Programme or Project Officer and his or her supervisor for initial review and consultation. The DGEF staff and senior Executing Agency staff are allowed to comment on the draft evaluation report.

They may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. The consultation also seeks agreement on the findings and recommendations. UNEP EOU collates the review comments and provides them to the evaluators for their consideration in preparing the final version of the report.

All UNEP GEF Evaluation Reports are subject to quality assessments by UNEP EOU. These incorporate GEF Office of Evaluation quality assessment criteria and are used as a tool for providing structured feedback to the evaluator (see Annex 3).

5. Submission of Final Terminal Evaluation Reports.

The final report shall be submitted in electronic form in MS Word format and should be sent to the following persons:

Segbedzi Norgbey, Chief, Evaluation and Oversight Unit
UNEP, P.O. Box 30552-00100
Nairobi, Kenya
Tel.: (254-20) 7624181
Fax: (254-20) 7623158
Email: segbedzi.norgbey@unep.org

With a copy to:

Shafqat Kakakhel, Officer-in-Charge
UNEP/Division of GEF Coordination
P.O. Box 30552-00100
Nairobi, Kenya
Tel: + 254-20-7624686
Fax: + 254-20-7624041/4042

Peerke De Bakker
Task Manager, Climate Change
United Nations Environment Programme (UNEP)
Division of GEF Coordination (DGEF)
PO Box 30552-00100
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Tel: 254 20 7623967
Fax: 254 20 7624041/2
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Catherine Vallee
UNEP/GEF SPO Climate Change
United Nations Environment Programme (UNEP)
Division of GEF Coordination (DGEF)
PO Box 30552-00100
Nairobi, Kenya
Tel: 254 20 7625076
Fax: 254 20 7624041/2
Email: catherine.vallee@unep.org

The final evaluation report will be printed in hard copy and published on the Evaluation and Oversight Unit's web-site www.unep.org/eou. Subsequently, the report will be sent to the GEF Office of Evaluation for their review, appraisal and inclusion on the GEF website.

6. Resources and schedule of the evaluation

This final evaluation will be undertaken by an international evaluator contracted by the Evaluation and Oversight Unit, UNEP. The contract for the evaluator will begin on May 1 2007 and end on July 31 2007 (30 days spread over 13 weeks (22days of travel, to Ethiopia-5 days, Uganda –5 days, Tanzania – 5 days, Nairobi –2 days briefing and 2 days debriefing, 3 days of travel and 8 days desk study). The evaluator will submit a draft report on July 15 2007 to UNEP/EOU, the UNEP/DGEF Task Manager, and key representatives of the executing agencies. Any comments or responses to the draft report will be sent to UNEP / EOU for collation and the consultant will be advised of any necessary revisions. Comments to the final draft report will be sent to the consultant by July 22 2007 after which, the consultant will submit the final report no later than July 31 2007.

The evaluator will after an initial telephone briefing with EOU and UNEP/GEF travel to Nairobi, Kenya and meet with UNEP DGEF Task Manager and project staff of the Executing Agency at the beginning of the evaluation. Furthermore, the evaluator is expected to travel capitals and project areas in Ethiopia (Addis Ababa), Uganda (Kampala) and Tanzania (Dar-es-Salam) and meet with representatives of the national project executing agencies, PV dealers (in the capital and project areas) as well as end users.

In accordance with UNEP/GEF policy, all GEF projects are evaluated by independent evaluators contracted as consultants by the EOU. The evaluators should have the following qualifications:

The evaluator should not have been associated with the design and implementation of the project. The evaluator will work under the overall supervision of the Chief, Evaluation and Oversight Unit, UNEP. The evaluator should be an international expert with extensive experience in PV Solar Home System Project management, PV SHS system component quality standards and system design, codes of practice for PV installations, Financial Assessment of SHS end user financing as well as project financial administration.
Knowledge of UNEP programmes and GEF activities is desirable. Fluency in oral and written English is a must.

7. Schedule Of Payment

The consultant shall select one of the following two contract options:

Lump-Sum Option

The evaluator will receive an initial payment of 30% of the total amount due upon signature of the contract. A further 30% will be paid upon submission of the draft report. A final payment of 40% will be made upon satisfactory completion of work. The fee is payable under the individual Special Service Agreement (SSA) of the evaluator and IS **inclusive** of all expenses such as travel, accommodation and incidental expenses.

Fee-only Option

The evaluator will receive an initial payment of 40% of the total amount due upon signature of the contract. Final payment of 60% will be made upon satisfactory completion of work.

The fee is payable under the individual SSAs of the evaluator and is NOT inclusive of all expenses such as travel, accommodation and incidental expenses. Ticket and DSA will be paid separately.

In case, the evaluator cannot provide the products in accordance with the TORs, the timeframe agreed, or his products are substandard, the payment to the evaluator could be withheld, until such a time the products are modified to meet UNEP's standard. In case the evaluator fails to submit a satisfactory final product to UNEP, the product prepared by the evaluator may not constitute the evaluation report.

Annex 1. OVERALL RATINGS TABLE

Criterion	Evaluator's Summary Comments	Evaluator's Rating
Attainment of project objectives and results (overall rating) **Sub criteria (below)**		
Effectiveness		
Relevance		
Efficiency		
Sustainability of Project outcomes (overall rating) **Sub criteria (below)**		
Financial		
Socio Political		
Institutional framework and governance		
Ecological		
Achievement of outputs and activities		
Monitoring and Evaluation (overall rating) **Sub criteria (below)**		
M&E Design		
M&E Plan Implementation (use for adaptive management)		
Budgeting and Funding for M&E activities		
Catalytic Role		
Preparation and readiness		
Country ownership / driveness		
Stakeholders involvement		
Financial planning		
UNEP Supervision and backstopping		
Overall Rating		

RATING OF PROJECT OBJECTIVES AND RESULTS

Highly Satisfactory (HS): The project had no shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Satisfactory (S): The project had minor shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Moderately Satisfactory (MS): The project had moderate shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Moderately Unsatisfactory (MU): The project had significant shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Unsatisfactory (U) The project had major shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Highly Unsatisfactory (HU): The project had severe shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Please note: Relevance and effectiveness will be considered as critical criteria. The overall rating of the project for achievement of objectives and results **may not be higher** than the lowest rating on either of these two criteria. Thus, to have an overall satisfactory rating for outcomes a project must have at least satisfactory ratings on both relevance and effectiveness.

RATINGS ON SUSTAINABILITY

A. Sustainability will be understood as the probability of continued long-term outcomes and impacts after the GEF project funding ends. The Terminal evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits after the project ends. Some of these factors might be outcomes of the project, i.e. stronger institutional capacities, legal frameworks, socio-economic incentives /or public awareness. Other factors will include contextual circumstances or developments that are not outcomes of the project but that are relevant to the sustainability of outcomes..

Rating system for sustainability sub-criteria

On each of the dimensions of sustainability of the project outcomes will be rated as follows.

Likely (L): There are no risks affecting this dimension of sustainability.

Moderately Likely (ML). There are moderate risks that affect this dimension of sustainability.

Moderately Unlikely (MU): There are significant risks that affect this dimension of sustainability

Unlikely (U): There are severe risks that affect this dimension of sustainability.

All the risk dimensions of sustainability are critical. Therefore, overall rating for sustainability will not be higher than the rating of the dimension with lowest ratings. For example, if a project has an Unlikely rating in either of the dimensions then its overall rating cannot be higher than Unlikely, regardless of whether higher ratings in other dimensions of sustainability produce a higher average.

RATINGS OF PROJECT M&E

Monitoring is a continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing project with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds. Evaluation is the systematic and objective assessment of an on-going or completed project, its design, implementation and results. Project evaluation may involve the definition of appropriate standards, the examination of performance against those standards, and an assessment of actual and expected results.

The Project monitoring and evaluation system will be rated on ‘M&E Design’, ‘M&E Plan Implementation’ and ‘Budgeting and Funding for M&E activities’ as follows:

Highly Satisfactory (HS): There were no shortcomings in the project M&E system.

Satisfactory(S): There were minor shortcomings in the project M&E system.

Moderately Satisfactory (MS): There were moderate shortcomings in the project M&E system.

Moderately Unsatisfactory (MU): There were significant shortcomings in the project M&E system.

Unsatisfactory (U): There were major shortcomings in the project M&E system.

Highly Unsatisfactory (HU): The Project had no M&E system.

"M&E plan implementation" will be considered a critical parameter for the overall assessment of the M&E system. The overall rating for the M&E systems will not be higher than the rating on "M&E plan implementation."

All other ratings will be on the GEF six point scale.

GEF Performance Description		Alternative description on the same scale
HS	= Highly Satisfactory	Excellent
S	= Satisfactory	Well above average
MS	= Moderately Satisfactory	Average
MU	= Moderately Unsatisfactory	Below Average
U	= Unsatisfactory	Poor
HU	= Highly Unsatisfactory	Very poor (Appalling)

Annex 2. Co-financing and Leveraged Resources

Co-financing (basic data to be supplied to the consultant for verification)

Co financing (Type/Source)	IA own Financing (mill US$)		Government (mill US$)		Other* (mill US$)		Total (mill US$)		Total Disbursement (mill US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
– Grants										
– Loans/Concessional (compared to market rate)										
– Credits										
– Equity investments										
– In-kind support										
– Other (*) - - - - -										
– Totals										

* Other is referred to contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and beneficiaries.

Leveraged Resources

Leveraged resources are additional resources—beyond those committed to the project itself at the time of approval—that are mobilized later as a direct result of the project. Leveraged resources can be financial or in-kind and they may be from other donors, NGO's, foundations, governments, communities or the private sector. Please briefly describe the resources the project has leveraged since inception and indicate how these resources are contributing to the project's ultimate objective.

Table showing final actual project expenditure by activity to be supplied by the UNEP Fund management Officer. (insert here)

Annex 3

Review of the Draft Report

Draft reports submitted to UNEP EOU are shared with the corresponding Programme or Project Officer and his or her supervisor for initial review and consultation. The DGEF staff and senior Executing Agency staff provide comments on the draft evaluation report. They may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. The consultation also seeks agreement on the findings and recommendations. UNEP EOU collates the review comments and provides them to the evaluators for their consideration in preparing the final version of the report. General comments on the draft report with respect to compliance with these TOR are shared with the reviewer.

Quality Assessment of the Evaluation Report

All UNEP GEF Mid Term Reports are subject to quality assessments by UNEP EOU. These apply GEF Office of Evaluation quality assessment and are used as a tool for providing structured feedback to the evaluator.

The quality of the draft evaluation report is assessed and rated against the following criteria:

GEF Report Quality Criteria	**UNEP EOU Assessment**	**Rating**
A. Did the report present an assessment of relevant outcomes and achievement of project objectives in the context of the focal area program indicators if applicable?		
B. Was the report consistent and the evidence complete and convincing and were the ratings substantiated when used?		
C. Did the report present a sound assessment of sustainability of outcomes?		
D. Were the lessons and recommendations supported by the evidence presented?		
E. Did the report include the actual project costs (total and per activity) and actual co-financing used?		
F. Did the report include an assessment of the quality of the project M&E system and its use for project management?		
UNEP EOU additional Report Quality Criteria	**UNEP EOU Assessment**	**Rating**
G. Quality of the lessons: Were lessons readily applicable in other contexts? Did they suggest prescriptive action?		
H. Quality of the recommendations: Did recommendations specify the actions necessary to correct existing conditions or improve operations ('who?' 'what?' 'where?' 'when?)'. Can they be implemented? Did the recommendations specify a goal and an associated performance indicator?		
I. Was the report well written? (clear English language and grammar)		
J. Did the report structure follow EOU guidelines, were all requested Annexes included?		
K. Were all evaluation aspects specified in the TORs adequately addressed?		
L. Was the report delivered in a timely manner		

GEF Quality of the MTE report = 0.3*(A + B) + 0.1*(C+D+E+F)
EOU assessment of MTE report = 0.3*(G + H) + 0.1*(I+J+K+L)
Combined quality Rating = (2* 'GEF EO' rating + EOU rating)/3
The Totals are rounded and converted to the scale of HS to HU

Rating system for quality of terminal evaluation reports
A number rating 1-6 is used for each criterion: Highly Satisfactory = 6, Satisfactory = 5, Moderately Satisfactory = 4, Moderately Unsatisfactory = 3, Unsatisfactory = 2, Highly Unsatisfactory = 1, and unable to assess = 0.

Annex 4 GEF Minimum requirements for M&E

Minimum Requirement 1: Project Design of M&E[42]

All projects must include a concrete and fully budgeted monitoring and evaluation plan by the time of Work Program entry (full-sized projects) or CEO approval (medium-sized projects). This plan must contain at a minimum:

- SMART (see below) indicators for project implementation, or, if no indicators are identified, an alternative plan for monitoring that will deliver reliable and valid information to management
- SMART indicators for results (outcomes and, if applicable, impacts), and, where appropriate, corporate-level indicators
- A project baseline, with:
  - a description of the problem to address
  - indicator data
  - or, if major baseline indicators are not identified, an alternative plan for addressing this within one year of implementation
- An M&E Plan with identification of reviews and evaluations which will be undertaken, such as mid-term reviews or evaluations of activities
- An organizational setup and budgets for monitoring and evaluation.

[42] http://gefweb.org/MonitoringandEvaluation/MEPoliciesProcedures/MEPTools/meptstandards.html

Minimum Requirement 2: Application of Project M&E

- Project monitoring and supervision will include implementation of the M&E plan, comprising:
- Use of SMART indicators for implementation (or provision of a reasonable explanation if not used)
- Use of SMART indicators for results (or provision of a reasonable explanation if not used)
- Fully established baseline for the project and data compiled to review progress
- Evaluations are undertaken as planned
- Operational organizational setup for M&E and budgets spent as planned.

SMART INDICATORS GEF projects and programs should monitor using relevant performance indicators. The monitoring system should be "SMART":

1. **Specific**: The system captures the essence of the desired result by clearly and directly relating to achieving an objective, and only that objective.
2. **Measurable:** The monitoring system and its indicators are unambiguously specified so that all parties agree on what the system covers and there are practical ways to measure the indicators and results.
3. **Achievable and Attributable:** The system identifies what changes are anticipated as a result of the intervention and whether the result(s) are realistic. Attribution requires that changes in the targeted developmental issue can be linked to the intervention.
4. **Relevant and Realistic:** The system establishes levels of performance that are likely to be achieved in a practical manner, and that reflect the expectations of stakeholders.
5. **Time-bound, Timely, Trackable, and Targeted:** The system allows progress to be tracked in a cost-effective manner at desired frequency for a set period, with clear identification of the particular stakeholder group to be impacted by the project or program.

Annex 5 List of intended additional recipients for the Terminal Evaluation

Name	Affiliation	Email
Government Officials		
Getahun Moges	General Director Ethiopian Electrical Agency	Electric.agency@telecom.net.et, getahunmoges@yahoo.co.uk
Gosaye Mengistie	Head , Energy Dev't Dept, Min of Mines and Energy, Ethiopia	gosayem@yahoo.com
Samuel Baire	Director General, Dep't of Energy, Eritrea	baireog@yahoo.com, samuelbaire@yahoo.com
John Okumu	Standards Officer, Uganda Nat Bureau of Standards	John.okumu@unbs.go.ug, john_okumu2003@yahoo.com
Albert Rugumayo	Manager Energy for Rrual Transformation Programme	rugumayo@energy.go.ug
Rachel Mijumbi	Project Officer BUDS ERT (WB)	rmijumbi@psfuganda.org
Dr. Kimambo	Chairman TASEA (Tz Solar Energy Association)	info@tasea.org
Mzumbe Musa	Coordinator Transf of Rural PV Markwet in Mwanza (UNDP/GEF/MEM)	Musa_mzumbe@yahoo.com
Thomas Mnunguli	Head Electrical Section Tz Bureau of Standards	tmnunguli@hotmail.com
GEF Focal Point(s)		
Executing Agency		

9.2 Time Schedule of Evaluation Mission

	Date		Place	Object
1	Monday	23/04	Nairobi	travel (overnight in Nairobi)
2	Tuesday	24/04	Nairobi	UNEP briefing & meetings
3	Wednesday	25/04	Nairobi	UNEP briefing & meetings + travel
4	Thursday	26/04	Addis	evaluation meeting
5	Friday	27/04	Jima (336km)	field evaluation in project area
6	Saturday	28/04	Jima	field evaluation in project area
7	Sunday	29/04	Jima	field evaluation in project area
8	Monday	30/04	Jima	field evaluation in project area
9	Tuesday	1/05	Addis	evaluation meeting + travel
10	Wednesday	2/05	Kampala	evaluation meeting
11	Thursday	3/05	Rakai (220km)	field evaluation in project area
12	Friday	4/05	Rakai	field evaluation in project area
13	Saturday	5/05	Rakai	field evaluation in project area
14	Sunday	6/05	Rakai	field evaluation in project area
15	Monday	7/05	Kampala	evaluation meeting + travel

	Date		Place	Object
16	Monday	25/06	Nairobi	travel (stop-over in Nairobi)
17	Tuesday	26/06	Dar Es Salaam	evaluation meeting
18	Wednesday	27/06	Iringa (503km)	field evaluation in project area
19	Thursday	28/06	Iringa	field evaluation in project area
20	Friday	29/06	Iringa	field evaluation in project area
21	Saturday	30/06	Iringa	field evaluation in project area
22	Sunday	1/07	Dar Es Salaam	reporting/analysis & preliminary conslusions
23	Monday	2/07	Dar Es Salaam	evaluation meeting + travel
24	Tuesday	3/07	Nairobi	debriefing meeting (UNEP, ...)
25	Wednesday	4/07	Nairobi	debriefing meeting (UNEP, ...) + travel (night)

9.3 List of Reviewed Documents

Document reviewed for Tanzania:

- Market assessment report
- Promotional/awareness campaign report
- Technical training report
- Sales training report
- Consulting Service Contract with ESDA
- Country Report
- UNEP/ESDA evaluation trip (Dec 2006)
- SolarNet Magazine – Dec. 05
- SunENERGY Magazine, Issues n°1 and 2, 2007

Document reviewed for Uganda:

- Market assessment report
- Technical training report
- Sales training report
- Final report on "The Uganda Experience": hard copy given by KCL
  → Including *Promotional/awareness campaign report*
- Consulting Service Contract with ESDA
- Country Report
- UNEP/ESDA evaluation trip (Dec 2006)
- SolarNet Magazine – Sept. 05

Document reviewed for Ethiopia:

- Market assessment report
- Technical training report
- Sales training report
- Consulting Service Contract with ESDA
- Country Report
- UNEP/ESDA evaluation trip (June 2006)
- SolarNet Magazine – Feb. 06

Missing: Promotional/awareness campaign report

Document reviewed for Eritrea:

- Market assessment report
- Promotional/awareness campaign – proposal
- Technical training report
- Sales training report
- Consulting Service Contract with ESDA
- Country Report
- ESDA evaluation trip (July 2006)
- Solarnet Magazine – April 06
- Phaesun .ppt presentation
- Answers to IED questionnaire and project data provided by email by Phaesun (Francis) and ESDA (Abdella)

Other Document reviewed:

- UNEP Project Document (Version 8) – Hard copy received from UNEP
- Project Implementation Review Report (PIRR) – July 05 to June 06 – soft copy from UNEP
- Lessons Learnt from Evaluation, Jan 07 – Hard copy received from UNEP
- Terminal Report on UNEP project, by ESDA, draft - April 07 (?)
- Workshop presentations and proceedings
- Project meeting reports (steering committee and management)
- Report on "Bangladesh MF Visit" – Sept. 06
- SolarNet Magazine – May 05
- SolarNet Magazine – Sept. 06

9.4 Guideline for Interviews

1. Project manager's meeting (ESDA)

Part 1: Management and coordination

- Administrative management
  - Reporting:
    - Monthly reports: not existing
    - 6-months reports: not provided as no additional information
    - Termination report (see part 2)
  - Delays:
- Regional Coordination
  - Efficiency and effectiveness
  - No country visits planned in the project
- Financial management
  - Budget table : provided by UNEP (Sandeep)
  - Expenditure table : not complete, only partial table
- Technical management
  - Progress and Achievement monitoring
    - SHS systems
      - List of demand/ sales/ installations
      - Project maps for location
      - Quality and Performances
      - End-users' satisfaction
    - Trained dealers
      - List of trainees
      - List of importers
      - Achievement & Quality assessment
    - Trained technicians
      - List of trainees
      - Achievement & Quality assessment
    - Trained sale agents
      - List of trainees
      - Achievement & Quality assessment
    - MFIs
      - Solar loan products : many different – to check with MFI/dealers
      - Risk assessment and collateral problems
      - Quality issues of components and services provided by dealers
      - MFI still interested in Solar development business despite the risks
      - Credit/loan and repayment schemes – conditions – actual user payments
    - Policy changes
      - Actual status of taxes and duties
      - Perspectives for subsidies
    - Actual measures taken after June evaluation

Part 2: Check of Outcomes and Achievement evidences

2. National consultant meeting[43]

Main topics:

- Overall management by ESDA (satisfaction? Coordination? Delays? …)
- UNEP supervision (quality support, advices …)
- Local organisation of key actors (MFI, Importers, Dealers, trainers, technicians, sales agents, end-users)
- Positive outcomes of activities: check with evidences
- Financing planning (control, audit, co-financing, management, breakdown tables)
- Supervision, quality control and monitoring (of project implementation and deliverables)
- Major problems encountered
- Lessons learnt
- Corrective measures on installations (after UNEP evaluation)

Specific issues

- Project maps
- Field project data with lists for
  - Installed SHS + dates
  - Records of demand & sales
  - Sales conditions (cash, credit, fee-for-services, …)
  - Technicians, sales agents …
- Technical and sales training: material, evaluation, quality of work
- Awareness: materials, outcomes
- National policy: support from Min Energy? Involvement of RE agencies?
- Policy barriers; taxes and duties status
- National PV standards & code of practices and enforcement strategy
- MFI innovative loan products, achievement, performances, confidence vs. risks and perspectives
- Details for credit/loan schemes and repayment conditions
- SHS target group: poorest? subsidy strategy?
- Commercial delivery route: operational? Perspectives?
- Links between dealers – importers
- Links between dealers – MFIs
- Dealer/technician activity: profitable & growing business? Quality of components, system design, installations, training, spare part management and after-sales services
- SHS price analysis and trend
- SHS performances and end-users' satisfaction

3. Importers/Dealers meeting

- Overall satisfaction
  - with the project achievements
  - with national consultant management
- links with upstream suppliers (international & national)

[43] Phaesun PLC, Megen Power Ltd, ESD-Tz, Konserv Consult Ltd

    - agreement
    - technical & logistical support
    - financial support
- links with downstream retailers/local technicians/sales agents
- Sales volume and trend in project area
- Potential demand and growing business activity? Expectation after project end?
- SHS price list
- Actual taxes and duties
- Subsidy and microfinance issues
- Quality of components, systems, installation, services → Standards? Warranties?
- Battery recycling
- SHS system sizing and standardisation of PV components

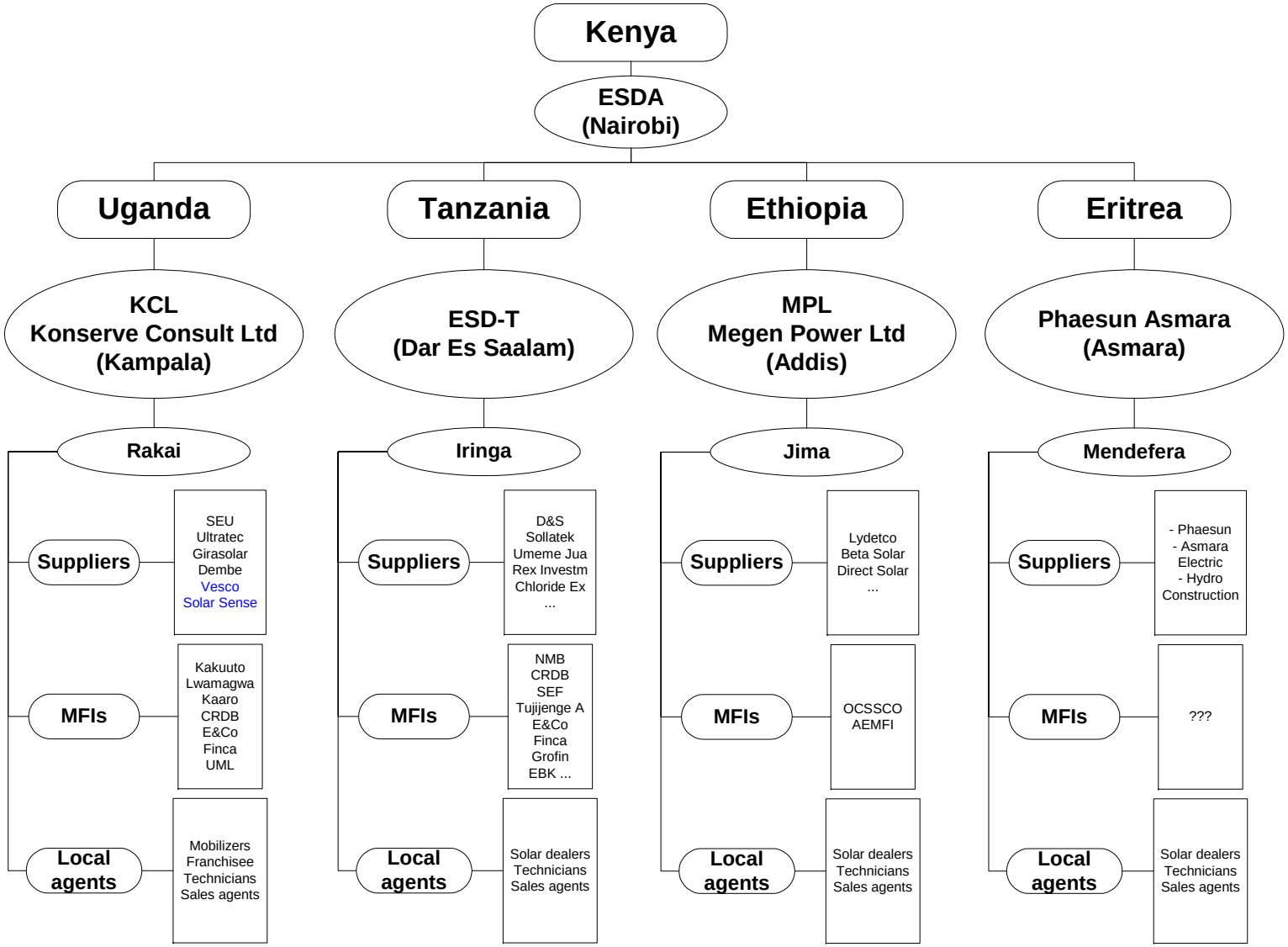
4. Micro Finance Institutions (MFI) meeting

- Satisfaction with the project
- Positive outcomes
- Problems encountered
- Lessons learnt

Specific issues

- Links with importers/dealers
- MFI's achievements
- Innovative PV loan products
    - Guideline for PV financing
    - Administrative procedure and constraints
    - Repayment period
    - Interest rates
    - Collateral
- Risk assessment
- Target group
- Planned activities and involvement after project's end
- Others issues …

9.5 List of Interviewees



List of Interviewees in Kenya

Location	Organisation	Name	Position
Nairobi	UNEP - DGEF	Peerke de Bakker	Programme Officer, Energy
Nairobi	UNEP – EOU	Michael Spilsbury	Evaluation Officer
Nairobi	UNEP – EOU	Segbedzi Norgbey	Chief EOU
Nairobi	UNEP - DGEF	Sandeep Bhambra	FMO
Nairobi	ESDA	Paul Amambia	
Nairobi	ESDA	Stephen Mutimba	Managing Director
Nairobi	Renewable Energy Consultant	Mark Hankins	consultant

List of Interviewees in Tanzania *(not met)*

Location	Organisation	Name	Position
Dar Es Saalam	ESD-T	Jeff Michael Felten	
Dar Es Saalam	ESD-T	Boniface Gissima Hanga	Project Coordinator
Dar Es Saalam	Ministry of Energy and Minerals (MEM)	N.C.X. Mwihava	Assistant Commissioner
Dar Es Saalam	TASEA	Finias B. Magessa	Executive Secretary
Dar Es Saalam	*TSB*		
Dar Es Saalam	*Sollatek Power Control Ltd*	*Abdulhamid Numari*	*General Manager*
Dar Es Saalam	Davis & Shirtliff Solar	Moses P. Sayula	Solar Engineer
Dar Es Saalam	Rex Investment Ltd	Francis Kibhisa	Managing Director
Dar Es Saalam	Chloride Exide	Louis Nyamwaya	Country Manager
Dar Es Saalam	Umeme Jua Ltd	Abbas M. Mohamed	Sales & Marketing Officer
Iringa	Mwaflug's Enterprises	Frederick Nzengele	Director
Iringa	Burhani Machinery & Tractor Parts	Seifuddin Kaderbhai (father)	
Iringa	Burhani Solar	Huzefa Kaderbhai (son)	Solar
Iringa	Cemma shop	Abdul	Solar dealer
Iringa	Sifa Saccos Ltd	Perecy Paulo Ugula	Manager
Iringa	Technicians		
Ilula	Koko Electrical Contractor	Koko	Solar dealer
Ilula	Chavala	Chavala	Solar dealer
Makambako	Swale Electrical	Redson Swale	owner
Makambako	Ikete Hardware	Moshi	owner
Njombe	Njombe Electronics & Solar	Reginald Ngailo	
Njombe	Luyungu General Electrical Store (LUGES)	Benjamin Luyungu	Managing Director
Njombe	Technicians	Barnabes & Odiro	

List of Interviewees in Uganda *(not met)*

Location	Organisation	Name	Position
Kampala	Konserve Consult Ltd	**Bobby Namiti**	Project Coordinator
Kampala	Konserve Consult Ltd	**Abdallah Kyezira**	Managing Director
Kampala	Solar Energy Uganda (SEU)	Charles … *& Richard Kanyike*	
Kampala	Ultratec	Abhay Shah	Director
Kampala	*Dembe Trading Enterprises*	*M. Joshua Muddu-Awulira*	
Kampala	*GiraSolar Ltd*	*Richard Ssettumba*	
Kampala	Private Sector Foundation (PSFU)	Geoffrey Ssebuggwawo	Director
Kampala	Private Sector Foundation (PSFU)	Rachael Mijumbi	
Kampala	Ministry of Energy and Mining Development (MEMD)	Albert Rugumayo	
Kampala	Ministry of Energy and Mining Development (MEMD)	Benon Bena	Principal Energy Officer
Kampala	*Uganda National Bureau of Standards (UNBS)*		
Kampala	*Uganda Microfinance Limited (UML)*		
Masaka	Ultrasolar Shop	Christina	
Kalisezo	electrical shop (+ Ultratec)		
Kakuuto	Sacco (+SEU)		
Sanje	electrical shop (+ SEU)		
Lwamagwa	Sacco (+ Ultratec)		
Dwaniro	1 technician (+ SEU)		
Kyotera	3 technicians		
Kyotera	electrical shop (Zopie)		
Kasagama	solar shop (technician) (+ Girasolar)		

List of Interviewees in Ethiopia *(not met)*

Location	Organisation	Name	Position
Addis	Megen Power Ltd	Melessaw Shanko	Managing Director
Addis	Megen Power Ltd	Hilawe Lakew	
Addis	Megen Power Ltd	Zelalem Mekonnen	Driver & Guide
Addis	EREDPC	Ato Ephrem, Getnet, …	
Addis	*MOME*	*Alamu Teganu*	
Addis	EPA - Environment Protection Authority	?	
Addis	*AEMFI*	*Anebo*	*retired*
Addis	Beta		
Addis	Direct Solar Energy Trading	Mulugeta Girma	Director
Addis	Lydetco	Dereje Walelign	Managing Director
Jima	Oumar	Oumar	Solar dealer
Jima	*Beta*		*Solar dealer*
Jima	Technicians		

List of Interviewees in Eritrea *(by email)*

Location	Organisation	Name	Position
Asmara	*Phaesun Asmara PLC*	*Francis Hilman*	*Managing Director*

10 Annex C: Project Data

10.1 TOR for Terminal Evaluation

TERMS OF REFERENCE

Terminal Evaluation of the UNEP GEF project
"Building Sustainable Commercial Dissemination Networks for Household PV Systems in Eastern Africa"
Project Number GF/4040-04-22

2. PROJECT BACKGROUND AND OVERVIEW

Project rationale from the project document

Among companies, consumers, decision-makers and other stakeholders, a lack of understanding of the role solar PV in rural electrification and the dynamics required for a successful commercial market are major barriers to the development of the industry. The project seeks to demonstrate how properly developed linkages between companies, consumers and communities can result in self-perpetuating markets for solar technology. This will be achieved by strengthening private sector ability to supply PV systems through increased consumer awareness and by sharing experiences between commercial markets and projects in the region.

The project will build linkages between regional and country businesses, consumers and institutions as well as facilitate the increased involvement of international PV companies in the region by building awareness of potential markets, linking them with local players. Through promotion and training activities focused in target regions, the project will assist stakeholders to develop sustainable commercial supply chains linking major cities and rural consumers. Most critically, the project will leverage the much needed investment using new and existing financing avenues to growing companies to enable them to become sustainable enterprises.

The overall objective of the project was stated as *'stimulate increased rural sales of PV by increasing consumer awareness and by sharing experiences between commercial markets and projects in region.*' For more information please refer to the projects' website: www.esda.co.ke/gef-pvproject/index.html

Relevance to GEF Programmes

The project falls under GEF Operational Program 6: Removing barriers and Reducing Implementation Costs to adoption of Renewable Energy. The project will share successful commercial experiences and experiences of GEF PV projects (including UPPPRE Uganda, ERT World Bank Uganda, PVMTI Kenya, UNDP-GEF Tanzania and WB-GEF Ethiopia).'

Executing Arrangements

Energy for Sustainable Development, Africa implemented the project in conjunction with selected local consultants in each country. A project steering committee was formed to guide the project. It included representatives of Triodos Renewable Energy Development Fund, country representatives from the PV private sector, project management and Government officials. The steering committee received quarterly reports of project progress and was copied all monitoring and evaluation outputs. A full-time manager based at ESDA in Nairobi carried out day-to-day project management. This manager delegated work to consultants in each country. Consultants in each country were chosen based on competitive tender.

Project Activities

The project duration was initially 20 months starting October 2004 and ending June 2006. which was later revised and extended to be completed in December 2006, making a total duration of 26 months.

The project had a number of components and activities including:

l) Management and Technical Support
m) PV SHS Trade Fair and Project Kick Off Meeting
n) Market Assessment in Target Regions of each Country
o) Business Opportunity Awareness Raising, Business Assistance and Investments in Companies
p) Technician and Sales Training
q) Country PV Trade Fairs and Seminars
r) Inter-Country Exchange Visits & Information Exchange
s) Region-Based Awareness Raising and Promotional Campaigns
t) Policy Workshops
u) Finance Workshops
v) Monitoring and Evaluation

Budget

The total budget was US$ 1,233,230 with US$ 693,600 funded by the GEF Trust Fund and in-kind co-funding from; Triodos Renewable Energy for Development Fund US$449,450 University of Hawaii US$ 75,000, Company contributions US$ 90,180.

TERMS OF REFERENCE FOR THE EVALUATION

8. Objective and Scope of the Evaluation

The objective of this terminal evaluation is to examine the extent and magnitude of any project impacts to date and determine the likelihood of future impacts. The evaluation will also assess project performance and the implementation of planned project activities and planned outputs against actual results. The evaluation will focus on the following main questions:

Has the project*:*

- Helped establish an operational commercial delivery route between the capital city and one rural district of each country? - including:
  • at least one national importer?,
  • several dealers in the target district?,
  • at least ten technicians and sales agents in the target district?,
  • interested community development NGOs?
  • interested micro-finance groups? and
  • hundreds of potential PV customers?
- Educated PV businesses in cities of each countries that are actively seeking to develop commercial rural markets?
- Created a network of influential policy makers who are aware of the necessity of including PV in rural electrification plans and will actively lobby for such plans.
- Increased participation by international PV companies in the PV markets of Uganda, Tanzania, Eritrea and Ethiopia?
- Promoted, as a direct result of project activities, installation of more than 750 PV solar home systems in the targeted districts, and a measurable growth in the rural PV sales in Uganda, Tanzania, Eritrea and Ethiopia. Five years after the project, we expect that 3000 systems will have been installed in the 5 districts?

9. Methods

This terminal evaluation will be conducted as an in-depth evaluation using a participatory approach whereby the UNEP/DGEF Task Manager, key representatives of the executing agencies and other relevant staff are kept informed and regularly consulted throughout the evaluation. The consultant will liaise with the UNEP/EOU and the UNEP/DGEF Task Manager on any logistic and/or methodological issues to properly conduct the review in as independent a way as possible, given the circumstances and resources offered. The draft report will be circulated to UNEP/DGEF Task Manager, key representatives of the executing agencies and the UNEP/EOU. Any comments or responses to the draft report will be sent to UNEP / EOU for collation and the consultant will be advised of any necessary revisions.

The findings of the evaluation will be based on the following:

6. A desk review of project documents including, but not limited to:
   (a) The project documents, outputs, monitoring reports (such as progress and financial reports to UNEP and GEF annual Project Implementation Review reports) and relevant correspondence.
   (b) Review of specific products including the final reports from country executing agencies, workshop proceedings, etc
   (c) Notes from the Steering Group meetings.

(d) Other project-related material produced by the project staff or partners.

7. Interviews with project management and technical support staff. Field visits to Jimma (Ethiopia), Rakai (Uganda), Iringa (Tanzania) will be undertaken in this connection.

8. Interviews and Telephone interviews with intended users for the project outputs and other stakeholders involved with this project, including in the participating countries and international bodies. As appropriate, these interviews could be combined with an email questionnaire.

9. The Consultant shall seek additional information and opinions from representatives of National Standards Bureaus, National and/or local Micro Finance Institutions, relevant (rural electrification) Gov't agencies by e-mail, through telephone communication, or by actual meetings.

10. Interviews with the UNEP/DGEF project task manager and Fund Management Officer, and other relevant staff in UNEP dealing with Climate Change related activities as necessary. The Consultant shall also gain broader perspectives from discussions with relevant GEF Secretariat staff.

Key Evaluation principles.
In attempting to evaluate any outcomes and impacts that the project may have achieved, evaluators should remember that the project's performance should be assessed by considering the difference between the answers to two simple questions ***"what happened?***" and ***"what would have happened anyway?"***. These questions imply that there should be consideration of the baseline conditions and trends in relation to the intended project outcomes and impacts. In addition it implies that there should be plausible evidence to attribute such outcomes and impacts to the actions of the project.

Sometimes, adequate information on baseline conditions and trends is lacking. In such cases this should be clearly highlighted by the evaluator, along with any simplifying assumptions that were taken to enable the evaluator to make informed judgements about project performance.

10.Project Evaluation Parameters

7. Attainment of objectives and planned results:
The assessment of project results seeks to determine the extent to which the project objectives were achieved, or are expected to be achieved, and assess if the project has led to any other positive or negative consequences. While assessing a project's outcomes the evaluation will seek to determine the extent of achievement and shortcomings in reaching the project's objectives as stated in the project document and also indicate if there were any changes and whether those changes were approved. As the project did not establish an elaborate baseline (initial conditions), the evaluator should seek to estimate the baseline condition so that achievements and results can be properly established (or simplifying assumptions used). Since most GEF projects can be expected to achieve the anticipated outcomes by project closing, assessment of project outcomes should be a priority. Outcomes are the likely or achieved short-term and medium-term effects of an intervention's outputs. Examples of outcomes

could include but are not restricted to stronger institutional capacities, higher public awareness (when leading to changes of behaviour), and transformed policy frameworks or markets. The evaluation should assess the extent to which the project's major relevant objectives were effectively and efficiently achieved or are expected to be achieved and their relevance.

- *Effectiveness:* Evaluate how, and to what extent, the stated project objectives have been met, taking into account the "achievement indicators" specified in the project document and logical framework[44]. In particular, the analysis of outcomes achieved should include, *inter alia*, an assessment of whether and to what extent the results of this project have informed national, regional or international processes such as greenhouse gas inventories, the IPCC or others.
- *Relevance:* In retrospect, were the project's outcomes consistent with the focal areas/operational program strategies and country priorities? The evaluation should also assess the whether outcomes specified in the project document and or logical framework are actually outcomes and not outputs or inputs.
- *Efficiency:* Cost-effectiveness assesses the achievement of the environmental and developmental objectives as well as the project's outputs in relation to the inputs, costs, and implementing time. Include an assessment of outcomes in relation to inputs, costs, and implementation times based on the following questions: Was the project cost-effective? Was the project the least cost option? Was the project implementation delayed and if it was then did that affect cost-effectiveness? The evaluation should assess the contribution of cash and in-kind co-financing to project implementation and to what extent the project leveraged additional resources. Comparisons of the cost-time vs. outcomes relationship of the project with that of other similar projects should be made if feasible.

8. Assessment of Sustainability of project outcomes:

Sustainability is understood as the probability of continued long-term project-derived outcomes and impacts after the GEF project funding ends. The evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits after the project ends. Some of these factors might be outcomes of the project, e.g. stronger institutional capacities or better informed decision-making. Other factors will include contextual circumstances or developments that are not outcomes of the project but that are relevant to the sustainability of outcomes. The evaluation should ascertain to what extent follow-up work has been initiated and how project outcomes will be sustained and enhanced over time. In this case, sustainability will be linked to the continued use and influence of scientific models and scientific findings, produced by the project.

Four aspects of sustainability should be addressed: financial, socio-political, institutional frameworks and governance, and ecological (if applicable) The following questions provide guidance on the assessment of these aspects:

[44] In case in the original or modified expected outcomes are merely outputs/inputs then the evaluators should assess if there were any real outcomes of the project and if yes then whether these are commensurate with the realistic expectations from such projects.

- *Financial resources.* To what extent are the outcomes of the project dependent on continued financial support? What is the likelihood that any required financial resources will be available to sustain the project outcomes/benefits once the GEF assistance ends (resources can be from multiple sources, such as the public and private sectors, income generating activities, and market trends that support the project's objectives)? Was the project was successful in identifying and leveraging co-financing?
- *Socio-political:* To what extent are the outcomes of the project dependent on socio-political factors? What is the likelihood that the level of stakeholder ownership will allow for the project outcomes/benefits to be sustained? Is there sufficient public / stakeholder awareness in support of the long term objectives of the project?
- *Institutional framework and governance.* To what extent are the outcomes of the project dependent on issues relating to institutional frameworks and governance? What is the likelihood that institutional and technical achievements, legal frameworks, policies and governance structures and processes will allow for, the project outcomes/benefits to be sustained? While responding to these questions consider if the required systems for accountability and transparency and the required technical know-how are in place.
- *Ecological.* Are there any environmental risks that can undermine the future flow of project environmental benefits? The TE should assess whether certain activities in the project area will pose a threat to the sustainability of the project outcomes.[45]

As far as possible, also assess the potential longer-term impacts considering that the evaluation is taking place upon completion of the project and that longer term impact is expected to be seen in a few years time. Frame any recommendations to enhance future project impact in this context. Which will be the major 'channels' for longer term impact from the project at the national and international scales? The evaluation should formulate recommendations that outline possible approaches and necessary actions to facilitate an impact assessment study in a few years time.

9. Catalytic role

The terminal evaluation will also describe any catalytic or replication effect of the project. What examples are there of replication and catalytic outcomes that suggest increased likelihood of sustainability? Replication approach, in the context of GEF projects, is defined as lessons and experiences coming out of the project that are replicated or scaled up in the design and implementation of other projects. Replication can have two aspects, replication proper (lessons and experiences are replicated in different geographic area) or scaling up (lessons and experiences are replicated within the same geographic area but funded by other sources). If no effects are identified, the evaluation will describe the catalytic or replication actions that the project carried out. No ratings are requested for the catalytic role.

[45] For example, construction of dam in a protected area could inundate a sizable area and thereby neutralizing the biodiversity related gains made by the project or, a newly established pulp mill might jeopardise the viability of nearby protected forest areas by increasing logging pressures.

10. Achievement of outputs and activities:

- Delivered outputs: Assessment of the project's success in producing each of the programmed outputs, both in quantity and quality as well as usefulness and timeliness.
- Assess the soundness and effectiveness of the methods and approached used by the project.

11. Assessment of Monitoring and Evaluation Systems:

- **M&E design.** Did the project have a sound M&E plan to monitor results and track progress towards achieving project objectives? The Terminal Evaluation will assess whether the project met the minimum requirements for project design of M&E and the application of the Project M&E plan (Minimum requirements are specified in Annex 4). The evaluation shall include an assessment of the quality, application and effectiveness of project monitoring and evaluation plans and tools, including an assessment of risk management based on the assumptions and risks identified in the project document. The M&E plan should include a baseline (including data, methodology, etc.), SMART (see Annex 4) indicators and data analysis systems, and evaluation studies at specific times to assess results. The time frame for various M&E activities and standards for outputs should have been specified.
- **M&E plan implementation.** Was an M&E system in place and did it facilitate tracking of results and progress towards projects objectives throughout the project implementation period. Were Annual project reports complete, accurate and with well justified ratings? Was the information provided by the M&E system used during the project to improve project performance and to adapt to changing needs? Did the Projects have an M&E system in place with proper training for parties responsible for M&E activities to ensure data will continue to be collected and used after project closure?
- **Budgeting and Funding for M&E activities.** Were adequate budget provisions made for M&E made and were such resources made available in a timely fashion during implementation?
- **Long-term Monitoring.** Is long-term monitoring envisaged as an outcome of the project? If so, comment specifically on the relevance of such monitoring systems to sustaining project outcomes and how the monitoring effort will be sustained.

12. Assessment of processes that affected attainment of project results.

The evaluation will consider, but need not be limited to, consideration of the following issues that may have affected project implementation and attainment of project results:

viii. **Preparation and readiness.** Were the project's objectives and components clear, practicable and feasible within its timeframe? Were capacities of the executing institutions and counterparts properly considered when the project was designed? Were lessons from other relevant projects properly incorporated in design? Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to implementation? Was availability of counterpart resources (funding, staff, and facilities), passage of enabling legislation, and adequate project management arrangements in place at project entry?

- Ascertain to what extent the project implementation mechanisms outlined in the project document have been closely followed. In particular, assess the role of the various committees established and whether the project document was clear and realistic to enable effective and efficient implementation, whether the project was executed according to the plan and how well the management was able to adapt to changes during the life of the project to enable the implementation of the project.
- Evaluate the effectiveness and efficiency and adaptability of project management and the supervision of project activities / project execution arrangements at all levels (1) policy decisions: Steering Group; (2) day to day project management: (3) GEF guidance: UNEP DGEF.

ix. **Country ownership/Drivenness.** This is the relevance of the project to national development and environmental agendas, recipient country commitment, and regional and international agreements. Examples of possible evaluative questions include: Was the project design in-line with the national sectoral and development priorities and plans? Are project outcomes contributing to national development priorities and plans? Were the relevant country representatives, from government and civil society, involved in the project? Did the recipient government maintain its financial commitment to the project? Have the government approved policies or regulatory frameworks been in-line with the project's objectives? Specifically the evaluation will:

- Assess the level of country ownership, and whether the project was effective in providing and communicating information and tools that assisted governments in promoting household PV systems.
- Assess the level of country commitment to promoting the use of household PV systems.

x. **Stakeholder involvement.** Did the project involve the relevant stakeholders through information sharing, consultation and by seeking their participation in project's design, implementation, and monitoring and evaluation? For example, did the project implement appropriate outreach and public awareness campaigns? Did the project consult and make use of the skills, experience and knowledge of the appropriate government entities, NGOs, community groups, private sector, local governments and academic institutions in the design, implementation and evaluation of project activities? Were perspectives of those that would be affected by decisions, those that could affect the outcomes and those that could contribute information or other resources to the process taken into account while taking decisions? Were the relevant vulnerable groups and the powerful, the supporters and the opponents, of the processes properly involved? Specifically the evaluation will:

- Assess the mechanisms put in place by the project for identification and engagement of stakeholders in each participating country and establish, in consultation with the stakeholders, whether this mechanism was successful, and identify its strengths and weaknesses.
- Assess the degree and effectiveness of collaboration/interactions between the various project partners and institutions during the course of implementation of the project.

- Assess the degree and effectiveness of any various public awareness activities that were undertaken during the course of implementation of the project.

xi. **Financial planning.** Did the project have the appropriate financial controls, including reporting and planning, that allowed management to make informed decisions regarding the budget and allowed for timely flow of funds. Specifically, the evaluation should:

- Assess the strength and utility of financial controls, including reporting, and planning to allow the project management to make informed decisions regarding the budget and allow for a proper and timely flow of funds for the payment of satisfactory project deliverables throughout the project's lifetime.
- Present the major findings from the financial audit if one has been conducted.
- Did promised co-financing materialize? Identify and verify the sources of co- financing as well as leveraged and associated financing (in co-operation with the IA and EA).
- Assess whether the project has applied appropriate standards of due diligence in the management of funds and financial audits.
- The evaluation should also include a breakdown of final actual project costs by activities compared to budget (variances), financial management (including disbursement issues), and co- financing. This information will be prepared by the relevant DGEF Fund Management Officer of the project for scrutiny by the evaluator (table attached in Annex 1 Co-financing and leveraged resources).

xii. **UNEP Supervision and backstopping.** Did UNEP Agency staff identify problems in a timely fashion and accurately estimate its seriousness? Did UNEP staff provide quality support and advice to the project, approved modifications in time and restructure the project when needed? Did UNEP and Executing Agencies provide the right staffing levels, continuity, skill mix, frequency of field visits?

xiii. **Co-financing and Project Outcomes & Sustainability.** If there was a difference in the level of expected co-financing and actual co-financing, then what were the reasons for this? Did the extent of materialization of co-financing affect the project's outcomes and/or sustainability, and if it did affect outcomes and sustainability then in what ways and through what causal linkages?

xiv. **Delays and Project Outcomes & Sustainability.** If there were delays in project implementation and completion, the evaluation will summarise the reasons for them. Did delays affect the project's outcomes and/or sustainability, and if so in what ways and through what causal linkages?

The ***ratings will be presented in the form of a table*** with each of the categories rated separately and with **brief justifications for the rating** based on the findings of the main analysis. An overall rating for the project should also be given. The rating system to be applied is specified in Annex 1:

11.Evaluation report format and review procedures

The report should be brief, to the point and easy to understand. It must explain; the purpose of the evaluation, exactly what was evaluated and the methods used. The report must highlight any methodological limitations, identify key concerns and present evidence-based findings, consequent conclusions, recommendations and lessons. The report should provide information on when the evaluation took place, the places visited, who was involved and be presented in a way that makes the information accessible and comprehensible. The report should include an executive summary that encapsulates the essence of the information contained in the report to facilitate dissemination and distillation of lessons.

Evidence, findings, conclusions and recommendations should be presented in a complete and balanced manner. The evaluation report shall be written in English, be of no more than 50 pages (excluding annexes), use numbered paragraphs and include:

ix) An **executive summary** (no more than 3 pages) providing a brief overview of the main conclusions and recommendations of the evaluation;

x) **Introduction and background** giving a brief overview of the evaluated project, for example, the objective and status of activities;

xi) **Scope, objective and methods** presenting the evaluation's purpose, the evaluation criteria used and questions to be addressed;

xii) **Project Performance and Impact** providing factual evidence relevant to the questions asked by the evaluator and interpretations of such evidence. This is the main substantive section of the report and should provide a commentary on all evaluation aspects (A − F above).

xiii) **Conclusions and rating** of project implementation success giving the evaluator's concluding assessments and ratings of the project against given evaluation criteria and standards of performance. The conclusions should provide answers to questions about whether the project is considered good or bad, and whether the results are considered positive or negative;

xiv) **Lessons learned** presenting general conclusions, based on established good practices that have the potential for wider application and use. Lessons may also be derived from problems and mistakes. The context in which lessons may be applied should be clearly specified, and lessons should always state or imply some prescriptive action. A lesson should be written such that experiences derived from the project could be applied in other projects or at portfolio level;

xv) **Recommendations** suggesting *actionable* proposals for stakeholders to rectify poor existing situations as well as recommendations concerning projects of similar nature.. In general, Terminal Evaluations are likely to have very few (only two or three) actionable recommendations;

xvi) **Annexes** include Terms of Reference, list of interviewees, documents reviewed, brief summary of the expertise of the evaluator / evaluation team, a summary of co-finance information etc. Dissident views or management responses to the evaluation findings may later be appended in an annex.

Examples of UNEP GEF Terminal Evaluation Reports are available at www.unep.org/eou

Review of the Draft Evaluation Report

Draft reports submitted to UNEP EOU are shared with the corresponding Programme or Project Officer and his or her supervisor for initial review and consultation. The DGEF staff and senior Executing Agency staff are allowed to comment on the draft evaluation report.

They may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. The consultation also seeks agreement on the findings and recommendations. UNEP EOU collates the review comments and provides them to the evaluators for their consideration in preparing the final version of the report.

All UNEP GEF Evaluation Reports are subject to quality assessments by UNEP EOU. These incorporate GEF Office of Evaluation quality assessment criteria and are used as a tool for providing structured feedback to the evaluator (see Annex 3).

12.Submission of Final Terminal Evaluation Reports.

The final report shall be submitted in electronic form in MS Word format and should be sent to the following persons:

Segbedzi Norgbey, Chief, Evaluation and Oversight Unit
UNEP, P.O. Box 30552-00100
Nairobi, Kenya
Tel.: (254-20) 7624181
Fax: (254-20) 7623158
Email: segbedzi.norgbey@unep.org

With a copy to:

Shafqat Kakakhel, Officer-in-Charge
UNEP/Division of GEF Coordination
P.O. Box 30552-00100
Nairobi, Kenya
Tel: + 254-20-7624686
Fax: + 254-20-7624041/4042

Peerke De Bakker
Task Manager, Climate Change
United Nations Environment Programme (UNEP)
Division of GEF Coordination (DGEF)
PO Box 30552-00100
Nairobi, Kenya
Tel: 254 20 7623967
Fax: 254 20 7624041/2
Email: Peerke.Debakker@unep.org

Catherine Vallee
UNEP/GEF SPO Climate Change
United Nations Environment Programme (UNEP)
Division of GEF Coordination (DGEF)
PO Box 30552-00100
Nairobi, Kenya
Tel: 254 20 7625076
Fax: 254 20 7624041/2
Email: catherine.vallee@unep.org

The final evaluation report will be printed in hard copy and published on the Evaluation and Oversight Unit's web-site www.unep.org/eou. Subsequently, the report will be sent to the GEF Office of Evaluation for their review, appraisal and inclusion on the GEF website.

13.Resources and schedule of the evaluation

This final evaluation will be undertaken by an international evaluator contracted by the Evaluation and Oversight Unit, UNEP. The contract for the evaluator will begin on May 1 2007 and end on July 31 2007 (30 days spread over 13 weeks (22days of travel, to Ethiopia-5 days, Uganda –5 days, Tanzania – 5 days, Nairobi –2 days briefing and 2 days debriefing, 3 days of travel and 8 days desk study). The evaluator will submit a draft report on July 15 2007 to UNEP/EOU, the UNEP/DGEF Task Manager, and key representatives of the executing agencies. Any comments or responses to the draft report will be sent to UNEP / EOU for collation and the consultant will be advised of any necessary revisions. Comments to the final draft report will be sent to the consultant by July 22 2007 after which, the consultant will submit the final report no later than July 31 2007.

The evaluator will after an initial telephone briefing with EOU and UNEP/GEF travel to Nairobi, Kenya and meet with UNEP DGEF Task Manager and project staff of the Executing Agency at the beginning of the evaluation. Furthermore, the evaluator is expected to travel capitals and project areas in Ethiopia (Addis Ababa), Uganda (Kampala) and Tanzania (Dar-es-Salam) and meet with representatives of the national project executing agencies, PV dealers (in the capital and project areas) as well as end users.

In accordance with UNEP/GEF policy, all GEF projects are evaluated by independent evaluators contracted as consultants by the EOU. The evaluators should have the following qualifications:

The evaluator should not have been associated with the design and implementation of the project. The evaluator will work under the overall supervision of the Chief, Evaluation and Oversight Unit, UNEP. The evaluator should be an international expert with extensive experience in PV Solar Home System Project management, PV SHS system component quality standards and system design, codes of practice for PV installations, Financial Assessment of SHS end user financing as well as project financial administration.
Knowledge of UNEP programmes and GEF activities is desirable. Fluency in oral and written English is a must.

14.Schedule Of Payment

The consultant shall select one of the following two contract options:

Lump-Sum Option

The evaluator will receive an initial payment of 30% of the total amount due upon signature of the contract. A further 30% will be paid upon submission of the draft report. A final payment of 40% will be made upon satisfactory completion of work. The fee is payable under the individual Special Service Agreement (SSA) of the evaluator and IS **inclusive** of all expenses such as travel, accommodation and incidental expenses.

Fee-only Option

The evaluator will receive an initial payment of 40% of the total amount due upon signature of the contract. Final payment of 60% will be made upon satisfactory completion of work.

The fee is payable under the individual SSAs of the evaluator and is NOT inclusive of all expenses such as travel, accommodation and incidental expenses. Ticket and DSA will be paid separately.

In case, the evaluator cannot provide the products in accordance with the TORs, the timeframe agreed, or his products are substandard, the payment to the evaluator could be withheld, until such a time the products are modified to meet UNEP's standard. In case the evaluator fails to submit a satisfactory final product to UNEP, the product prepared by the evaluator may not constitute the evaluation report.

Annex 1. OVERALL RATINGS TABLE

Criterion	Evaluator's Summary Comments	Evaluator's Rating
Attainment of project objectives and results (overall rating) **Sub criteria (below)**		
Effectiveness		
Relevance		
Efficiency		
Sustainability of Project outcomes (overall rating) **Sub criteria (below)**		
Financial		
Socio Political		
Institutional framework and governance		
Ecological		
Achievement of outputs and activities		
Monitoring and Evaluation (overall rating) **Sub criteria (below)**		
M&E Design		
M&E Plan Implementation (use for adaptive management)		
Budgeting and Funding for M&E activities		
Catalytic Role		
Preparation and readiness		
Country ownership / driveness		
Stakeholders involvement		
Financial planning		
UNEP Supervision and backstopping		
Overall Rating		

RATING OF PROJECT OBJECTIVES AND RESULTS

Highly Satisfactory (HS): The project had no shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Satisfactory (S): The project had minor shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Moderately Satisfactory (MS): The project had moderate shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Moderately Unsatisfactory (MU): The project had significant shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Unsatisfactory (U) The project had major shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Highly Unsatisfactory (HU): The project had severe shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Please note: Relevance and effectiveness will be considered as critical criteria. The overall rating of the project for achievement of objectives and results **may not be higher** than the lowest rating on either of these two criteria. Thus, to have an overall satisfactory rating for outcomes a project must have at least satisfactory ratings on both relevance and effectiveness.

RATINGS ON SUSTAINABILITY

B. Sustainability will be understood as the probability of continued long-term outcomes and impacts after the GEF project funding ends. The Terminal evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits after the project ends. Some of these factors might be outcomes of the project, i.e. stronger institutional capacities, legal frameworks, socio-economic incentives /or public awareness. Other factors will include contextual circumstances or developments that are not outcomes of the project but that are relevant to the sustainability of outcomes..

Rating system for sustainability sub-criteria

On each of the dimensions of sustainability of the project outcomes will be rated as follows.

Likely (L): There are no risks affecting this dimension of sustainability.

Moderately Likely (ML). There are moderate risks that affect this dimension of sustainability.

Moderately Unlikely (MU): There are significant risks that affect this dimension of sustainability

Unlikely (U): There are severe risks that affect this dimension of sustainability.

All the risk dimensions of sustainability are critical. Therefore, overall rating for sustainability will not be higher than the rating of the dimension with lowest ratings. For example, if a project has an Unlikely rating in either of the dimensions then its overall rating cannot be higher than Unlikely, regardless of whether higher ratings in other dimensions of sustainability produce a higher average.

RATINGS OF PROJECT M&E

Monitoring is a continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing project with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds. Evaluation is the systematic and objective assessment of an on-going or completed project, its design, implementation and results. Project evaluation may involve the definition of appropriate standards, the examination of performance against those standards, and an assessment of actual and expected results.

The Project monitoring and evaluation system will be rated on ‘M&E Design’, ‘M&E Plan Implementation’ and ‘Budgeting and Funding for M&E activities’ as follows:

Highly Satisfactory (HS): There were no shortcomings in the project M&E system.

Satisfactory(S): There were minor shortcomings in the project M&E system.

Moderately Satisfactory (MS): There were moderate shortcomings in the project M&E system.

Moderately Unsatisfactory (MU): There were significant shortcomings in the project M&E system.

Unsatisfactory (U): There were major shortcomings in the project M&E system.

Highly Unsatisfactory (HU): The Project had no M&E system.

"M&E plan implementation" will be considered a critical parameter for the overall assessment of the M&E system. The overall rating for the M&E systems will not be higher than the rating on "M&E plan implementation."

All other ratings will be on the GEF six point scale.

GEF Performance Description		Alternative description on the same scale
HS	= Highly Satisfactory	Excellent
S	= Satisfactory	Well above average
MS	= Moderately Satisfactory	Average
MU	= Moderately Unsatisfactory	Below Average
U	= Unsatisfactory	Poor
HU	= Highly Unsatisfactory	Very poor (Appalling)

Annex 2. Co-financing and Leveraged Resources

Co-financing (basic data to be supplied to the consultant for verification)

Co financing (Type/Source)	IA own Financing (mill US$)		Government (mill US$)		Other* (mill US$)		Total (mill US$)		Total Disbursement (mill US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
– Grants										
– Loans/Concessional (compared to market rate)										
– Credits										
– Equity investments										
– In-kind support										
– Other (*) - - - - -										
– Totals										

* Other is referred to contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and beneficiaries.

Leveraged Resources

Leveraged resources are additional resources—beyond those committed to the project itself at the time of approval—that are mobilized later as a direct result of the project. Leveraged resources can be financial or in-kind and they may be from other donors, NGO's, foundations, governments, communities or the private sector. Please briefly describe the resources the project has leveraged since inception and indicate how these resources are contributing to the project's ultimate objective.

Table showing final actual project expenditure by activity to be supplied by the UNEP Fund management Officer. (insert here)

Annex 3

Review of the Draft Report

Draft reports submitted to UNEP EOU are shared with the corresponding Programme or Project Officer and his or her supervisor for initial review and consultation. The DGEF staff and senior Executing Agency staff provide comments on the draft evaluation report. They may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. The consultation also seeks agreement on the findings and recommendations. UNEP EOU collates the review comments and provides them to the evaluators for their consideration in preparing the final version of the report. General comments on the draft report with respect to compliance with these TOR are shared with the reviewer.

Quality Assessment of the Evaluation Report

All UNEP GEF Mid Term Reports are subject to quality assessments by UNEP EOU. These apply GEF Office of Evaluation quality assessment and are used as a tool for providing structured feedback to the evaluator.

The quality of the draft evaluation report is assessed and rated against the following criteria:

GEF Report Quality Criteria	**UNEP EOU Assessment**	**Rating**
A. Did the report present an assessment of relevant outcomes and achievement of project objectives in the context of the focal area program indicators if applicable?		
B. Was the report consistent and the evidence complete and convincing and were the ratings substantiated when used?		
C. Did the report present a sound assessment of sustainability of outcomes?		
D. Were the lessons and recommendations supported by the evidence presented?		
E. Did the report include the actual project costs (total and per activity) and actual co-financing used?		
F. Did the report include an assessment of the quality of the project M&E system and its use for project management?		
UNEP EOU additional Report Quality Criteria	**UNEP EOU Assessment**	**Rating**
G. Quality of the lessons: Were lessons readily applicable in other contexts? Did they suggest prescriptive action?		
H. Quality of the recommendations: Did recommendations specify the actions necessary to correct existing conditions or improve operations ('who?' 'what?' 'where?' 'when?)'. Can they be implemented? Did the recommendations specify a goal and an associated performance indicator?		
I. Was the report well written? (clear English language and grammar)		
J. Did the report structure follow EOU guidelines, were all requested Annexes included?		
K. Were all evaluation aspects specified in the TORs adequately addressed?		
L. Was the report delivered in a timely manner		

GEF Quality of the MTE report = 0.3*(A + B) + 0.1*(C+D+E+F)
EOU assessment of MTE report = 0.3*(G + H) + 0.1*(I+J+K+L)
Combined quality Rating = (2* 'GEF EO' rating + EOU rating)/3
The Totals are rounded and converted to the scale of HS to HU

Rating system for quality of terminal evaluation reports
A number rating 1-6 is used for each criterion: Highly Satisfactory = 6, Satisfactory = 5, Moderately Satisfactory = 4, Moderately Unsatisfactory = 3, Unsatisfactory = 2, Highly Unsatisfactory = 1, and unable to assess = 0.

Annex 4 GEF Minimum requirements for M&E

Minimum Requirement 1: Project Design of M&E[46]

All projects must include a concrete and fully budgeted monitoring and evaluation plan by the time of Work Program entry (full-sized projects) or CEO approval (medium-sized projects). This plan must contain at a minimum:

- SMART (see below) indicators for project implementation, or, if no indicators are identified, an alternative plan for monitoring that will deliver reliable and valid information to management
- SMART indicators for results (outcomes and, if applicable, impacts), and, where appropriate, corporate-level indicators
- A project baseline, with:
  - a description of the problem to address
  - indicator data
  - or, if major baseline indicators are not identified, an alternative plan for addressing this within one year of implementation
- An M&E Plan with identification of reviews and evaluations which will be undertaken, such as mid-term reviews or evaluations of activities
- An organizational setup and budgets for monitoring and evaluation.

[46] http://gefweb.org/MonitoringandEvaluation/MEPoliciesProcedures/MEPTools/meptstandards.html

Minimum Requirement 2: Application of Project M&E

- Project monitoring and supervision will include implementation of the M&E plan, comprising:
- Use of SMART indicators for implementation (or provision of a reasonable explanation if not used)
- Use of SMART indicators for results (or provision of a reasonable explanation if not used)
- Fully established baseline for the project and data compiled to review progress
- Evaluations are undertaken as planned
- Operational organizational setup for M&E and budgets spent as planned.

SMART INDICATORS GEF projects and programs should monitor using relevant performance indicators. The monitoring system should be "SMART":

6. **Specific**: The system captures the essence of the desired result by clearly and directly relating to achieving an objective, and only that objective.
7. **Measurable:** The monitoring system and its indicators are unambiguously specified so that all parties agree on what the system covers and there are practical ways to measure the indicators and results.
8. **Achievable and Attributable:** The system identifies what changes are anticipated as a result of the intervention and whether the result(s) are realistic. Attribution requires that changes in the targeted developmental issue can be linked to the intervention.
9. **Relevant and Realistic:** The system establishes levels of performance that are likely to be achieved in a practical manner, and that reflect the expectations of stakeholders.
10. **Time-bound, Timely, Trackable, and Targeted:** The system allows progress to be tracked in a cost-effective manner at desired frequency for a set period, with clear identification of the particular stakeholder group to be impacted by the project or program.

Annex 5 List of intended additional recipients for the Terminal Evaluation

Name	Affiliation	Email
Government Officials		
Getahun Moges	General Director Ethiopian Electrical Agency	Electric.agency@telecom.net.et, getahunmoges@yahoo.co.uk
Gosaye Mengistie	Head , Energy Dev't Dept, Min of Mines and Energy, Ethiopia	gosayem@yahoo.com
Samuel Baire	Director General, Dep't of Energy, Eritrea	baireog@yahoo.com, samuelbaire@yahoo.com
John Okumu	Standards Officer, Uganda Nat Bureau of Standards	John.okumu@unbs.go.ug, john_okumu2003@yahoo.com
Albert Rugumayo	Manager Energy for Rrual Transformation Programme	rugumayo@energy.go.ug
Rachel Mijumbi	Project Officer BUDS ERT (WB)	rmijumbi@psfuganda.org
Dr. Kimambo	Chairman TASEA (Tz Solar Energy Association)	info@tasea.org
Mzumbe Musa	Coordinator Transf of Rural PV Markwet in Mwanza (UNDP/GEF/MEM)	Musa_mzumbe@yahoo.com
Thomas Mnunguli	Head Electrical Section Tz Bureau of Standards	tmnunguli@hotmail.com
GEF Focal Point(s)		
Executing Agency		

Time Schedule of Evaluation Mission

	Date		Place	Object
1	Monday	23/04	Nairobi	travel (overnight in Nairobi)
2	Tuesday	24/04	Nairobi	UNEP briefing & meetings
3	Wednesday	25/04	Nairobi	UNEP briefing & meetings + travel
4	Thursday	26/04	Addis	evaluation meeting
5	Friday	27/04	Jima (336km)	field evaluation in project area
6	Saturday	28/04	Jima	field evaluation in project area
7	Sunday	29/04	Jima	field evaluation in project area
8	Monday	30/04	Jima	field evaluation in project area
9	Tuesday	1/05	Addis	evaluation meeting + travel
10	Wednesday	2/05	Kampala	evaluation meeting
11	Thursday	3/05	Rakai (220km)	field evaluation in project area
12	Friday	4/05	Rakai	field evaluation in project area
13	Saturday	5/05	Rakai	field evaluation in project area
14	Sunday	6/05	Rakai	field evaluation in project area
15	Monday	7/05	Kampala	evaluation meeting + travel

	Date		Place	Object
16	Monday	25/06	Nairobi	travel (stop-over in Nairobi)
17	Tuesday	26/06	Dar Es Salaam	evaluation meeting
18	Wednesday	27/06	Iringa (503km)	field evaluation in project area
19	Thursday	28/06	Iringa	field evaluation in project area
20	Friday	29/06	Iringa	field evaluation in project area
21	Saturday	30/06	Iringa	field evaluation in project area
22	Sunday	1/07	Dar Es Salaam	reporting/analysis & preliminary conslusions
23	Monday	2/07	Dar Es Salaam	evaluation meeting + travel
24	Tuesday	3/07	Nairobi	debriefing meeting (UNEP, ...)
25	Wednesday	4/07	Nairobi	debriefing meeting (UNEP, ...) + travel (night)

List of Reviewed Documents

Document reviewed for Tanzania:

- Market assessment report
- Promotional/awareness campaign report
- Technical training report
- Sales training report
- Consulting Service Contract with ESDA
- Country Report
- UNEP/ESDA evaluation trip (Dec 2006)
- SolarNet Magazine – Dec. 05
- SunENERGY Magazine, Issues n°1 and 2, 2007

Document reviewed for Uganda:

- Market assessment report
- Technical training report
- Sales training report
- Final report on "The Uganda Experience": hard copy given by KCL
  → Including *Promotional/awareness campaign report*
- Consulting Service Contract with ESDA
- Country Report
- UNEP/ESDA evaluation trip (Dec 2006)
- SolarNet Magazine – Sept. 05

Document reviewed for Ethiopia:

- Market assessment report
- Technical training report
- Sales training report
- Consulting Service Contract with ESDA
- Country Report
- UNEP/ESDA evaluation trip (June 2006)
- SolarNet Magazine – Feb. 06

Missing: Promotional/awareness campaign report

Document reviewed for Eritrea:

- Market assessment report
- Promotional/awareness campaign – proposal
- Technical training report
- Sales training report
- Consulting Service Contract with ESDA
- Country Report
- ESDA evaluation trip (July 2006)
- Solarnet Magazine – April 06
- Phaesun .ppt presentation
- Answers to IED questionnaire and project data provided by email by Phaesun (Francis) and ESDA (Abdella)

Other Document reviewed:

- UNEP Project Document (Version 8) – Hard copy received from UNEP
- Project Implementation Review Report (PIRR) – July 05 to June 06 – soft copy from UNEP
- Lessons Learnt from Evaluation, Jan 07 – Hard copy received from UNEP
- Terminal Report on UNEP project, by ESDA, draft - April 07 (?)
- Workshop presentations and proceedings
- Project meeting reports (steering committee and management)
- Report on "Bangladesh MF Visit" – Sept. 06
- SolarNet Magazine – May 05
- SolarNet Magazine – Sept. 06

Guideline for Interviews

5. Project manager's meeting (ESDA)

Part 1: Management and coordination

- Administrative management
  - Reporting:
    - Monthly reports: not existing
    - 6-months reports: not provided as no additional information
    - Termination report (see part 2)
  - Delays:
- Regional Coordination
  - Efficiency and effectiveness
  - No country visits planned in the project
- Financial management
  - Budget table : provided by UNEP (Sandeep)
  - Expenditure table : not complete, only partial table
- Technical management
  - Progress and Achievement monitoring
    - SHS systems
      - List of demand/ sales/ installations
      - Project maps for location
      - Quality and Performances
      - End-users' satisfaction
    - Trained dealers
      - List of trainees
      - List of importers
      - Achievement & Quality assessment
    - Trained technicians
      - List of trainees
      - Achievement & Quality assessment
    - Trained sale agents
      - List of trainees
      - Achievement & Quality assessment
    - MFIs
      - Solar loan products : many different – to check with MFI/dealers
      - Risk assessment and collateral problems
      - Quality issues of components and services provided by dealers
      - MFI still interested in Solar development business despite the risks
      - Credit/loan and repayment schemes – conditions – actual user payments
    - Policy changes
      - Actual status of taxes and duties
      - Perspectives for subsidies
    - Actual measures taken after June evaluation

Part 2: Check of Outcomes and Achievement evidences

6. National consultant meeting[47]

Main topics:

- Overall management by ESDA (satisfaction? Coordination? Delays? …)
- UNEP supervision (quality support, advices …)
- Local organisation of key actors (MFI, Importers, Dealers, trainers, technicians, sales agents, end-users)
- Positive outcomes of activities: check with evidences
- Financing planning (control, audit, co-financing, management, breakdown tables)
- Supervision, quality control and monitoring (of project implementation and deliverables)
- Major problems encountered
- Lessons learnt
- Corrective measures on installations (after UNEP evaluation)

Specific issues

- Project maps
- Field project data with lists for
  - Installed SHS + dates
  - Records of demand & sales
  - Sales conditions (cash, credit, fee-for-services, …)
  - Technicians, sales agents …
- Technical and sales training: material, evaluation, quality of work
- Awareness: materials, outcomes
- National policy: support from Min Energy? Involvement of RE agencies?
- Policy barriers; taxes and duties status
- National PV standards & code of practices and enforcement strategy
- MFI innovative loan products, achievement, performances, confidence vs. risks and perspectives
- Details for credit/loan schemes and repayment conditions
- SHS target group: poorest? subsidy strategy?
- Commercial delivery route: operational? Perspectives?
- Links between dealers – importers
- Links between dealers – MFIs
- Dealer/technician activity: profitable & growing business? Quality of components, system design, installations, training, spare part management and after-sales services
- SHS price analysis and trend
- SHS performances and end-users' satisfaction

7. Importers/Dealers meeting

- Overall satisfaction
  - with the project achievements
  - with national consultant management
- links with upstream suppliers (international & national)

[47] Phaesun PLC, Megen Power Ltd, ESD-Tz, Konserv Consult Ltd

    - agreement
    - technical & logistical support
    - financial support
- links with downstream retailers/local technicians/sales agents
- Sales volume and trend in project area
- Potential demand and growing business activity? Expectation after project end?
- SHS price list
- Actual taxes and duties
- Subsidy and microfinance issues
- Quality of components, systems, installation, services → Standards? Warranties?
- Battery recycling
- SHS system sizing and standardisation of PV components

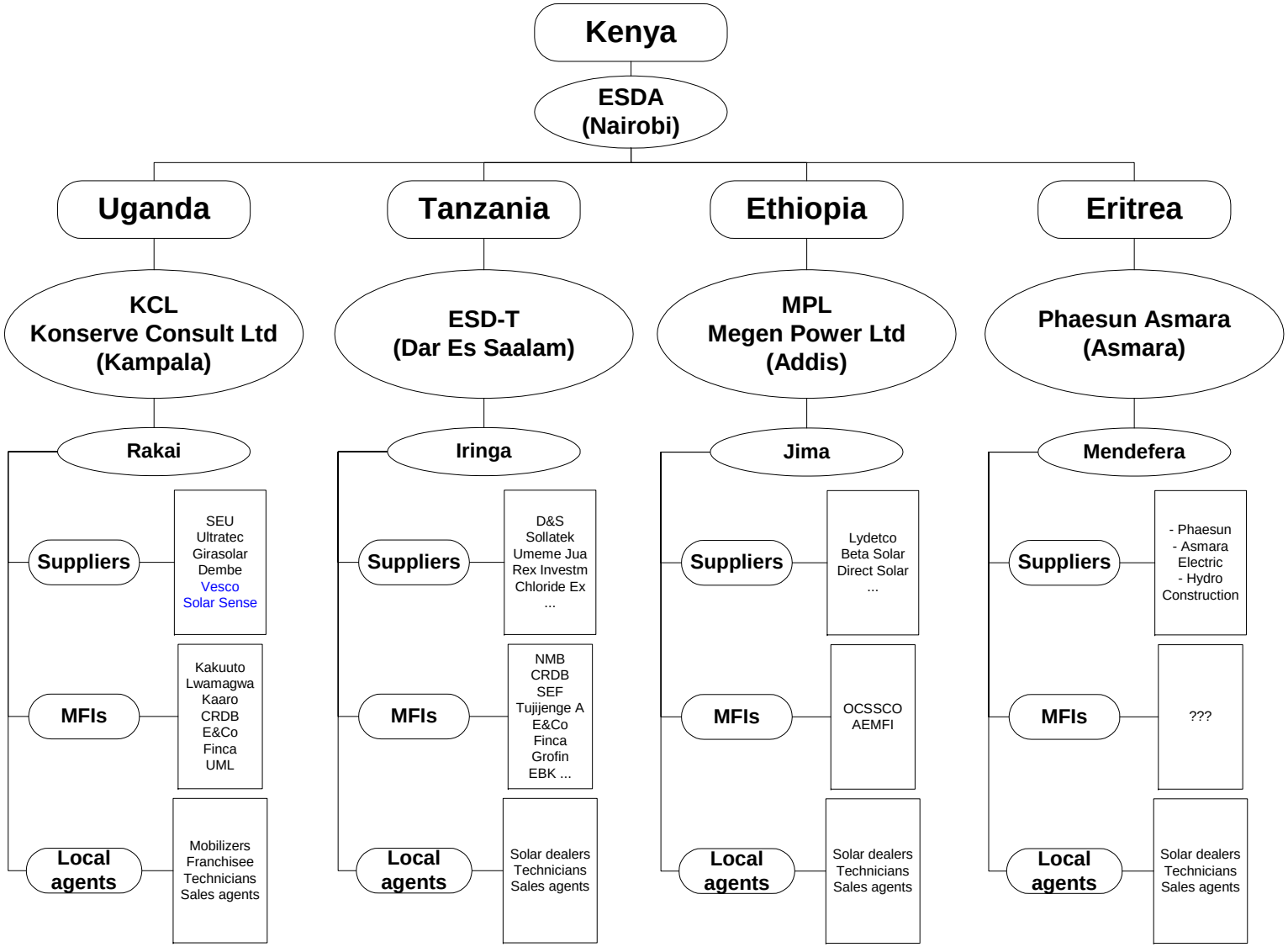
8. Micro Finance Institutions (MFI) meeting

- Satisfaction with the project
- Positive outcomes
- Problems encountered
- Lessons learnt

Specific issues

- Links with importers/dealers
- MFI's achievements
- Innovative PV loan products
    - Guideline for PV financing
    - Administrative procedure and constraints
    - Repayment period
    - Interest rates
    - Collateral
- Risk assessment
- Target group
- Planned activities and involvement after project's end
- Others issues …

List of Interviewees



List of Interviewees in Kenya

Location	Organisation	Name	Position
Nairobi	UNEP - DGEF	Peerke de Bakker	Programme Officer, Energy
Nairobi	UNEP – EOU	Michael Spilsbury	Evaluation Officer
Nairobi	UNEP – EOU	Segbedzi Norgbey	Chief EOU
Nairobi	UNEP - DGEF	Sandeep Bhambra	FMO
Nairobi	ESDA	Paul Amambia	
Nairobi	ESDA	Stephen Mutimba	Managing Director
Nairobi	Renewable Energy Consultant	Mark Hankins	consultant

List of Interviewees in Tanzania *(not met)*

Location	Organisation	Name	Position
Dar Es Saalam	ESD-T	Jeff Michael Felten	
Dar Es Saalam	ESD-T	Boniface Gissima Hanga	Project Coordinator
Dar Es Saalam	Ministry of Energy and Minerals (MEM)	N.C.X. Mwihava	Assistant Commissioner
Dar Es Saalam	TASEA	Finias B. Magessa	Executive Secretary
Dar Es Saalam	*TSB*		
Dar Es Saalam	*Sollatek Power Control Ltd*	*Abdulhamid Numari*	*General Manager*
Dar Es Saalam	Davis & Shirtliff Solar	Moses P. Sayula	Solar Engineer
Dar Es Saalam	Rex Investment Ltd	Francis Kibhisa	Managing Director
Dar Es Saalam	Chloride Exide	Louis Nyamwaya	Country Manager
Dar Es Saalam	Umeme Jua Ltd	Abbas M. Mohamed	Sales & Marketing Officer
Iringa	Mwaflug's Enterprises	Frederick Nzengele	Director
Iringa	Burhani Machinery & Tractor Parts	Seifuddin Kaderbhai (father)	
Iringa	Burhani Solar	Huzefa Kaderbhai (son)	Solar
Iringa	Cemma shop	Abdul	Solar dealer
Iringa	Sifa Saccos Ltd	Perecy Paulo Ugula	Manager
Iringa	Technicians		
Ilula	Koko Electrical Contractor	Koko	Solar dealer
Ilula	Chavala	Chavala	Solar dealer
Makambako	Swale Electrical	Redson Swale	owner
Makambako	Ikete Hardware	Moshi	owner
Njombe	Njombe Electronics & Solar	Reginald Ngailo	
Njombe	Luyungu General Electrical Store (LUGES)	Benjamin Luyungu	Managing Director
Njombe	Technicians	Barnabes & Odiro	

List of Interviewees in Uganda *(not met)*

Location	Organisation	Name	Position
Kampala	Konserve Consult Ltd	**Bobby Namiti**	Project Coordinator
Kampala	Konserve Consult Ltd	**Abdallah Kyezira**	Managing Director
Kampala	Solar Energy Uganda (SEU)	Charles … *& Richard Kanyike*	
Kampala	Ultratec	Abhay Shah	Director
Kampala	*Dembe Trading Enterprises*	*M. Joshua Muddu-Awulira*	
Kampala	*GiraSolar Ltd*	*Richard Ssettumba*	
Kampala	Private Sector Foundation (PSFU)	Geoffrey Ssebuggwawo	Director
Kampala	Private Sector Foundation (PSFU)	Rachael Mijumbi	
Kampala	Ministry of Energy and Mining Development (MEMD)	Albert Rugumayo	
Kampala	Ministry of Energy and Mining Development (MEMD)	Benon Bena	Principal Energy Officer
Kampala	*Uganda National Bureau of Standards (UNBS)*		
Kampala	*Uganda Microfinance Limited (UML)*		
Masaka	Ultrasolar Shop	Christina	
Kalisezo	electrical shop (+ Ultratec)		
Kakuuto	Sacco (+SEU)		
Sanje	electrical shop (+ SEU)		
Lwamagwa	Sacco (+ Ultratec)		
Dwaniro	1 technician (+ SEU)		
Kyotera	3 technicians		
Kyotera	electrical shop (Zopie)		
Kasagama	solar shop (technician) (+ Girasolar)		

List of Interviewees in Ethiopia *(not met)*

Location	Organisation	Name	Position
Addis	Megen Power Ltd	Melessaw Shanko	Managing Director
Addis	Megen Power Ltd	Hilawe Lakew	
Addis	Megen Power Ltd	Zelalem Mekonnen	Driver & Guide
Addis	EREDPC	Ato Ephrem, Getnet, …	
Addis	*MOME*	*Alamu Teganu*	
Addis	EPA - Environment Protection Authority	?	
Addis	*AEMFI*	*Anebo*	*retired*
Addis	Beta		
Addis	Direct Solar Energy Trading	Mulugeta Girma	Director
Addis	Lydetco	Dereje Walelign	Managing Director
Jima	Oumar	Oumar	Solar dealer
Jima	*Beta*		*Solar dealer*
Jima	Technicians		

List of Interviewees in Eritrea *(by email)*

Location	Organisation	Name	Position
Asmara	*Phaesun Asmara PLC*	*Francis Hilman*	*Managing Director*

Annex C to Terminal Evaluation Report

C: Project Data

10.2 Project Data Summary

10.2.1 Table A: Project Time Schedule

Work Plan and Timetable		2004						2005												2006												2007					
Activities	**Location**	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Initial project duration					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X													
Project extension																										X	X	X	X	X	X						
Project approval and start-up					X	X	X	X	X	X	X																											
KO workshop + Trade Fair	Nairobi												X																								
Financial WS + Trade Fair	Dar es S																					X															
Policy WS + Trade Fair	Addis																								X												
Steering Committee meeting 1	Nairobi												X																								
Steering Committee meeting 2	Dar es S																					X															
Steering Committee meeting 3	Addis																								X												
Management meeting 1	Nairobi												X																								
Management meeting 2	Nairobi																	X																			
Microfinance trip (study tour)	Bangladesh																											X									
Trade fairs	(regional)												X									X			X												
Market Assessment	(national)													X	X	X																					
Technical TOT	Kenya																X																				
Sales TOT	Kenya																				X																
Awareness campaigns	(national)																		Tz	Tz		Ug															
Technical training	(national)																	Ug	Tz	Er	Et																
Sales Training	(national)																								Er	Tz		Et									
Start of PV sales	(national)															Er					Et																
Monitoring & Evaluation																																					
Mid-Term Review (UNEP)	(regional)																								X												
Field Evaluation (ESDA/UNEP)	(national)																								X												X
Terminal Evaluation (Ext.)	(regional)																																			X	X
Financial Audit (FY 2005)	(regional)																																				X
SolarNet Magazine												X				X			X		X		X					X									

10.2.2 Table B: Socio-Economic & Market Data

Socio-Economic & Market Data	Tanzania	Uganda	Ethiopia	Eritrea
Selected districts	Iringa	Rakai	Jima	Mendefera
Distance from capital to district (km)	500	600	500	70
Project area (approx. diameter in km)	400	80	150	?
Total no. of households	300,000	300	561,218	52,527
Access to Electricity (in% of popul.)	0,06	0,1	0,08	0,26
Monthly income range (US$/hh)	50 to 900	120 to 800	80	35 to 85
Estimated installed PV capacity (kWp per country)	1700	62[1]	1400	585
Estimated installed capacity in project district (kWp)	14	N/A	N/A	N/A
Potential outlets for stocking solar PV	30 Electr. & Hardw. shops	N/A	11 electronic shops	30 Electronic shops
Willingness to pay by Cash / Credit	34.2% / 65.8%	20% / 40%[2]	46.5% / 53.5%	10% / 90%
Installed PV system price (US$/Wp)	15	12	20	29
Battery charging shops	19	43	5	5
Cost of re-charging (US$/battery)	1.2	0.8	0.6	2
Projected demand (kWp per country?	2400	900	1400	34.8
National kWh price (US$/kWh in 2006)	0,023	?	0,051	?

10.2.3 Table C: National participations

Event	Place	Date	Tanzania	Uganda	Ethiopia	Eritrea	Total
KO workshop + Trade Fair	Nairobi	June 05	7	13	5	1	**26**
Financial WS + Trade Fair	Dar es S	Mar. 06	46	6	5	0	**57**
Policy WS + Trade Fair	Addis	June 06	6	8	?	0	**14**
Microfinance trip (study tour)	Bangladesh	Sept. 06	3	1	2	0	**6**
SC meeting 1	Nairobi	June 05	0	2	0	0	**2**
SC meeting 2	Dar es S	Mar. 06	1	2	1	0	**4**
SC meeting 3	Addis	June 06	1	2	1	0	**4**
Management meeting 1	Nairobi	June 05	2	1	1	1	**5**
Management meeting 2	Nairobi	Nov. 05	1	1	1	1	**4**
Technical TOT	Kenya	Oct. 05	2	2	2	1	**7**
Sales TOT	Kenya	Feb. 06	3	3	2	2	**10**
			72	**41**	**20**	**6**	

10.2.4 Table D: Performance indicators

		Baseline --> Achievement				
Dealers' network	**Target**	**Tanzania**	**Uganda**	**Ethiopia**	**Eritrea**	**Total**
Capital-based suppliers (--> district)	**6 - 8 - 6 - 5**	2 --> 5	5 --> 8	3 --> 5	1 --> 1	**19**
District-based dealers	**2**	3 --> 7	2 --> 5	1 --> 2	0	**29**
trained technicians	**10**	16	9	0 --> 9	5	**39**
trained sales agents	**5**	5	6	0 --> 9	5	**25**
Total sales	**200**	480	386	56	258	**1180**

Other Performance Indicators	Target	Tanzania	Uganda	Ethiopia	Eritrea	Total
Awareness campaign		***	***	*	–	
Number of internat. traders involved		n.a.	n.a.	n.a.	n.a.	
Number of interested MFIs & NGOs		Low	High	Medium	None	
Increase access to commercial financing		NMB expected	E+Co, Saccos	**E+Co**	None	
Loan value to dealers (US$)	**0-50,000$**	$0	$0	$116.000	$0	**$116.000**
National Taxes and Duties		full exemption	partial exemption	no exemp. + surtax	partial exemption	
Projection of sales 5 yrs	**3000**	5000	6000	5000	1000	**17000**
Carbon emission reduction (ton/yr)	**300**	80	36	12	28	**156**
Further influenced PV projects		SIDA-MEM	GTZ-ETC	*WB/GEF/ EREDPC/EAP*	-	

10.2.5 Table E: Project achievements

UNEP project	Target	Tanzania	Uganda	Ethiopia	Eritrea	Total
Estim. Nb. of systems sold	**750**	480	386	56	258	**1180**
Average Wp per system		30	15	35	23	
Estim. kWp installed		14	5,8	2	5,8	**27,6**
Project price ($/Wp inst.)		**$14,0**	**$15,0**	**$19,0**	**$17,0**	
Market prices ($/Wp)		$15-20	$13-20	$13-20	$20-40	
Estim. Leverage	**$400.000**	$113.842	$91.700	$140.721	$18.900	**$365.163**
Estim. Tons CO_2/year		84	34,8	12	34,8	**165,6**

10.2.6 Table F: PV market prices comparison

Price comparison ('06-'07)	Laos		
Project price ($/Wp inst.)			
Market prices ($/Wp)			

10.2.7 Table G: Project Reports & Deliverables

	Target	ESDA	Tanzania	Uganda	Ethiopia	Eritrea
Workshop proceedings	**3**	**3**	**-**	**-**	**-**	**-**
Minutes of meetings		**X**	**-**	**-**	**-**	**-**
TOT report	**2**	**?**	**-**	**-**	**-**	**-**
SolarNet Magazine	**6 issues**	**6**	**-**	**-**	**-**	**-**
Study tour in Bangladesh	**1**	**X**	**-**	**-**	**-**	**-**
Market assessment report	**4**	**-**	**X**	**X**	**X**	**X**
Awareness campaign report	**4**	**-**	**X**	**X**	**O**	**(X)**
Technical training report	**4**	**-**	**X**	**X**	**X**	**X**
Sales training report	**4**	**-**	**X**	**X**	**X**	**X**
Final Project Report	**1**	**X**		**X**		

10.3 Financing & Co-financing Information

10.3.1 Table H: Co-Financing

Co financing (Type/Source)	IA own Financing		Government		Other*		Total		Total Disbursement	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants (GEF/UNEP + TREDF)	$ 693.600	$ 693.600			$ 49.450	$ 49.450	$ 743.050	$ 743.050		
Loans/Concessional (TREDF)					$ 400.000	$ -	$ 400.000	$ -		
Credits (E+Co)					$ -	$ 116.000	$ -	$ 116.000		
Equity investments							$ -	$ -		
In-kind support (PV companies)					$ 90.180	$ 90.180	$ 90.180	$ 90.180		
Other (*)										
- University of Hawaii					$ 75.000	$ -	$ 75.000	$ -		
- Leverage from Beneficiaries					$ -	$ 249.163	$ -	$ 249.163		
Totals	$ 693.600	$ 693.600	$ -	$ -	$ 614.630	$ 504.793	$ 1.308.230	$ 1.198.393	$ -	$ -
						Grant:	***57%***	***62%***		
						Co-financing:	***43%***	***38%***		

* Other is referred to contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and beneficiaries.

10.3.2 Table I: Cost Breakdowns

I - 1: Financing Sources versus Activities (source: PID - version 8)

Cost Breakdown	Financing Sources (Budget)			
Activity	**GEF**	**TREDF**	**PV firms**	**Total**
A - Management	$334.740	$5.000	$0	$339.740
B - KO meeting + trade fair	$11.000	$17.000	$8.800	$36.800
C - Market assessment	$7.740	$0	$4.140	$11.880
D - Business awareness …	$0	$461.840	$0	$461.840
E - Trainings	$75.000	$0	$6.440	$81.440
F - Trade fair & awareness	$22.800	$22.500	$1.000	$46.300
G - Inter-country visits	$53.850	$0	$5.000	$58.850
H - Village awareness	$203.520	$0	$64.800	$268.320
I - Policy workshop	$9.950	$0	$0	$9.950
J - Financial workshop	$0	$9.950	$0	$9.950
K - Monitoring & Evaluation				*$0*
	$718.600	**$516.290**	**$90.180**	**$1.325.070**

I - 2: National Budget versus Activities (source: Minutes of Management Meeting)

Country Distribution	National Budget					***Budget Balance***
Activity	**Tanzania**	**Uganda**	**Ethiopia**	**Eritrea**	**Total**	
A - Management	$20.000	$20.000	$20.000	$20.000	$80.000	*$259.740*
B - KO meeting + trade fair					$0	*$36.800*
C - Market assessment	$1.920	$1.470	$2.070	$1.080	$6.540	*$5.340*
D - Business awareness …					$0	*$461.840*
E - Trainings	$12.000	$10.000	$11.000	$6.500	$39.500	*$41.940*
F - Trade fair & awareness	$6.000		$6.000		$12.000	*$34.300*
G - Inter-country visits					$0	*$58.850*
H - Village awareness	$45.000	$35.000	$55.000	$25.000	$160.000	*$108.320*
I - Policy workshop			$4.000		$4.000	*$5.950*
J - Financial workshop	$4.000				$4.000	*$5.950*
K - Monitoring & Evaluation					*$0*	*$0*
Total Budget	**$88.920**	**$66.470**	**$98.070**	**$52.580**	**$306.040**	***$1.019.030***
Payments out - 2005	$11.500	$27.410	$25.010	$20.795	$84.715	
Payments out - July 2006	$39.910	$31.900	$61.950	$24.000	$157.760	
Total Payments (in July 06)	**$51.410**	**$59.310**	**$86.960**	**$44.795**	**$242.475**	
	58%	89%	89%	85%	79%	

I - 3: Balance versus Components (source: UNEP/DGEF - FMO)

Cost Breakdown	Budget			Expenses		
Component	**2005**	**2006**	**Total**	**2005**	**2006**	**Total**
10 - Project personnel	$185.520	$170.040	$355.560	$159.338	$202.228	$361.566
20 - Sub-Contract	$57.740	$59.800	$117.540	$52.784	$60.971	$113.755
30 - Training & Conferences	$92.800	$46.000	$138.800	$64.478	$69.678	$134.156
40 - Equipments & Premises	$22.500	$40.000	$62.500	$3.337	$58.140	$61.477
50 - Miscellaneous	$8.000	$11.200	$19.200	$194	$18.818	$19.012
Total	**$366.560**	**$327.040**	**$693.600**	**$280.131**	**$409.834**	**$689.965**

Assessment	Balance			Accomplishment rate (%)		
Component	**Δ for 2005**	**Δ for 2006**	**Δ Total**	**05**	**% '06**	**% Tot.**
10 - Project personnel	-$26.182	$32.188	$6.006	86%	119%	102%
20 - Sub-Contract	-$4.956	$1.171	-$3.786	91%	102%	97%
30 - Training & Conferences	-$28.322	$23.678	-$4.644	69%	151%	97%
40 - Equipments & Premises	-$19.163	$18.140	-$1.023	15%	145%	98%
50 - Miscellaneous	-$7.806	$7.618	-$188	2%	168%	99%
Total	**-$86.429**	**$82.794**	**-$3.635**	**76%**	**125%**	**99%**

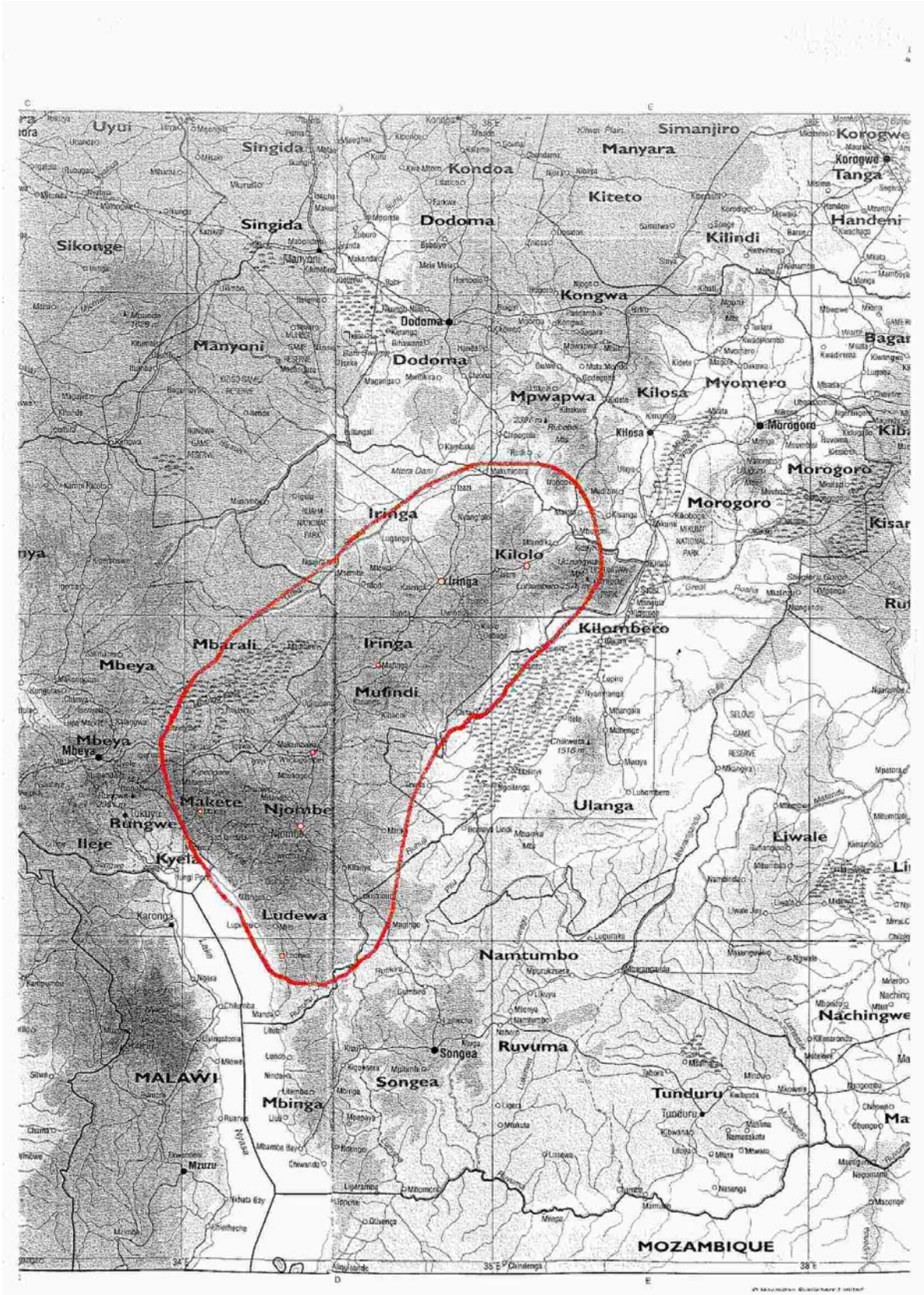
10.3.3 Table J : Accomplishment Rate

Intermediate Balance (end of 06)	ORIGINAL UNEP BUDGET			ESDA EXPENDITURE					Accomplishment Rate	
	2005	2006	Total	2005	2006				2005	05 + 06
				Q1 --> Q4	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Q1 --> Q4	Q1 --> Q3
PROJECT PERSONNEL				*Actual*	*Actual*	*Actual*	*Actual*	*Balance*		
Sub Total - Project Personnel	97.200	64.800	162.000	84.541	118	52.777	21.000	3.564	87%	98%
Sub Total - Consultants	63.600	38.400	102.000	46.935	4.147	12.850	-	38.068	74%	63%
Sub Total - Administrative support	17.400	10.000	27.400	17.850	-	6.050	3.500	0	103%	100%
Sub Total - Travel on official business	7.320	56.840	64.160	4.237	20.761	10.313	3.684	25.165	58%	61%
Project Personnel Total	**185.520**	**170.040**	**355.560**	**153.563**	**25.026**	**81.990**	**28.184**	**66.797**	**83%**	**81%**
SUB-CONTRACT										
Sub Contract Total	**57.740**	**59.800**	**117.540**	**54.621**	**54.256**	**10.780**	**-**	**-2.117**	**95%**	**102%**
TRAINING										
Sub Total - Group training	50.000	25.000	75.000	21.343	10.000	267	-	43.390	43%	42%
Sub Total - Meetings, conferences	42.800	21.000	63.800	23.828	14.786	2.421	-	22.766	56%	64%
Training Total	**92.800**	**46.000**	**138.800**	**45.171**	**24.786**	**2.688**	**-**	**66.155**	**49%**	**52%**
EQUIPMENT & PREMISES										
Equipment & Premises Total	**22.500**	**40.000**	**62.500**	**4.100**	**37.500**	**20.254**	**-**	**646**	**18%**	**99%**
MISCELLANEOUS										
Sub Total - Reporting costs	8.000	4.000	12.000	-	-	7.516	-	4.484	0%	63%
Sub Total - Evaluation	-	7.200	7.200	-	1.263			5.937		18%
Miscellaneous Total	**8.000**	**11.200**	**19.200**	**-**	**1.263**	**7.516**	**-**	**10.421**	**0%**	**46%**
Grand Total	**366.560**	**327.040**	**693.600**	**257.455**	**142.831**	**123.228**	**28.184**	**141.902**	**70%**	**80%**

(Source: ESDA - accounting control tool)

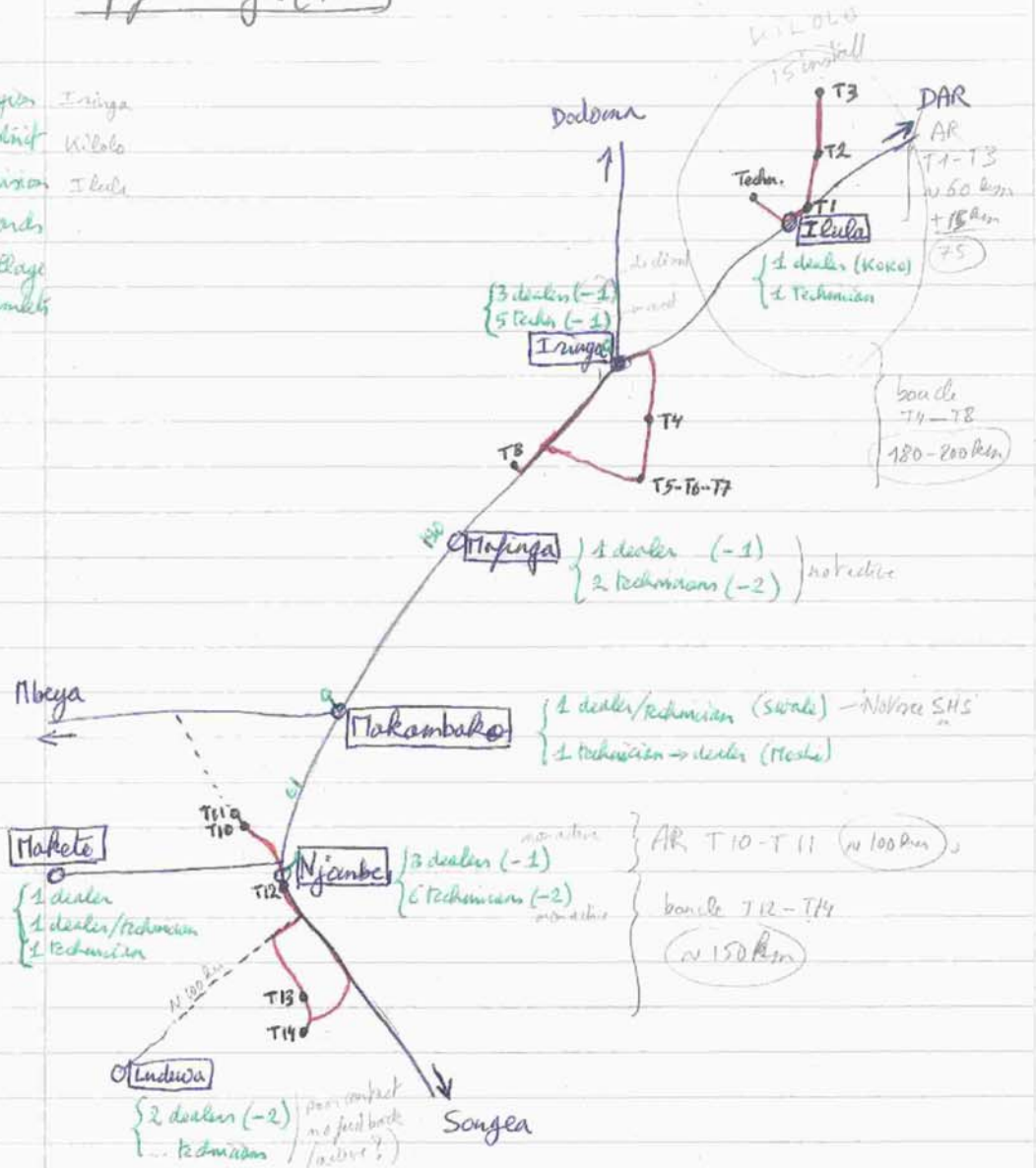
10.4 Maps of project areas

10.4.1 Tanzania – Iringa



Map of Iringa (T2)

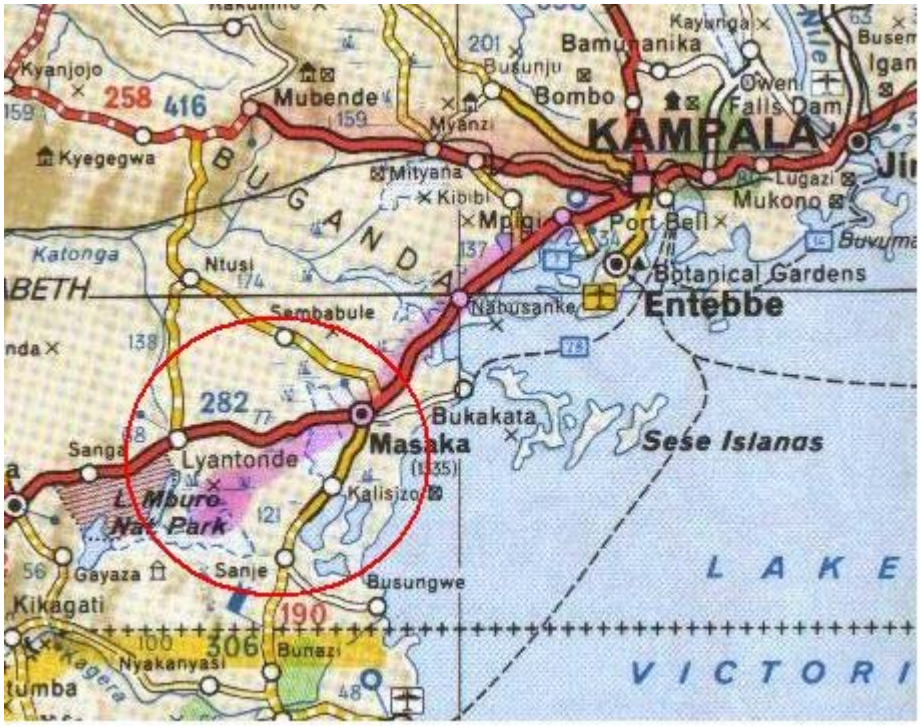
Region Iringa
District Kilolo
Division Ilula
Wards
Village
hamlets

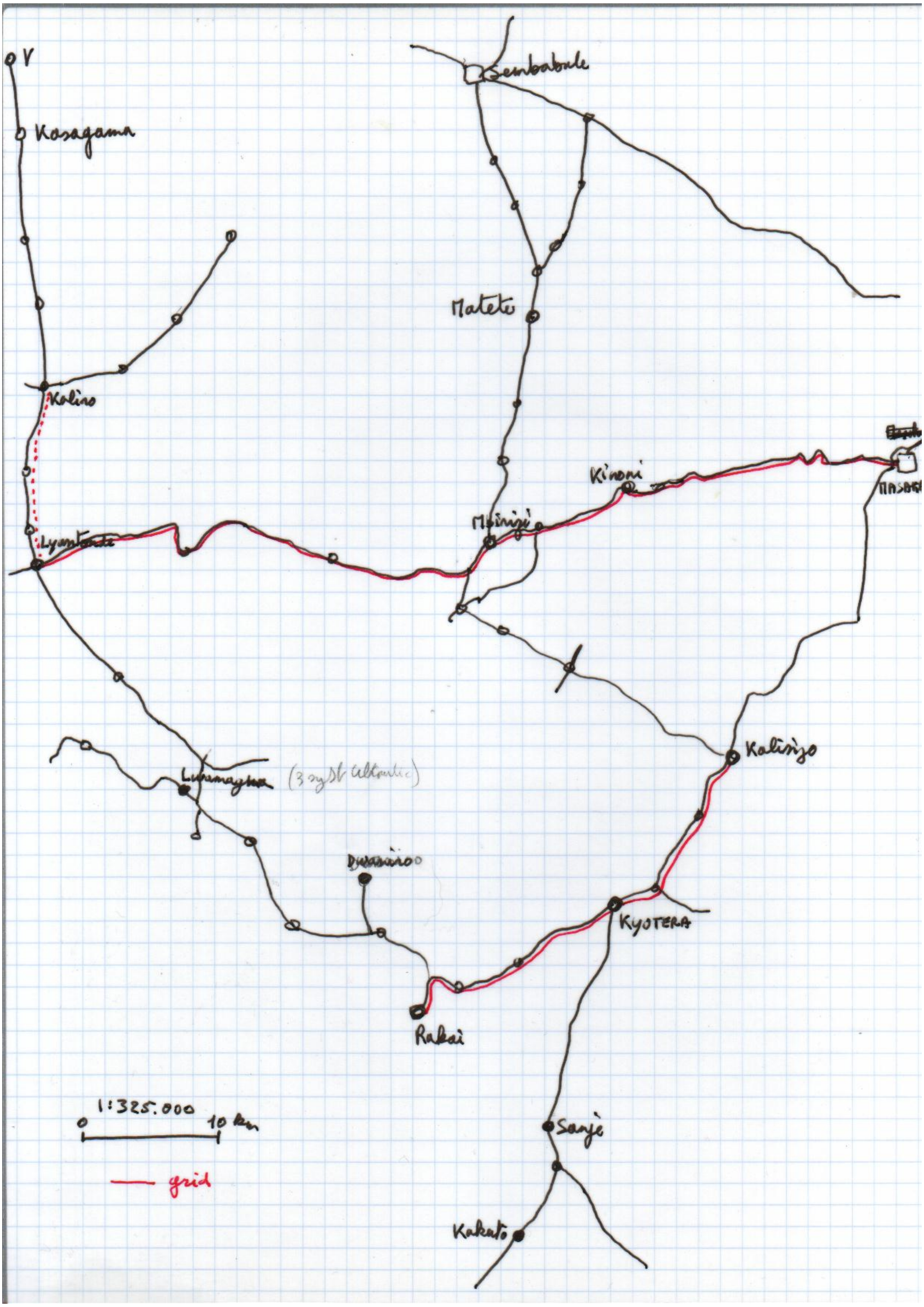


Tot km		
	DAR – Iringa	503
	Iringa – Njombe	252
	boucle Ilula	80 – 100 km
	boucle Iringa	180 – 200 km
	boucle Njombe (North)	20 – 100 km
	" " (South)	150 – 170 km
		490 – 570 km

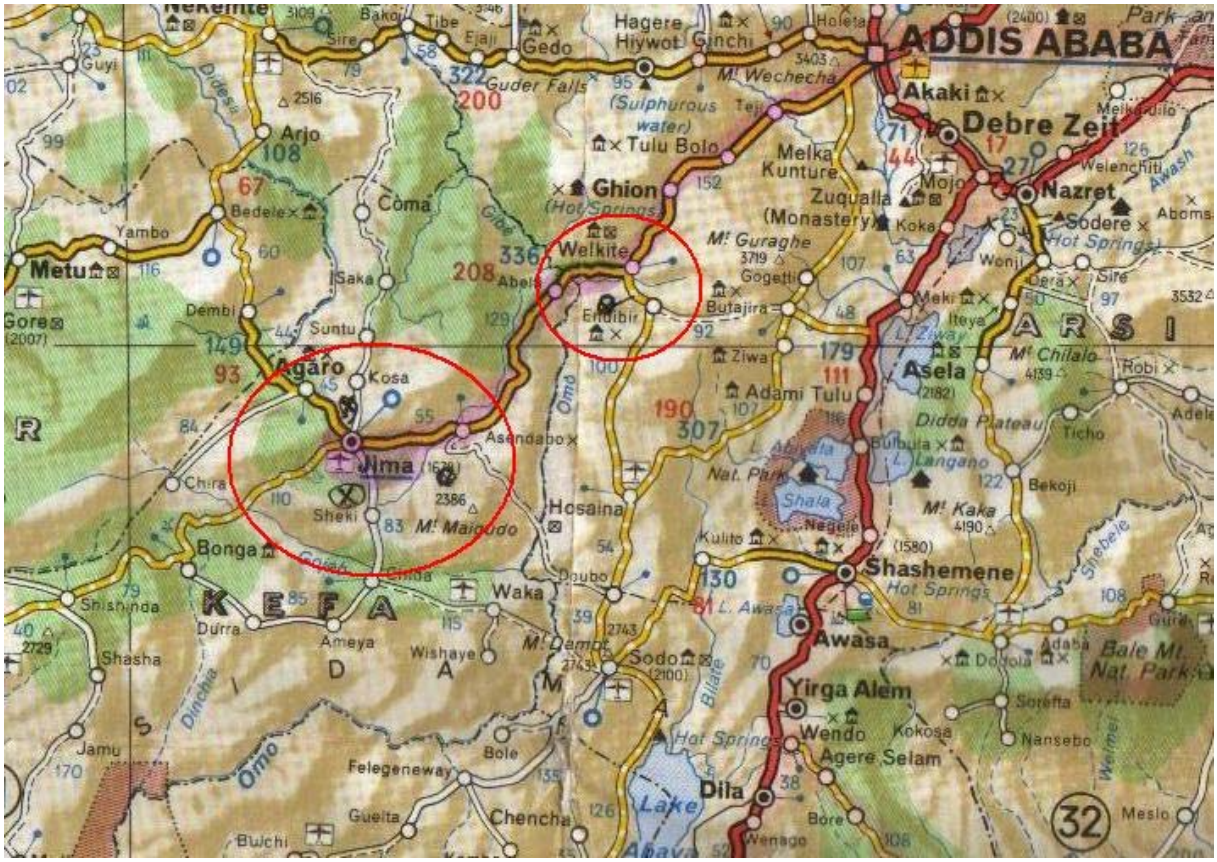
755 x 2 = 1510 km → 2080 km

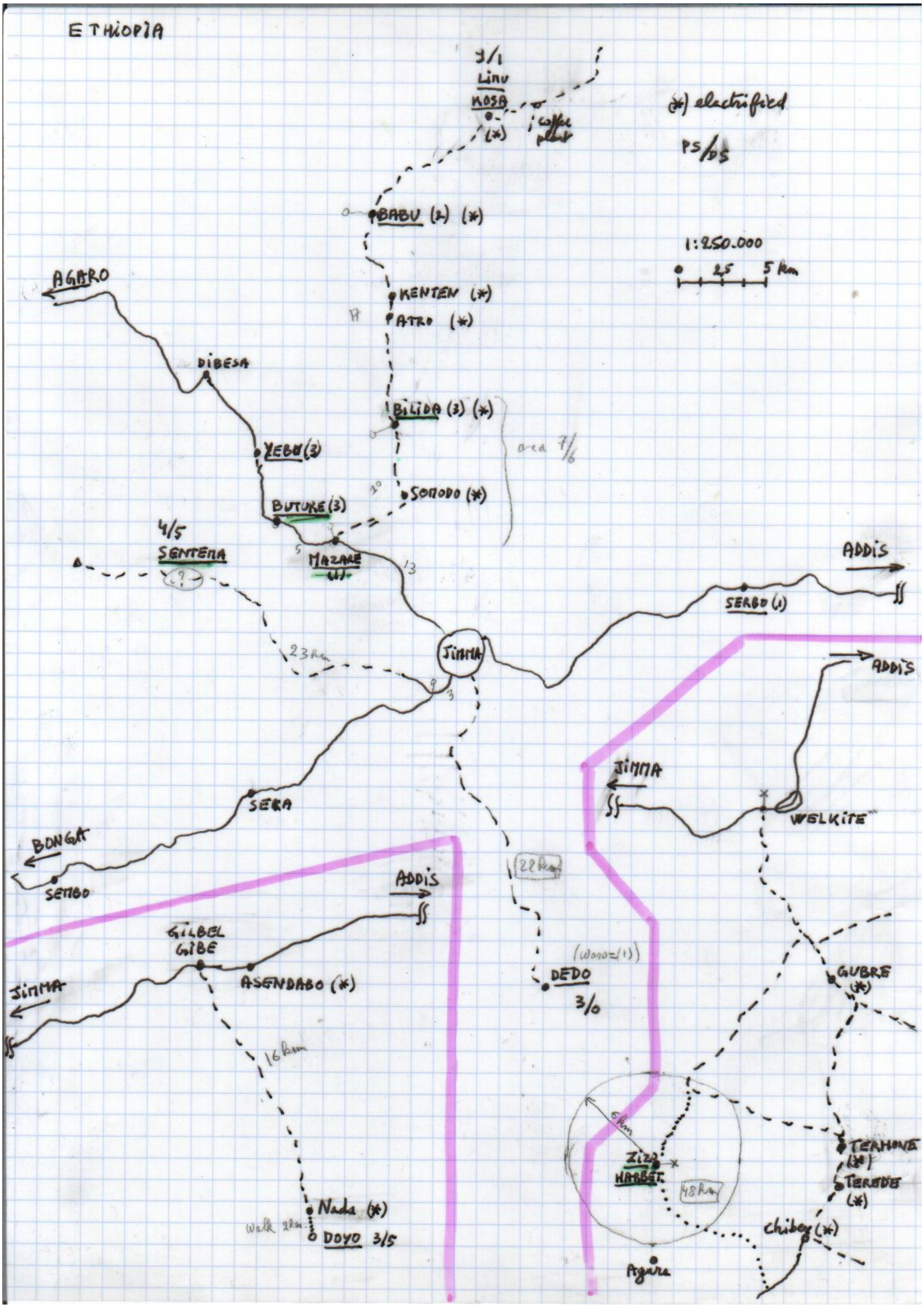
10.4.2 Uganda - Rakai




V
Kasagama
Kaliro
Sembabule
Matete
Mbirizi
Kinoni
Kalisizo
Kyotera
Rakai
Sanje
Kakuto
1:325.000
0
10 km
grid

10.4.3 Ethiopia - Jima




ETHIOPIA
7/1
LIMU
KOSA
(*)
coffee plant
(*) electrified
PS/DS
BABU (2) (*)
1:250.000
0 2.5 5 km
AGARO
KENTEN (*)
ATRO (*)
DIBESA
BILIDA (3) (*)
area 7/6
YEBU (3)
SOMODO (*)
BUTUKE (3)
4/5
SENTEMA
MAZAKE
ADDIS
SERBO (1)
23 km
JIMMA
ADDIS
JIMMA
WELKITE
SEKA
BONGA
SEMBO
22 km
ADDIS
GILBEL GIBE
ASENDABO (*)
JIMMA
(Woro=(1))
DEDO
3/0
GUBRE (*)
16 km
6 km
ZIZO HABBET
48 km
TEHMONE (*)
TEREDE (*)
Chibey (*)
Nada (*)
Walk 2km
DOYO 3/5
Agaro

10.4.4 Eritrea - Mendefera