

APPENDICES

Appendix A: Incremental Cost Analysis

Table A1

Project Outcomes	Baseline	Alternative	Increment
Outcome 1: Investment confidence established in small hydropower sector among investors, project developers and financing institutions	<ul style="list-style-type: none"> Tea factories do not substantially invest in attractive hydropower projects in their vicinity and continue to use unreliable grid electricity and backup diesel generators instead. The few who do invest, in response to high fuel prices, design their projects with insufficient data analysis or to poor technical standards giving a bad name to the technology. The exceptional, properly done small hydro does not replicate to other factories in the near future. Financial institutions lack due diligence capacity to review hydropower loan applications and do not invest in small hydro. Commercial banks have insufficiently short repayment schedules. <p>Baseline cost: 500,000</p>	<ul style="list-style-type: none"> High quality feasibility studies (10) are carried out by the Project for hydropower projects to supply tea factories, co-financed with tea factories. Studies include identification of energy efficiency opportunities. Technical backstopping is provided to developers (as per demand) for negotiation with banks, utilities, system design, equipment purchase and selection of contractors. Confidence of Financial Institutions and insurance companies is enhanced by training on project due diligence and 'Project Finance'. Study tour to Sri Lanka provides confidence to investors and bankers that small hydropower can be an attractive investment sector. <p>Alternative cost: 23,642,000</p>	<ul style="list-style-type: none"> Investment confidence of investors and project developers established. Investment confidence of financial institutions established. Investment mobilized from tea factories in feasibility studies and from factories and FI's into 6 pilot hydropower project investments. <p>Incremental cost: 23,142,000 GEF: 1,388,000 Private Sector: 21,500,000 TA Co-finance: 254,000</p>
Outcome 2: Technical capacity enhanced in EATTA countries to design and construct small hydropower and fabricate associated equipment	<ul style="list-style-type: none"> Engineering and construction firms in EATTA countries have limited experience carrying out feasibility studies, designing and constructing small hydropower projects Lack of technical know-how and lack of investment will reinforce each other into inhibiting the development of the hydropower sector Lack of manufacturing firms for electro-mechanical and control equipments required for small hydropower plants 	<ul style="list-style-type: none"> Capacity of engineering and construction firms in East Africa is enhanced through hands-on training during feasibility studies and project design and construction. Capacity is further enhanced through targeted technical training. Local equipment and component manufacturers (turbines, control systems, steel pipes) are trained to supply small hydropower projects and to increase local value added Partnerships are facilitated between international and Eastern and Southern 	<ul style="list-style-type: none"> Technical capacity of Eastern and Southern African consultancy/engineering and construction firms enhanced so they can substantially participate in construction of small hydro. Capability of Eastern and Southern African firms enhanced to provide equipment and components to small hydropower projects. Local value-added increases significantly. Technology transferred to engineering and equipment supply firms through partnerships with international firms.

Project Outcomes	Baseline	Alternative	Increment
	<ul style="list-style-type: none"> Lack of technical know-how and in-house manufacturing translate to higher costs of hydropower projects Repairs and maintenance of equipment can not be done in a timely manner without local expertise. This puts a question mark on the sustainability of projects. <p>Baseline cost: 20,000</p>	<p>African firms for joint collaboration and technology transfer</p> <ul style="list-style-type: none"> Quality standard are developed for feasibility studies and civil, mechanical, and electrical components of small hydropower plants <p>Alternative cost: 479,000</p>	<p>Local firms able to supply faster service to tea factory hydro.</p> <ul style="list-style-type: none"> Quality standards available for adoption by the concerned authorities in the Bureau of standards, utilities and Association of Engineers in EATTA countries. <p>Incremental cost: 459,000 GEF: 259,000 Co-finance: 200,000</p>
Outcome 3: Models in place for private-public participation in rural electrification through small hydropower	<ul style="list-style-type: none"> Small hydropower projects do not extend power to neighbouring rural communities for lack of encouraging regulations and incentives. Rural electrification expands very slowly due to inadequate power on the national grid and low returns from RE to utilities. Innovative private-public models are not developed to provide rural electrification services in a cost-effective manner. <p>Baseline cost: 400,000</p>	<ul style="list-style-type: none"> Hydropower developers are supported to apply for government or donor grants to develop a rural electrification component alongside their small hydro project Feasibility studies are carried out by the GEF Project to determine cost-effective development of RE distribution networks alongside the small hydropower investment User group formation is supported among potential beneficiary communities in the four projects and negotiations on tariff and terms of supply for four projects are facilitated with the tea factory <p>Alternative cost: 3,348,000</p>	<ul style="list-style-type: none"> Models are in place for linking small hydropower development (through the private sector) and financing of the rural electrification component through government or donor grants (public) Communities are mobilized for rural electrification through formation of user groups; agreements are in place for supply of power from tea factory small hydropower plants <p>Incremental cost: 2,948,000 GEF: 388,000 TA Co-finance: 360,000 Governments: 2,200,000</p>
Outcome 4: Regulatory environment enabled to be conducive to small hydropower IPP investment and rural electrification in EATTA member countries	<ul style="list-style-type: none"> 'Light-handed' regulations including for licensing and environmental clearances are not in place to encourage investment in small hydro and rural distribution Existing regulations do not adequately simplify rules for small projects with minimal environmental and social disruptions Existing regulations do not sufficiently encourage IPPs to carry out rural 	<ul style="list-style-type: none"> Light-handed regulations for licensing for small hydropower generation by IPPs and for small hydropower based rural electrification development are drafted and submitted to in four EATTA countries Consultations are carried out with authorities and other stakeholders to arrive at supportive regulations Study tours to South Asia and in Africa allow regulators and utilities to see effective 	<ul style="list-style-type: none"> Regulatory environment made conducive to small hydropower investment by IPPs through drafting of light-handed regulations on licensing and environmental clearance Rural electrification development by IPPs encouraged by formulating light handed regulations on rural distribution of power from small hydropower based generation Agreement among authorities and other

Project Outcomes	Baseline	Alternative	Increment
	electrification Baseline cost: 40,000	regulations in practice which can bring in investment into for small hydro and rural electrification Alternative cost:403,000	stakeholders established for supportive regulations Incremental cost:363,000 GEF: 323,000 Co-finance: 40,000
Outcome 5: Stage set for establishment of a viable 'standard PPA' in EATTA countries for small hydropower	<ul style="list-style-type: none"> The process of negotiating a PPA is uncertain and time consuming which translates to higher transaction costs for a small producer Market risks and uncertainties are high for project developers due to the uncertainty of a PPA Small hydropower scaling up does not occur due to lack of a standard offer from the utility on power purchase at a pre-announced price Baseline cost: nil	<ul style="list-style-type: none"> Studies are carried out in five EATTA countries on a 'viable' standard PPA for small hydropower Consultations are carried out with authorities and other stakeholders to arrive at a 'standard PPA' based on the study Study tours to South Asia and within Africa for regulators and utility officials demonstrate the value of the standard PPA to scaling up investment in small hydropower Alternative cost:237,000	<ul style="list-style-type: none"> Policy case made on the attractiveness of a standard PPA for investors, utilities and end users Draft standard PPA formulated and proposed to authorities in EATTA countries Incremental cost:237,000 GEF: 237,000
Project Coordination, including monitoring and evaluation (M&E)	<ul style="list-style-type: none"> No project management or coordination activities will occur in the baseline Collaboration and linkages among stakeholders non-existent or limited Baseline cost: nil	<ul style="list-style-type: none"> M&E activities monitor performance and outputs and document lessons learned for replicability and sustainability Collaboration and linkages result with, stakeholders, relevant programs and other GEF-funded projects Alternative cost:359,000	<ul style="list-style-type: none"> M&E lessons applied for the effectiveness of the project Sustainability of the Project charted through a sound Business Plan and integrated in the design of the activities of the Project Incremental cost:359,000 GEF: 259,000 Co-finance (EATTA) : 100,000
TOTAL	Baseline cost: 960,000	Alternative cost:28,468,000	Incremental cost:27,508,000 GEF: 2,854,000 Co-finance: 24,654,000

Appendix B: Project Logical Framework

Table B1

Objectives and Outcomes	Verifiable Indicators	Sources of Verification	Important Assumptions/Risks
Development Goal Development of a more sustainable and competitive tea industry through wider use of climate friendly energy options.			
Project objective Increased investment in small hydropower to reduce energy costs in the tea industry in Eastern/Southern Africa, improve reliability of supply, increase power supply for rural electrification, and reduce Greenhouse Gas emissions.	<ul style="list-style-type: none"> • \$'s invested • MW produced • MWh utilized • Cost of energy • New households electrified • GHG reduced 	<ul style="list-style-type: none"> • EATTA/ National tea boards/ associations • Investors • Banks • Tea factories • Rural electrification boards 	<ul style="list-style-type: none"> • World tea prices do not collapse • Regulatory improvements continue
Outcome 1 Investment confidence established in small hydropower sector among investors, project developers and financing institutions	<ul style="list-style-type: none"> • Applications for licenses • Feasibility studies completed beyond pilot • Growth rates in investment (\$s) and MWs • Small hydropower investment attractiveness spilling over to non-tea sector 	<ul style="list-style-type: none"> • Regulators • EATTA/ National tea boards/ associations • Investors • Banks • Tea factories • Rural electrification boards • M&E of project 	Overall investment climate positive in the countries in the region
Outcome 2 Technical capacity enhanced in EATTA countries to design and construct small hydropower and fabricate associated equipment	<ul style="list-style-type: none"> • Number of competent consultant and engineering firms engaged in designing, construction, and successfully commissioning small hydropower. • Increasing local manufacturing content in small hydro installations • Increased local value added in SHP investment 	<ul style="list-style-type: none"> • Directory of small hydro firms • M&E of project 	Sufficient interest from local firms.
Outcome 3 Models in place for private-public participation in rural electrification through small hydropower	<ul style="list-style-type: none"> • Private sector incentives for investment in rural electrification proposed to govt • New distribution models developed and proposed to authorities 	<ul style="list-style-type: none"> • Public announcements/ reports from RE Boards, Regulators • M&E of project 	Governments committed to innovative RE
Outcome 4 Regulatory environment enabled to be conducive to small hydropower IPP investment and rural electrification in EATTA member countries	<ul style="list-style-type: none"> • New 'light handed' regulations proposed to relevant authorities outlining a simplified process to acquire water rights and licenses for generation and where appropriate, distribution of power • Simple yet effective environmental 	<ul style="list-style-type: none"> • Gazettes • Government acts and policies • Public announcements • M&E of project 	Reform processes continue momentum.

Objectives and Outcomes	Verifiable Indicators	Sources of Verification	Important Assumptions/Risks
	regulations proposed for small hydropower		
Outcome 5 Stage set for establishment of a viable 'standard PPA' in EATTA countries for small hydropower	<ul style="list-style-type: none"> Number of countries with proposed 'standard PPA' for small hydropower 	<ul style="list-style-type: none"> Utility announcements/ reports Electricity Regulator announcements Ministries M&E of project 	Terms of PPA are practical Utility in good financial health
OUTPUTS			
<u>Outputs for Outcome 1</u> 1.1 Ten full feasibility studies, including detailed design, completed for small hydropower demonstration projects in at least four EATTA countries. 1.2 At least six small hydropower projects developed with commercial investment from the tea industry. 1.3 Five additional pre feasibility studies with accompanying training completed in remaining EATTA countries. 1.4 Financing modalities facilitated for small hydropower	<ul style="list-style-type: none"> Licenses received for ten small hydropower projects Ten high quality feasibility studies completed PPAs signed with respective utilities (where appropriate) Small hydropower financing window established Financial closure achieved Contracts signed for construction and equipment supply Project construction completed Projects commissioned Five additional feasibility studies financed by developers 	<ul style="list-style-type: none"> Announcement and reports of financing institutions M&E of project 	Risk: High interest rates make infrastructure investment unattractive. Frequency of droughts not exacerbated by climate change
<u>Outputs for Outcome 2</u> 2.1 Five Eastern/Southern African consultancy/engineering and construction firms engaged in small hydropower development. 2.2 Two Eastern/Southern African manufacturing firms engaged in producing components for small hydropower. 2.3 Increased local value added in small hydropower development. 2.4 Quality standards for small hydropower formulated and proposed to concerned authorities in Bureau of standards, utilities, and Association of Engineers in EATTA countries.	<ul style="list-style-type: none"> Engineering firms receive feasibility study and construction contracts Manufacturing firms win contracts to supply small hydropower components Good quality work carried out by Eastern/Southern African firms Estimate of local value added in small hydropower development. Quality standards for small hydropower proposed and acknowledgement received from concerned authorities. 	<ul style="list-style-type: none"> Engineering firms records M&E 	

Objectives and Outcomes	Verifiable Indicators	Sources of Verification	Important Assumptions/Risks
<u>Outputs for Outcome 3</u> 3.1 Two feasibility studies completed for viable models to demonstrate small hydropower-based RE project electrifying neighbouring communities.	<ul style="list-style-type: none"> Feasible studies available to demonstrate the viability of a small hydropower based RE in EATTA countries Power sales agreement between small hydropower developer and community electrification cooperative (where appropriate). 	<ul style="list-style-type: none"> M&E 	
<u>Outputs for Outcome 4</u> 4.1 Light-handed regulations on licensing of small hydropower generation by IPPs formulated and proposed for EATTA countries 4.2 Light-handed regulations for private sector involvement in small hydro based rural electrification formulated and proposed to authorities in EATTA countries.	<ul style="list-style-type: none"> Draft regulations available on water rights for small hydropower, licensing, distribution and environmental requirements in EATTA countries. Acknowledgment from authorities of draft regulations 	<ul style="list-style-type: none"> Public announcements/reports Official communications M&E of project 	
<u>Outputs for Outcome 5</u> 5.1 Policy case made for standard PPA's attractive to investors, utilities, and end users for small hydropower made in all EATTA countries. 5.2 Draft standard PPA formulated and proposed to authorities in EATTA countries.	<ul style="list-style-type: none"> Policy studies available demonstrating the viability of a standard PPA for all EATTA member countries Acknowledgment from authorities of draft standard PPA 	<ul style="list-style-type: none"> M&E of project Reports Official communication Stakeholder consultations 	
ACTIVITIES	MEANS	COST	
<u>Activities for Outputs 1.1-1.5</u> 1.1 Undertake high quality feasibility studies for 10 hydropower sites including demand analysis and energy efficiency. 1.2 Study tours to South Asia and within Africa for prospective investors and developers. 1.3 Support in negotiating PPA agreements with utility and in negotiating financial closure with banks.	<ul style="list-style-type: none"> Project financing expertise Feasibility study experts Energy efficiency experts System design experts Training workshops 	Total Cost: US\$ 23,642,000 of which GEF contribution is US\$ 1,388,000	Six feasibility studies will typically result in 3-4 completed projects! This is a risk!

Objectives and Outcomes	Verifiable Indicators	Sources of Verification	Important Assumptions/Risks
<p>1.4 Training on managing risks in small hydropower for developers.</p> <p>1.5 Develop financing modality for small hydropower investments</p> <p>1.6 Training on 'project finance' for bankers and insurance companies.</p> <p>1.7 Technical backstopping (on demand) for system design, selection of contractors, and equipment purchase.</p> <p>1.8 Review and conduct quality control of (pre-) feasibility studies undertaken in by prospective developers.</p>			
<u>Activities for Outputs 2.1-2.3</u>	MEANS	COST	
<p>2.1 Develop quality standards for feasibility studies and civil, mechanical, and electrical components of small hydropower established in EATTA countries.</p> <p>2.2 Training of consulting and construction engineers, system designers, surveyors.</p> <p>2.3 Training and Q.C. of local equipment and component manufacturers.</p> <p>2.4 Facilitation of partnerships between international and Eastern and Southern African firms for joint collaboration and technology transfer.</p> <p>2.5 Assessment of local value added in small hydropower development.</p>	<ul style="list-style-type: none"> • Small hydropower design and construction expertise • Small hydro fabrication expertise <p>Training workshops</p>	<p>Total Cost: US\$ 479,000 of which GEF contribution is US\$ 259,000</p>	

Objectives and Outcomes	Verifiable Indicators	Sources of Verification	Important Assumptions/Risks
<u>Activities for Output 3.1</u>	MEANS	COST	
3.1 Feasibility studies of local distribution network.	<ul style="list-style-type: none">• Feasibility study experts (economists, engineers)• Social mobilization expertise• Distribution tariff expertise Stakeholder consultation	Total Cost: US\$ 3,348,000 of which GEF contribution is US\$ 388,000	
3.2 Initiate negotiation of tariff and terms of supply.			
3.3 Stimulate formation of user groups among potential beneficiary communities.			
<u>Activities for Output 4.1-4.2</u>	MEANS	COST	
1.1 Draft 'light handed' regulations for small hydropower development in EATTA countries	<ul style="list-style-type: none">• International, regional, & national experts• Regulatory expertise• Facilitators• Workshops and meetings	Total Cost: US\$ 403,000 of which GEF contribution is US\$ 323,000	
1.2 Consultations with authorities and other stakeholders to arrive at supportive regulations			
1.3 Study tours to South Asia and within Africa to visit countries with effective regulations			
<u>Activities for Outputs 5.1-5.2</u>	MEANS	COST	
5.1 Studies on a 'viable' standard PPA for small hydropower in EATTA countries.	<ul style="list-style-type: none">• Consultants with PPA expertise• Facilitators• Workshops and meetings	Total Cost: US\$ 237,000 of which GEF contribution is US\$ 237,000	
5.2 Consultations with authorities and other stakeholders to arrive at a 'standard PPA' based on study			
5.3 Study tours to South Asia and within Africa for regulators and utility officials to observe impacts of standard PPA			

Appendix C: Response to Project Reviews

STAP Expert Review

By Maxwell Mapako

Project Number: GFL/2328-2721-PMS: GF/4010/5-

Project Title: Greening the Tea Industry in East Africa

Minor editorial details

Draft 3 of the project brief is well written and makes a persuasive case for the development of mini hydro power for tea estates. The use of examples from countries that are comparable to those targeted in Africa is also highly appropriate. The comments will dwell more on those points where it was felt that important issues needed to be flagged.

There are some minor editorial issues which still need to be dealt with. Some of these are summarized below:

- On pages 16, 18 and elsewhere the unit GHz is used for electricity consumed. Presumably this was meant to be GWh. This can be easily fixed with a global search and replace.
- The heading for table 4 on page 15 does not adequately convey the contents of the table, which contains both *energy use* as well as *reliability* data. The exact meaning of the percentages presented for “Outages on the grid” is also not clear.
- Commas are sometimes used as decimals and also as thousands delimiters (see for example pages 44 and 60) while spaces are also used as thousands delimiters. This will cause confusion.
- Units need to be presented in accordance with the SI system. The abbreviations for meter (m), kilo-(k) for example are not consistently written, for example in Table 9 on page 20, *Km* should be *km*, and *M* should be *m* where it denotes meters. *M* is also used to denote *million* under the column “Investment cost”. *Cams* under the “Design flow” column is presumably meant to be m^3/s .

Response: These have all been corrected in the final FSP Brief.

Scientific and technical soundness of the project

1. Has the most appropriate and effective approach been used to remove the barriers?

By adopting a regional approach from the outset and seeking to develop a model standard IPP the brief seems to have adopted a sound approach to addressing barriers which are common across the region. By the same token care needs to be exercised to accommodate local specifics in this regional approach. This point will be revisited under (7) below.

Other relevant barriers suggested elsewhere¹ are the slow pace of power sector reform and the low level of industrial development in some countries, which will complicate the long-term provision of local technical support.

Response:

As mentioned in the final brief, although there are differences in technical capability to support hydropower development across the countries in the region, tea factories themselves are technically competent in all the EATTA countries. This comes from operating mechanically-complex tea factory equipment and backup diesel generators with demanding operation and maintenance protocols. The substantial technical expertise available in tea factories will be valuable in implementing small hydropower projects and particularly in setting up routine maintenance and operation procedures for them.

The Full Size Project Brief has a component (Outcome 2) to enhance technical capacity within regional engineering, equipment manufacturing and construction firms to be able to design and construct high quality small hydropower projects. Transferring technical capability to the region will significantly improve the chances for sustainable development of the hydropower sector.

Power sector reforms are sufficiently advanced in all the participating EATTA countries to initiate private sector development of small hydropower. Six pilot projects will be constructed within the Full Size Project period in three of the countries with conducive regulatory environments. These pilot projects will serve as examples within these countries and in the other participating EATTA countries as well. The 'standard Power Purchase Agreement (PPA)' (Outcome 5) is not a pre-condition for development of the pilot projects but will be promoted in EATTA countries, where the reform process is most advanced, as a measure to scale-up investment in small hydropower, beyond the pilot projects.

2. Has the most appropriate and effective approach been used to reduce the costs of the technologies?

The approach taken seems to be reasonable as the technology is not new and the target tea industries are located in generally suitable sites for mini hydro schemes.

3. Was the potential market determined on the basis of RETs data and databases?

Regional data is quoted extensively in the project brief.

¹ DBSA and ISES (1999). Renewable Energy Technologies in Southern Africa – A Guide for Investors. DBSA. South Africa.

4. Has an evaluation of the demand-side mechanisms to support after sales-service been undertaken?

By having the Tea Industry as the key beneficiaries of the proposed mini hydro plants, it can be expected that their dependence on these plants will be a strong incentive for effective after-sales service. The likely complications are with the community side of the project.

Response:

The Project Brief recognizes the challenges of community rural electrification and has a component (Outcome 3) to address them. The Project will seek co-financing to accomplish rural electrification alongside private sector hydropower investment. This will include co-financing for capacity building, rural electrification planning and social mobilization from COOPENER/EC and other donors as well as financing support for investment into distribution networks from relevant ministries and utilities. Many tea factories already have experience providing services to neighboring communities, particularly those where their employees live. In the past these services have consisted of drinking water supply, health and education services and, in several tea estates, electricity. A number of tea factories have expressed confidence that they can also provide electricity to these communities on a fee for service basis. Other tea factories which do not want to distribute electricity themselves have expressed interest in engaging in a contractual relationship with Energy Service Companies (ESCOs) including local cooperatives that will purchase power in bulk and distribute to individual consumers. Smallholder farmers of the KTDA are particularly keen to form cooperatives to distribute power among their members. The Project will support the establishment of these ESCOs and build their capability to operate professionally.

5. Adequacy of the financing mechanism?

Ultimately the financing is commercial and under the right policy framework there should be no major obstacles. Power purchase agreements where excess power is to be sold to the grid are a key issue.

6. Adequacy of the introduced financial incentives?

The support provided to attract investors is deemed to be adequate, particularly if all the other envisaged stakeholders participate as anticipated.

7. Comments on the design of demonstration project?

The proposed project is based on existing commercial demand and also attempts to address rural electrification. It is regional and takes advantage of the prevailing atmosphere of power sector reform that should make it relatively easier for IPPs to operate. The proposed project is necessarily complex and its multi-country scope could be one of the major threats to timely implementation.

A phased approach based on a prioritized *country* list may reduce the risk of the project getting bogged down in less supportive policy and institutional environments in the early stages. Starting in the most promising countries may facilitate rapid showcase success stories that act as examples for the other countries to follow. This is another selection layer in addition to the project focused selection proposed on page 42.

Response:

Conducive regulatory framework was an important criterion for selection of projects for carrying out pre-feasibility studies and short-listing of projects for the detailed feasibility studies during the PDF-B. As mentioned in the Final Project Brief, the six pilot projects will be implemented in three countries with supportive policy and institutional environments and will serve as a showcase for the other EATTA countries.

8. Will a process be put in place to monitor the project?

A PMO is proposed and this would have to be one of its natural functions. The issue is well addressed in section 3.6.

9. Is the barrier removal supported by an underlying policy framework?

From a regional perspective the policy framework is not uniformly developed across the target countries and this is potentially a problem that may not be easily resolved in practice. This project alone is unlikely to be able to address this problem, and a coordinated approach with other stakeholders including regional bodies like SADC may facilitate the necessary changes to the policy framework where it lags behind.

Response:

This is a very good point. Coordination with SADC as well as with the Southern African Power Pool (SAPP), the Eastern African Community (EAC) and the Nile Basin Initiative, all of which are regional agencies involved in the power sector of participating EATTA countries has been included in the Final Project Brief. In addition, the brief emphasizes the need to coordinate with the Regional Electricity Regulators Association of Southern Africa www.rerasadc.com and the African Forum of Utility Regulation www.afurnet.org particularly on the issue of a standard PPA.

10. Is the proposed activity feasible from an engineering and technical perspective?

The proposed hardware should be off-the-shelf and experience in both Africa and elsewhere exists. Implementation should therefore be straightforward from a technical perspective.

Identification of global environmental benefits

This is discussed in section 3.2.5 and some quantification of the benefits presented on the basis of displacement of diesel generation. The need for thermal energy in the tea factories means wood will still be used for thermal energy, though this is not a major problem as long as the wood is grown by the tea factories. The community-related environment issues are not addressed in this section. At community level there may be more impact on use of wood if the electricity supplied is used for cooking because rural communities typically get firewood from natural woodlands. Cooking with electricity is commonplace in some countries and not others, and the cost of the electricity is an important factor. Load-limited supplies to communities may preclude the use of electric stoves and force continued reliance on wood.

Response:

As mentioned in the final brief, the cost of fuel wood based energy comes to around US¢ 0.80 per kWh in Kenya, with the highest prices for firewood among the EATTA countries. Electricity tariff on the grid in most EATTA countries is typically around 10 times as high as this. Even accounting for the higher efficiency of the electrical stove over the wood stove, cooking on electricity will be extremely expensive for rural populations. Certain countries in southern Africa, particularly South Africa and Zimbabwe, have provided electricity for cooking in rural areas. However, this is uncommon in the other countries with higher electricity tariff. From a financial perspective it would be difficult to justify increasing the size of the small hydropower plant to meet the cooking needs of the rural population or to meet the thermal needs of the tea factory with electricity. Heating energy needs of factories are generally met using fuel wood from well managed plantations. Fuel wood plantations have the additional benefit of providing local employment. Where the thermal energy needs are met sustainably from plantations within the tea estates, the GHG benefits of substituting for thermal energy with electricity are also modest.

The situation will be somewhat different in smallholder tea growing areas. There is a shortage of firewood in these areas and KTDA factories are using fuel oil to meet a part of their thermal energy needs when they can not purchase enough firewood from farmers. Thermal energy (per kWh) costs from fuel oil comes to around one third that of grid electricity in Kenya. However, the cost of electricity from small hydropower could be much lower. As mentioned in the final brief, in some instances the marginal cost of generating electricity from a small hydropower plant can be lower than fuel oil costs, especially during off-peak hours. In some cases it might even make economic sense to increase the size of the small hydropower plant to substitute for all or part of fuel oil used for firing the boilers with electricity. This will be explored on a case by case basis during detailed hydropower feasibility studies under the Full Size Project. Substituting for fossil

fuel can also have substantial GHG reduction benefits which could translate into revenue from the sales of carbon credits, potentially further increasing the attractiveness of this option.

Section 3.2.5 assumes that the hydropower project will have a plant factor of 60% in calculating the GHG benefits. This includes the electricity supplied by the small hydropower project to the tea factory (displacing diesel fuel) and electricity supply to nearby communities (displacing kerosene fuel for lighting and diesel fuel for operating mills). But it does not include electricity that could be sold to grid to substitute for fossil fuels or possible use of electricity to displace fuel oil at the tea factories. The Section thus makes a conservative estimate of the global climate benefits of the project.

How does the project fit within the context of the goals of the GEF

The draft brief has specifically identified the Operational Programs and GEF Strategic Priorities to which it is directly relevant (Section 3.1)

Regional Context

The differences between the countries will be a challenge for the proposed project. It includes Anglophone and Lusophone countries and may have to contend with language difficulties. The key common factors that underpin the regional context of the proposed project are the common tea industry and local (near tea estates) topography suitable for mini hydro.

Response:

The East Africa Tea Trade Association (EATTA) will provide the regional framework and outreach for the envisaged project. The fact that the project includes Portuguese speaking Mozambique and French speaking Rwanda and Burundi together with the Anglophone countries will pose certain challenges. While it is anticipated that many senior officials and power experts in the non-English speaking countries will have a good grasp of English, efforts will be made to identify international experts and regional Project Management Office (PMO) staff with required multilingual skills.

Replicability of the project

The project should be replicable given the prevalence of tea industries and suitable sites. Risk factors include political and economic instability since some of the countries included have been prone to these problems.

Sustainability of the project

The commercial nature of the proposed project may greatly enhance sustainability. The community electrification part of the project needs careful thought and experiences with mini hydro supply of power to communities in other countries in the region needs to be considered. Issues around tariffs are generally sensitive with communities and some community involvement in the running of the project where it involves communities is desirable. ITDG has considerable international experience² with this.

Secondary issues

Linkages to other focal areas

This project can be seen as contributing to rural development through energisation, enhancement of employment through strengthening local industry, and reduction of greenhouse gas emissions. Its most pronounced limitation is in terms of scale. It is relatively small in relation to the power sector.

Response:

The success of this project is likely to be replicated into independent power generation from other agro-industries, e.g. cogeneration in the sugar industry, which face similar regulatory and policy

² ITDG 2000, Best practices for sustainable development of mini-hydro power in developing countries. ITDG. Rugby.

and financing challenges. A Full Size Project 'Cogen for Africa' has been proposed through UNEP for overcoming the barriers for cogeneration. The establishment of the 'standard PPA' for small IPPs (Outcome 5) would open the way for the substantial growth of the small hydropower IPP industry. The examples of Nepal and Sri Lanka demonstrate that within a decade of instituting a 'standard PPA', small hydropower could generate as much as 10% of the power on the grid in EATTA countries with the most conducive regulatory and policy frameworks.

Linkages to other programmes and action plans at the regional sub regional levels

The issue of linkages to past and ongoing work of stakeholders is addressed in different sections and could usefully be summarized (in the background sections?) for clarity. Some of the linkages that are clear include power sector reform, GHG emissions reduction, Regional Networking such as NEPAD, SADC, the East African Community, and private sector company networks.

Response: This has been added to the final FSP Brief.

Other beneficial or damaging environmental effects

Supply of electricity to communities is far more likely to lead to replacement of kerosene lamps than wood for cooking. The local impacts would therefore be more around indoor air pollution contributed by kerosene.

Response: This has been added to the final FSP Brief.

Degree of involvement of stakeholders in the project

Among the key stakeholders, the tea companies and financing institutions are clearly involved and are being actively engaged in discussions. There is as yet little evidence of engagement of communities that may be customers for excess power from the mini-hydro plants. Also the extent of engagement with policy making organs at national and regional levels seems relatively less pronounced.

Response:

This has been elaborated in the final FSP Brief. Communities that would participate in rural electrification have been engaged during pre-feasibility studies of the small hydropower projects and will be further engaged during the detailed feasibility studies. KTDA which represents smallholder owned tea factories and has consulted extensively with local communities has been strongly involved in the Project preparation. Policy makers have participated in the regional workshop during the preparation of the Project and will also be represented on the Project Steering Committee and National Steering Committees in countries which will host pilot small hydropower projects.

Capacity building aspects

Sub-Saharan Africa generally has low levels of technical capacity and this is a long-term problem. It does compromise local maintenance capability. The project is unlikely to be capable of resolving this problem. A deliberate policy of maximizing local content and using the simplest equipment is likely to facilitate maintenance under these circumstances. It should however be acknowledge that the tea factories represent 'islands' of high level expertise in their localities.

Response:

Tea factories do have a high level of expertise in the operation and maintenance of mechanical and electrical equipment. While expertise varies between factories, most factories have sufficient capability in-house to operate and maintain a small hydropower project.

As the Reviewer correctly points out, local content will need to be maximized in order to facilitate quick repair and maintenance. As mentined in the final Full Size Project Brief will transfer

technical capability to regional engineering, construction and equipment manufacturing firms for civil engineering design and construction and supply of components like penstock pipes and gates. These components will comprise of around two thirds of the individual project costs. The Project will encourage the establishment of Joint Venture partnerships between regional and international firms for supplying turbines, generators, and control equipment. It is unlikely that the volume of business generated by the small hydropower pilot projects will be large enough to justify local manufacture of these components. Over time, provided the anticipated growth in the sector, turbines and controllers could be assembled or fabricated locally.

Innovativeness of the project

The project does not attempt to introduce new technology but rather to apply well known approaches in a relatively difficult implementation environment. This is where approach flexibility and innovation will be vital.

Appendix D: Summary of Cost and Financing Breakdown

Table D1

Project Outcomes	Total Cost	GEF Funding	TA Co-finance (Coopener/EC; bilateral donors)	EATTA Co-finance	Government Co-finance	Capacity Building by Construction & Equipment Cos.	Tea Factories (equity)	Banks (debt)
Outcome 1: Investment confidence established in small hydropower sector among investors, project developers and financing institutions	23,642,000	1,388,000	254,000				7,000,000	15,000,000
Outcome 2: Technical capacity enhanced in EATTA countries to design and construct small hydropower and fabricate associated equipment	479,000	259,000				220,000		
Outcome 3: Models in place for private-public participation in rural electrification through small hydropower	3,348,000	388,000	360,000		2,600,000			
Outcome 4: Regulatory environment enabled to be conducive to small hydropower IPP investment and rural electrification in EATTA member countries	403,000	323,000			80,000			
Outcome 5: Stage set for establishment of a viable 'standard PPA' in EATTA countries for small hydropower	237,000	237,000						
Project Coordination, including monitoring and evaluation (M&E)	359,000	259,000		100,000				
TOTAL	28,468,000	2,854,000	614,000	100,000	2,680,000	220,000	7,000,000	15,000,000

GEF Budget

Table D2

Project Outcomes	GEF (US\$)	Co-financing (US\$)	Observations
Outcome 1: Investment confidence established in small hydropower sector among investors, project developers and financing institutions	1,388,000	22,254,000	Co-financing for feasibility studies from donor sources; Investment co-finance from tea factories and banks
Outcome 2: Technical capacity enhanced in EATTA countries to design and construct small hydropower and fabricate associated equipment	259,000	220,000	Co-financing from contracting and equipment supply firms in terms of investments in construction and manufacturing equipment and time for training.
Outcome 3: Models in place for private-public participation in rural electrification through small hydropower	388,000	2,960,000	Co-financing for studies and plans from donor sources; Co-financing from governments for expansion of RE
Outcome 4: Regulatory environment enabled to be conducive to small hydropower IPP investment and rural electrification in EATTA member countries	323,000	80,000	Governments to invest in streamlining of regulations
Outcome 5: Stage set for establishment of a viable 'standard PPA' in EATTA countries for small hydropower	237,000	0	
Project Coordination, including monitoring and evaluation (M&E)	259,000	100,000	Co-financing from EATTA for office premises
GRAND TOTAL	2,854,000	25,614,000	

Appendix E: Summary of co-financiers

Table G1

Name of organization/Fund	Contact details	Type of financing	Geographical coverage	Commitment
1. Triodos Bank	Rene Magermans Managing Director rene.magermans@triodos.nl Ashington Ngigi, Local Representative in Kenya ashington@integral-advisory.com	Fund & Portfolio management/ Prefers 2-3 additional partners to set up fund for mini hydro & cogen	Africa-wide	Submitted letter of interest
2. DEG (Deutsche Investitions und Entwicklungsgesellschaft mbH)	Eric Kaleja Sr. Investment Manager, East Africa POBox 52074-00200 Nairobi, Kenya/ T254203872122/111F254203872103 deg@kfw.co.ke	Long term financing for start up or expansion projects	Africa-wide	To prepare
3. E+Co	Gavin Watson Investment Officer T27126653454 gavin@energyhouse.com	Seed and growth capital in the form of debt or equity to SME	Uganda, Ethiopia, Tanzania, Zambia, South Africa, Gambia, Senegal, Mali, Ghana	Submitted letter of interest
4. FINN fund (Finish fund for Industrial Cooperation Ltd)	Helena Korhonen Sr. Investment Manager, Renewable Energy and CIS POBOX391(Ratakatu27)FI-00121	Co-financing on cogeneration investments projects	Kenya, Uganda, Tanzania, Malawi, Ethiopia, Swaziland, Sudan	Submitted letter of interest

Name of organization/Fund	Contact details	Type of financing	Geographical coverage	Commitment
	Helsinki, Finland/ T358934843307/M358408228 296/F358934843347 helena.korhonen@finnfund.fi			
5. GTZ (German Technical Cooperation)	Holger Liptow Director, Climate Protection Programme Dag-Hammarskjold-Web1-5, Postfach 51 80 Eschborn, Germany 65726/ T496196794103F4961967963 20/M4915112162803 holger.liptow@gtz.de	Project investment and Technical Assistance	Africa-wide	To confirm interest
6. AICAD/JICA	African Institute for Capacity Development (AICAD) Project Phase-II c/o AICAD, P.O.Box 46179-00100, Nairobi, KENYA Web: http://www.aicad.or.ke Email: hirabayashi@aicad-jica.org	Project investment and Technical Assistance?	Africa-wide	Requested
7. EIB	Carmelo A. COCUZZA EIB East & Central Africa Office Tel +254 -20 273 5260/1 Mobile +254 722 20 88 11 Fax + 254 20 271 3278 COCUZZA@eib.org	Credit line via regional/national finance institution e.g. EADB. Approval of credit line with EADB progressing fast	Africa-wide	To prepare
8. EADB	David James Chief credit officer	Interested in project financing (east Africa, Kenya Uganda and	East Africa (Kenya Uganda, Tanzania)	Submitted letter of interest

Name of organization/Fund	Contact details	Type of financing	Geographical coverage	Commitment
	(djames@eadb.org)	Tanzania); could support pre-feasibility studies; additional information for further assessment and, if appropriate and possible, provide a Letter of Support for the two initiatives		
9. AfDB	Dr. Vyas; W.Klunne/Y.Rfaoui, L.Borin (Private Sector) R.E exparts BP323-1002 Tunis Belvedere, Tunisia/T21671103004 w.klunne@afdb.org/y.arfaoui@afdb.org l.borin@afdb.org	Co-finance small hydro projects	Africa-wide	Submitted letter of interest
10. AfD/Proparco	C. de Gromard AFD/ Département Infrastructures et Développement urbain" "Chef du Service Infrastructures & Mines and an Investment Officer " 33 1 53 44 35 57, 33 1 53 44 31 16	Provides guarantees, loans or equity in projects. They specialise in limited recourse finance. Projects of US\$ 7 million or greater are preferred. Can provide loans of as low as US\$ 3million	Africa-wide	Submitted email of interest for Small Hydro
11. ABSA	Alwyn Wessels Project Finance Absa Towers East 3rd Floor 170 Main Street Johannesburg	Co-financing of cogeneration projects, must have South African involvement Projects of at least US\$ 10million preferred	South Africa (or projects with South African component) Africa-wide through Barclays Bank	To prepare

Name of organization/Fund	Contact details	Type of financing	Geographical coverage	Commitment
	Email: Alwynw@absa.co.za			
12. KENGEN (Kenya Electricity Generating Company Limited)	Edward Njoroge Managing Director KENGEN P.O.Box 47936 00100 Nairobi Kenya	Co-financing of electricity generation projects, up to 50% of investment costs	Kenya	Submitted letter of interest for Small Hydro and Cogen
13. Kenya Commercial Bank (KCB)	MD, Terry Davidson Managing Director	Financing small hydro projects in the tea sector	Kenya	Submitted letter of interest for Small Hydro
14. Stanbic Bank - Kenya	Mike du Toit Managing Director David Wafula	Financing small hydro projects in the tea sector	Kenya	To prepare
15. Standard Chartered Bank Structured Trade Finance Africa	Birju Sanghrajka Wholesale Banking Standard Chartered Bank Birju.Sanghrajka@ke.standardchartered.com	Financing small hydro projects in the tea sector	Africa	Submitted letter of interest for Small Hydro and Cogen
16. K-REP Bank	Kimanthi Albert Mutua Managing Director M0722511785 www.k-rep.org Email: k-rep@arcc.co.ke	Loans to tea factories for energy projects	Kenya	To request
17. COOPENER	Jean-Michel SERS" The COOPENER Team European Commission Intelligent Energy Executive Agency (IEEA) European Commission; B-7	Co-financing for international projects which address non-technological issues and aim to improve access to modern sustainable energy services for poverty	Kenya, Uganda, Tanzania, Ethiopia, Rwanda, Burundi, Malawi, Mozambique, Zambia, Swaziland, Sudan	Proposal submitted

Name of organization/Fund	Contact details	Type of financing	Geographical coverage	Commitment
	01/36, B-1049 Brussels "Jean-Michel.SERS@cec.eu.int	alleviation and social economic development in developing countries		
18. REEEP	International Secretariat Beverly.Robbins@reeep.org or www.reeep.org.	TA, specifically targets expansion of sources of finance, improved communications between existing and potential providers of financing and ensuring the establishment of innovative risk mitigation tools that will reinforce these efforts	Kenya, Uganda, Tanzania, Ethiopia, Rwanda, Burundi, Malawi, Mozambique, Zambia, Swaziland, Sudan	Proposal submitted
19. PROINVEST/DE	Mr. Gaston Baganzicaha, PROINVEST gba@proinvest-eu.org http://www.proinvest-eu.org/	Technical assistance activities that lead to investment. Works through two principal modalities – namely: (i) Strengthening ACP intermediary organizations and business associations; and, (ii) Direct support to individual companies.	Africa-wide	To prepare
20. Swaziland Industrial Development Corporation	Mbuso Simelane Finance and Administration Manager Email:mbuso@sidc.co.sz	Co-financing for cogeneration projects in sugar factories	Swaziland	To prepare
21. Standard Bank Swaziland Limited	Tineyi Mawocha Managing Director Email: mawochat@stanbic.com	Co-financing for cogeneration projects in sugar factories	Swaziland	Submitted letter of interest for Cogen
22. EU office	Vanessa Dick/Johan Canvenberg Vanessa.Dick@cec.eu.int	Technical Assistance	Africa-wide	Requested
23. ORET/FMO	FMO/ORET at Netherlands embassy: Roeland Kollen,	Project investment	Africa-wide	Requested

Name of organization/Fund	Contact details	Type of financing	Geographical coverage	Commitment
	commercial attache, Riverside lane, PO Box 41537, Nairobi, Kenya, tel 020 4447413, email: rad.kollen@minbuza.nl			
24. International Finance Corporation	Jean Philippe Prosper Regional Manager Phone: 3226300/400	Project investment and Technical Assistance	Africa-wide	Requested
25. Danida	Thomas Hernoe Senior Project Manager Carl Bro International AB thomas.hernoe@carlbro.se	Mixed credit - Technical Assistance	Africa-wide	To prepare
26. GroFIN	Chris Venter chris@grofin.com	SME financing	East and southern Africa	Requested
27. Actis	Kungu Gatabaki Investment Principal PO Box 43233-00100 Nairobi Kenya Telephone: +254 20 219952/3/4 Fax: +254 20 219 744 Email: info@act.is	Project investment	Africa-wide	Requested
28. BASE	Virginia O'Brien virginia.sonntabob@energy.base.org	Technical Assistance	Africa-wide	Requested
29. Development Bank of Southern Africa	Ms Jean Madzongwe Energy Specialist	Project investment	Southern Africa	Requested
30. USAID	Dr. Griffin Thompson Energy Team Leader U.S Agency for International Development Ronald Reagan Building, Room 3.08B, Washington, DC 20523-3800 Washington, DC USA +1 202 712 1750 +1 202 216 3230	Investment & TA	Africa-wide	Requested

Name of organization/Fund	Contact details	Type of financing	Geographical coverage	Commitment
	gthompson@usaid.gov			
31. IN-HSP	Prof. Tong Jiandong Director General, International Center on SHP P.O. Box 202, 310002 Hangzhou, China Hangzhou China +86 571 87070070 Ext 6317 or +86 571 870 23380 +86 571 87023353 hic@mail.hz.zj.cn http://www.inshp.org	Technical Assistance and co-finance of demo projects	Africa wide	Submitted email of interest for Small Hydro

Aide Memoirs

A. East Africa Development Bank

Meeting on the UNEP/GEF Projects held at the East African Development Bank (EADB) Head Office at 2.00pm on 12th January 2006

- 1.0 The subject meeting was organised by Mr. James Baanabe of the Ministry of Energy and Mineral Development on behalf of the coordinating team of the two UNEP/GEF Projects entitled “*Cogen for Africa*” and “*Greening the Tea Industry in East Africa*”.
- 2.0 The meeting commenced with a brief overview of the aforementioned UNEP/GEF Projects as well as an introduction those in attendance, namely:

Mr. David L. James, Chief Credit Officer and Director of Operations, EADB
Mr. Bernard Mboha, Resident Manager, EADB-Uganda
Mr. Peerke de Bakker, UNEP/GEF Representative
Mr. Stephen Karekezi, Director, AFREPREN/FWD
Mr. Bikash Pandey, Lead Expert, “*Greening the Tea Industry in East Africa*” Project
Mr. Alan Dale Gonzales, Lead Expert, “*Cogen for Africa*” Project
Mr. James Baanabe, Ag. Assistant Commissioner Energy Efficiency, Ministry of Energy and Mineral Development
Mr. John Kimani, Senior Programme Officer, AFREPREN/FWD
Mr. Nicholas Owino, Project Officer, AFREPREN/FWD
- 3.0 After summarising the two projects (summary attached), Mr. de Bakker highlighted the financing options that are envisaged for the implementation of the projects. Financing options that are being actively developed include project finance and the establishment of a dedicated energy fund to support investments in cogeneration and small hydro in the sugar and tea industries, respectively.
- 4.0 Mr. James of EADB explained that the sugar and tea sub-sectors are familiar to the Bank. For example, the Bank, as an on-lender for the World Bank and the Energy for Rural Transformation Programme, recently provided financial support to Kakira Sugar Works. In addition, at the time of subject meeting, the Bank has been in discussion with Lugazi Sugar Factory in Uganda to provide similar financial support. The Bank, said Mr. James, is actively involved in the sugar industry in Tanzania as well as other sugar factories in Uganda. In the tea sub-sector, the Bank has supported the construction of new tea factories in Uganda and Kenya (especially KTDA).
- 5.0 In response to the Bank’s interest in supporting the two projects, Mr. James indicated that EADB can, in fact, begin providing the requisite financing in the near term subject to availability of sound investment opportunities. With regard to the question of opening a financing window (credit line) for the projects, Mr. James said that EADB would be comfortable with the idea as long as it does not affect existing credit lines or require the reordering of its priorities. However, in line with its mandate, EADB’s support would only be limited to the three East African countries of Kenya, Uganda and Tanzania. As for the line of credit that EADB has requested from the European Investment Bank (EIB), Mr. James is willing to provide a “window” for cogeneration and small hydro projects to tap within this line of credit.
- 6.0 According to the EADB representatives, the Bank would be the ideal financing agency for the two projects as it is flexible and can provide repayment periods of up to 14 years and even more, if necessary. The Bank is also capable of carrying out pre-feasibility studies where required as part of its due diligence. However, as the two projects incorporate pre-feasibility studies, the Bank would build on the available studies.
- 7.0 Furthermore, EADB has access to a wide range of financial resources including locally raised funds from Corporate Bonds as well as credit lines from larger financing institutions such as the African Development Bank; DBSA (South Africa); FMO (Netherlands); and, DEG (Germany).

8.0 Since financial viability and socio-economic soundness are two of EADB's most important criteria, the EADB representatives requested for additional information (such as more detailed pre-feasibility studies) for further assessment and, if deemed appropriate, provide an initial Letter of Support for the two initiatives. More substantive letters of commitment can be provided subject to availability of more detailed data/information on the prospective projects and results of its in-house due diligence.

B. African Development Bank

Meeting on the UNEP/GEF Projects held at the AfDB Uganda Country Office at 11.00 am on 12th January 2006

1.0 The subject meeting was organised by Mr. James Baanabe of the Ministry of Energy and Mineral Development on behalf of the coordinating team of the two UNEP/GEF Projects entitled “*Cogen for Africa*” and “*Greening the Tea Industry in East Africa*”. The proposed projects, which would source technical assistance from the Global Environmental Fund (GEF), aim to assist a number of industries in the region to become self sufficient in power consumption and generation of additional electricity for sale to the national grids. The countries where the initiatives would be undertaken include Kenya, Uganda, Tanzania, Ethiopia, Malawi, Zambia, Mozambique, Rwanda, Burundi and Swaziland.

2.0 The meeting commenced with an introduction of those present, namely:

Mr. Ashie Mukungu, Macro Economist, AfDB Uganda Country Office (UGCO)
Mr Daniel Rutabingwa, Investment Officer, AfDB Uganda Country Office (UGCO)
Mr. Peerke de Bakker, UNEP/GEF Representative
Mr. Stephen Karekezi, Director, AFREPREN/FWD
Mr. Bikash Pandey, Lead Expert, “*Greening the Tea Industry in East Africa*” Project
Mr. Alan Dale Gonzales, Lead Expert, “*Cogen for Africa*” Project
Mr. James Baanabe, Ag. Assistant Commissioner Energy Efficiency, Ministry of Energy and Mineral Development
Mr. John Kimani, Senior Programme Officer, AFREPREN/FWD
Mr. Nicholas Owino, Project Officer, AFREPREN/FWD

3.0 Mr. de Bakker then gave an extensive brief on the two projects: 1) development of mini-hydro projects on rivers that flow through tea estates in East Africa. The tea companies had been approached and were said to be willing to be project partners in developing the hydro-power potential with financiers. They would provide part of the finance required and captive market for generated power. 2) development of power as a bi-product of the main stream activity of some companies (e.g., sugar companies producing thermal power using bagasse). He explained that the envisaged financing options include direct project finance and the establishment of a dedicated energy fund to support investments in cogeneration and small hydros in the sugar and tea industries, respectively.

4.0 In response, Messrs Mukungu and Rutabingwa indicated that AfDB considers the power sector a priority sector for lending. They added that since both projects involve the private sector, they were in line with the Bank’s commitment to expanding its support to the private sector.

5.0 With regard to the proposed financing options, the AfDB UGCO officials stated that although prima facie, the projects appeared to be attractive; they needed to be studied in more detail. Technical, financial and economic aspects need deep review. They proposed that more detailed information be submitted to the Bank for further assessment. The officials added that they could introduce the UNEP/GEF Projects team to EADB and PTA Bank, which are relatively large intermediary financial institutions that have capacity of handling both projects, and who the Bank had close working relationship.

6.0 The AfDB UGCO officials recommended to the delegation to pay a visit to the two institutions. The visit would shed light on whether they have the capability to meet the financial demand of the two projects and also establish their interest in having dedicated lines of credit from AfDB specifically for financing the two projects.

7.0 As next steps, the following was proposed:

- Visit to EADB and PTA Bank to establish their interest;
- A concept brief be prepared and submitted to AfDB UGCO by end of January 2006.
- The UGCO would study the concept brief and advise accordingly.

C. DEG

Subject: Meeting between DEG and the representatives involved in the UNEP/GEF Projects entitled “*Cogen for Africa*” and “*Greening the Tea Industry in East Africa*”

Location of meeting: DEG Office, Nairobi

Date of meeting: 25 January 2006

Participants in the meeting:

- Mr. Eric Kaleja, DEG
- Ms. Hiroko Sugimoto, UNEP/DGEF
- Mr. G. Ngugi Waireri, EATTA
- Ms. Hadija Shakombo, EATTA
- Mr. Steve Karekezi, AFREPREN
- Mr. Alan Dale Gonzales, Lead Cogen Expert

Details of discussions:

- Mr. Kaleja was briefed on the two UNEP/GEF projects. It was emphasized that these projects aim to identify and support concrete projects using small hydro and cogeneration technologies. The private sector will develop and implement the projects and will also provide all or part of the required equity. Different financing options to fund the remaining portion of the project costs are currently being investigated.
- DEG, a member of the KfW Group, is Germany’s financing institution for the promotion of the private sector in developing and transition economies. DEG participates in commercially viable projects of all sectors that contribute to sustainable economic development of the country and comply with environmental standards.
- DEG can participate in the financing of projects in the following ways: equity capital, guarantees, mezzanine finance and long-term loans. As equity investor, DEG usually seeks for a minor shareholding (e.g. 5-25 %) and applies a clearly defined exit strategy (usually exiting in 5 to 6 years). As a loan provider, DEG requires a good sponsor (project owner), an equity from the sponsor(s) of around 35 to 40 % of the total project costs and collaterals as a security. DEG's loans can go up to 10 years, although a longer tenor under certain conditions may be possible (the Bujagali project in Uganda has a tenor of 15 years). Interest rate could be fixed or variable and is market oriented according to the project and country risks. A loan on a Project Finance basis can be arranged.
- DEG is active in the power and agriculture sector in Africa and has financed projects in the sugar, horticulture and cotton industries, among others. Examples of projects financed in the power sector include a diesel power plant in Mombasa, Kenya and the Bujagali Hydropower Project in Uganda.

Action/next steps:

- The two UNEP/GEF projects will provide Mr. Kaleja with more details of the potential projects and the financing requirements.
- Mr. Kaleja will be requested to provide a letter to UNEP/GEF indicating DEG's relevance and interest in participating in the financing of cogeneration and small hydro projects that fall within the scope and financing schemes/requirements of DEG.

D. E+Co

Subject: Meeting between E&Co and Lead Cogeneration Expert, Project coordinator and Southern Africa expert

Location of meeting: Pretoria and Johannesburg, South Africa

Date of meeting: 9th and 12th February, 2006

Participants in the meeting:

- Gavin Watson – Investment Officer, E+Co Africa
- Paul van Aalst – Director, E+Co
- Alandale Gonzales – Lead Cogeneration Consultant
- Maxwell Mapako – CSIR Southern Africa Expert
- Waeni Kithyoma – AFREPREN/FWD

Brief of discussions:

Meeting with Gavin on 9th February

- E&Co mainly involved in investments for modern energy in SMEs, and are active in the following countries: Senegal, Mali, Ghana, South Africa, Gambia, Ethiopia, Tanzania, Uganda and Zambia.
- E&Co. provide loans or equity investments; maximum level of investment is U\$250,000 (in Ethiopia only equity investments due to government restrictions)
- A 2% fee is chargeable to the project sponsor, to cover costs of processing the loan
- E&Co. also manage an investment facility from German development funds (KfW, GTZ, DEG) of about us\$8million
- E&Co have experience in operating energy funds, currently running a Solar Water Heater Fund in Cameroon. Would be interested in participating in other funds
- Would be able to bring on board matching funds from international financiers e.g. IFC fund for Africa
- Examples of projects they have participated in
 - o Landfill gas project in Ethiopia
 - o Projects with PV entrepreneurs in various countries
 - o Charcoal project in Zambia
- Keen on small hydro projects in the tea industry

Meeting with Paul on 12th February

- Paul is currently working with Triodos in developing a 'Fund of Funds' for the European Commission. The fund will be managed by Triodos Bank. Several regional funds will thereafter be developed, and the Cogen and Small Hydro Fund being developed by Ashington falls in the category of regional funds that they plan to establish. E+Co will manage the regional funds. Rene of Tridos has already asked Paul to work with Ashington on the Triodos-led cogen and small hydro fund.
- E+Co is interested in funding a number of pre-investment projects prior to establishment of the Fund of Funds and the regional funds. Some of the more advanced small hydro for tea factories could be included in this pre-investment phase.
- E+Co have investment in fund management, and have expertise in negotiating with a wide range of investors and financiers, regionally and internationally.
- E

Possible areas of involvement:

- +Co can provide one third of project cost as equity investment or as loan. Their rates are lower than commercial rates. One third of project cost can be met by the project sponsor as equity, and the remaining one third sourced from local banks.

- Equity investment in projects in Ethiopia after development of feasibility studies and business plan
- Fund opportunity – based on viability of the fund
- Participate in individual investments based on case by case assessment
- Can provide a letter of support

Next steps:

- AFREPREN/FWD to send them a sample letter of support, for the manager of E&Co. to send letter of support to UNEP.
- To receive more detailed information on pipeline of projects e.g. pre-feasibility studies, once these are finalized.
- Send details of both projects electronically to Paul van Aalst
- Provide Ashington with Paul's contact so that they can be in touch
- Keep Paul in the loop on development of the Triodos-led cogen and small hydro fund
- Possible follow-up on the fund with Paul in April 2006, when he will be in Africa

Key websites:

E+Co – www.energyhouse.com

Small hydro project: <http://greeningtea.unep.org>

Cogen project: <http://cogen.unep.org>

E. ABSA

Subject: Meeting between ABSA (Amalgamated Banks of South Africa) and Lead Cogeneration Expert, Project coordinator and Southern Africa expert

Location of meeting: Pretoria, South Africa

Date of meeting: 9th February, 2006

Participants in the meeting:

Alwyn Wessels– Project Finance, Corporate and Merchant Bank

Alandale Gonzales – Lead Cogeneration Consultant

Maxwell Mapako – CSIR Southern Africa Expert

Waeni Kithyoma – AFREPREN/FWD

Absa in brief: Absa Group Limited is one of South Africa's largest financial services organizations, serving personal, commercial and corporate customers in South Africa. The Group also provides products and services to selected markets in the United Kingdom, Germany, Singapore and Angola, Mozambique, Namibia, Tanzania and Zimbabwe in Africa. The Group interacts with its customers through a combination of physical and electronic channels, offering a comprehensive range of banking services, (from basic products and services for the low-income personal market to customized solutions for the commercial and corporate markets), bancassurance and wealth management products and services.

Brief of discussions:

- Provide funding on commercial basis
- Could consider participating in a fund, based on their own assessment. Would like to receive the information on the fund and review it internally. If they were to put their money in a fund, for example, they would have a number of conditions e.g. they should be given first priority to fund etc
- Can bring in multi-laterals and offer funding at mezzanine-level
- ABSA became a subsidiary of Barclays, and will be taking up Barclays branches in Africa, therefore will have Africa-wide presence. Have experience in funding projects in sub-Saharan Africa countries other than South Africa
- Examples of projects they have participated in
 - o SEFI – cogeneration plant in Mpumalanga Province in South Africa
 - o Mining
 - o Electricity distribution

Possible areas of involvement:

- Would be interested in participating based on the following conditions:
 - o Minimum investment of the project should be at least US\$10million, to justify the transaction costs
 - o Projects must have South African involvement, e.g. ownership, equipment supplier, management etc
- Case by case review of feasible/viable projects

Next steps:

- Alwyn will forward information on the projects to his colleague who deals with investments in the energy sector.
- AFREPREN/FWD and UNEP to send them a sample letter of support, for them to send letter of support to UNEP.

Key websites:

Email: <http://www.absa.co.za/absacoza/>

Cogen project: <http://cogen.unep.org>

F. PROINVEST

Subject: Meeting between PROINVEST and technical/finance experts involved in the UNEP/GEF/EATTA Project *“Greening the Tea Industry in East Africa”*

Location of meeting: Nairobi Safari Club Hotel

Date of meeting: 6 February, 2006

Participants in the meeting:

- Mr. Gaston Baganzicaha, PROINVEST
- Mr. Stephen Karekezi, AFREPREN/FWD
- Mr. Ashington Ngigi, Integral Advisory Company

Brief of discussions:

- Mr. Baganzicaha (in charge of Public-Private Policy Dialogue) was briefed on the UNEP/GEF/EATTA Small Hydro *“Greening the Tea Industry in East Africa”* project. It was also explained that there was widespread interest in the project from the region’s tea industry which is faced by stagnant world prices and rising production costs – especially energy costs. The region’s tea industry is keen to participate in the project with over 100 tea factories responding to the questionnaire circulated in preparation for the project. It was emphasized the project is at an advanced stage with 8 completed country scoping studies, over 50 small hydro sites that are near tea factories identified and 12 ongoing pre-feasibility studies which are due for completion by end of February, 2006. The aim is to complete the project proposal by end of February, 2006 and progress is on course to achieve this objective. Mr. Karekezi and Mr. Ngigi explained that the project had already approached financiers to source for support for both investment and technical assistance for the project.
- Mr. Baganzicaha explained that PROINVEST is an EU (European Union) – ACP (African, Caribbean and Pacific) partnership programme for the promotion of investment and technology flows in the ACP countries. In principle, PROINVEST does not participate in the investment phase of projects but can assist in a wide range of support and technical assistance activities that lead to investment. It works through two principal modalities – namely: (i) Strengthening ACP intermediary organizations and business associations; and, (ii) Direct support to individual companies. Mr. Baganzicaha explained that although many of PROINVEST activities in eastern Africa have been in support of the transport sector, it is involved in a wide range of sectors include agro-industries such as the tea industry. It is currently supporting the tea industry association of Uganda and it would, in principle, be interested in supporting small hydro investment in the region’s tea industry through EATTA.
- Mr. Baganzicaha explained that although PROINVEST support is very flexible and can be used to procure technical assistance support from any appropriately qualified specialist firm that meets PROINVEST standards, collaboration with an EU-based firm of experts/specialists firms or an EU-based business or trade association is an advantage. For example, if the UNEP/GEF and EATTA were to collaborate with an EU-based small hydro specialist agency or business association, it would strengthen the application for PROINVEST grant support.
- PROINVEST has a 7-year budget totalling Euro 110 million from the European Investment Fund (EDF 8th). At the moment, PROINVEST initial support to business associations is limited to Euro 70,000 grant per association and to individual companies Euro 50,000 grant per company. PROINVEST support is not designed to flow to multilateral institutions such as UNEP/GEF but it can co-finance activities that are also financed by agencies such as UNEP/GEF.
- PROINVEST has a new modality of support which allows for higher levels of support, namely “Cluster” approach in which a number of companies are given simultaneous parallel grants to address an issue of common concern. For example, a cluster of tea companies could apply through EATTA for grant support to undertake pre-feasibility studies or full feasibility studies. Mr. Karekezi and Mr. Ngigi explained that the UNEP/GEF/EATTA project has sufficient resources to prepare up to 20 pre-feasibilities studies from which it will select 6 priority small hydro investments. The project is keen to mobilize co-finance to cover the cost of financing the full-scale feasibility studies which will be in the order of Euro 50,000 depending on the site. Mr. Baganzicaha explained that PROINVEST would be willing to consider the possibility

of supporting a cluster of 6 small hydro investments by the tea sector – translating to a total technical support grant of the order of Euro 300,000 grant (Euro 50,000 X 6 companies).

- PROINVEST can work directly with EATTA to pursue the aforementioned opportunity but would like to establish direct contact with UNEP/GEF (Mr. Peerke deBakker) to discuss exactly how PROINVEST's support can be coordinated with UNEP/GEF grant support.
- Mr. Gaston Baganzicaha was also informed of the planned UNEP/GEF/EATTA Workshop scheduled to be held on 13-14 February, 2006 and indicated that it might be possible to organize PROINVEST participation with either a representative from its headquarters in Brussels, Belgium or through its representatives CDE (it also has a technical support experts coming out of the Ernst & Young office in Dar-es-salaam, Tanzania).

Action/next steps:

- Prepare a brief of this meeting for circulation to EATTA, PROINVEST and UNEP/GEF for their review and approval.
- Provide PROINVEST contact to UNEP/GEF and encourage direct contact between the two institutions as well as EATTA to discuss co-finance of the 6 clusters of small hydro investments by the tea industry in the region through EATTA.
- Mr. Baganzicaha to discuss the option of providing grant support that would lead to small hydro investment in a cluster of 6 tea companies with colleagues at PROINVEST headquarters and inform EATTA and UNEP/GEF on the best way forward.
- Invitation to the forthcoming UNEP/GEF/EATTA Workshop to be extended to PROINVEST (or possibly its local CDE representative in Nairobi).
- UNEP/GEF/EATTA (with inputs from AFREPREN/FWD) to begin to compile a draft proposal applying for a grant for the cluster of 6 tea companies for eventual submission to PROINVEST.

Key websites:

PROINVEST: <http://www.proinvest-eu.org>

SMALL HYDRO PROJECT: <http://greeningtea.unep.org>

G. SIDC

Subject: Meeting between Swaziland Industrial Development Corporation (SIDC) and Lead Cogeneration Expert, Project coordinator and Southern Africa expert

Location of meeting: Mbabane, Swaziland

Date of meeting: 10th February, 2006

Participants in the meeting:

Mbuso Simelane – Finance and Administration, SIDC
Alandale Gonzales – Lead Cogeneration Consultant
Maxwell Mapako – CSIR Southern Africa Expert
Waeni Kithyoma – AFREPREN/FWD
Peterson Dlamini – Ministry of Energy, Swaziland
John Mark Sithebe – Simunye Sugar Factory, Swaziland

SIDC in brief: The Swaziland Industrial Development Company (SIDC) was established in October 1987 to supply local and international funds to finance private business projects. SIDC is a private development finance bank which provides:

- long-term loans
- equity financing
- asset leasing
- industrial land and buildings
- expert advice and guidance to local and international investors.

SIDC is 35% government owned, while five international development finance institutions own the remaining share.

Brief of discussions:

- Keen interest in financing projects in the sugar sector in Swaziland, which would make it more efficient. Have a history of financing the sugar sector
- Especially concerned about the impending crisis in the power sector, where cheap power import from South Africa may be discontinued in the next 2 years.
- Would be able to provide loans and can also be involved in equity.
- Would weigh each project on its merit and only invest if it is commercially viable.

Next steps:

- Mbuso Simelane to brief the General Manager about the cogen project in Swaziland.
- AFREPREN/FWD and UNEP to send them a sample letter of support, for the manager to send letter of support to UNEP.

Key websites:

Email: <http://www.absa.co.za/absacoza/>

Cogen project: <http://cogen.unep.org>

G. Standard Bank Swaziland Limited

Subject: Meeting between Standard Bank Swaziland Limited and Lead Cogeneration Expert, Project coordinator and Southern Africa expert

Location of meeting: Mbabane, Swaziland

Date of meeting: 10th February, 2006

Participants in the meeting:

Tineyi Mawocha – Managing Director
Charles Gillon – Account Executive
Barry Schutzler – Head of Corporate Banking
Alandale Gonzales – Lead Cogeneration Consultant
Maxwell Mapako – CSIR Southern Africa Expert
Waeni Kithyoma – AFREPREN/FWD
Peterson Dlamini – Ministry of Energy, Swaziland
John Mark Sithebe – Simunye Sugar Factory, Swaziland

Brief of discussions:

- Presence in 17 countries in Africa, Head office in South Africa.
- Already doing business with sugar companies such as RSCC
- Interested in participating in the project, would review each project on a case by case basis
- There is a possibility for bundling projects together, through the project finance office in South Africa.
- They are also involved in asset financing, and could be involved in financing equipment purchase for projects.
- Would also be interested in project finance, through Johannesburg office
- Are willing to provide a letter of support and interest in participating in the project.
- Examples of projects they have participated in
 - o Jatropha plant in Swaziland, where cogeneration could be considered
-

Next steps:

- AFREPREN/FWD and UNEP to send them a sample letter of support, for the manager to send letter of support to UNEP.
- MD to provide contact for head office in South Africa

Key websites:

Email: http://www.sidc.co.sz/sidc_about.html

Cogen project: <http://cogen.unep.org>

Appendix F: Initial Long List (56) of Identified Small Hydropower Projects from Scoping Study

Table F1

no°	Country	River	Average flow (m3/s)	Net head (m)	Installed power (kW)	Tea Company	Tea Factory
1	BURUNDI	Nyabihondo	0.317	171	325		Teza
2	BURUNDI	Mushwabure	1.823	70	764		Tora
3	BURUNDI	Nyamagana	1.744	133	1,390		Muhingo
4	BURUNDI	Kayave	0.523	117	368		Rwegura
5	RWANDA	Base 1	2.140	24	293	Muvumo	Sorwathe
6	RWANDA	Base 2	3.282	33	602	Gituba	Sorwathe
7	RWANDA	Rugezi Swamp	0.571	209	666	Myove	Sorwathe
8	RWANDA	Rusumu	1.855	151	1,574	Butaro	Mulindi Sorwathe
9	RWANDA	Sebeya 1	2.968	71	1,185	Nyundo	Pfunda
10	RWANDA	Giciye 1	1.926	96	1,040	Kabitozi	Nyabihu Rubaya
11	RWANDA	Akanyaru 1	1.784	38	377	Uwisaga	Mata / Kitabi
12	RWANDA	Rukarara 1	3.924	132	2,897	Bigarama	Kitabi
13	RWANDA	Rukarara 2	1.427	77	618	Bushiguishi	Kitabi
14	RWANDA	Rubyiro	1.427	45	364	Mwishogwe	Kitabi
15	RWANDA	Mazimeru	0.143	272	217	Rishiwa	Nshili
16	RWANDA	Akanyaru 2	3.211	24	436	Munini	Nshili
17	RWANDA	Kamiranzovu	0.400	120	269	Ruheru	Gisakura
18	RWANDA	Mbirurume1	0.371	145	301	Masumu	Guissovu
19	RWANDA	Mbirurume2	0.442	207	513	Masumu	Guissovu
20	KENYA	Kipkurere	1.915	243	2,607	scheme 1	Koisagat Tinderet
21	KENYA	Kipkurere	1.915	275	2,949	scheme 2	Koisagat Tinderet
22	KENYA	Kipkurere	1.915	318	3,414	scheme 3	Koisagat Tinderet
23	KENYA	Kipkurere	1.915	373	3,995	scheme 4	Koisagat Tinderet
24	KENYA	Kipkurere	1.915	371	3,979	scheme 5	Koisagat Tinderet
25	KENYA	Kasabe	0.507	202	574		Tinderet
26	KENYA	Kipchoria	1.332	332	2,475	scheme 1	Savani
27	KENYA	Kipchoria	1.332	316	2,353	scheme 2	Savani
28	KENYA	Kipchoria	2.332	333	4,814	scheme 3	Savani
29	TANZANIA	Suma	1.681	165	1,550	Wakulima	Katumba
30	TANZANIA	Kiwira 1	5.000	70	1,960	Wakulima	Katumba
31	TANZANIA	Mosiya	1.110	181	1,125	Wakulima	Katumba
32	TANZANIA	n.a	n.a	n.a	3,000	Mufindi	Itonga
33	TANZANIA	Luhololo	0.476	195	520	Mufindi	Luponde

no°	Country	River	Average flow (m3/s)	Net head (m)	Installed power (kW)	Tea Company	Tea Factory
34	TANZANIA	Ruhuhu	1.585	94	832	Mufindi	Luponde
35	TANZANIA	Hagafiro	2.426	66	893	Mufindi	Luponde
36	TANZANIA	Kwamkuyo	0.793	201	891	East Usambara	Kwamkoro / Bulwa
37	KENYA	Gura	4	100	2,775	KTDA	Gathuthi, Gitugi
38	KENYA	North Mathioya 1	3.1	92.53	2,010	KTDA	Kanyenyaini, Kiru, Gatunguru, Githambo
39	KENYA	North Mathioya 2	3.1	70.2	1,540	KTDA	Kanyenyaini, Kiru, Gatunguru, Githambo
40	KENYA	North Mathioya 3	3.1	89.9	1,960	KTDA	Kanyenyaini, Kiru, Gatunguru, Githambo
41	KENYA	South Mathioya	2.5	88	1,570	KTDA	Kanyenyaini, Kiru, Gatunguru, Githambo
42	KENYA	Maragua	2	140.39	1,970	KTDA	Kanyenyaini, Kiru, Gatunguru, Githambo
43	UGANDA(*)	Mpanga (river)	0.40	50.00	160	(1)Rwensory Commodities Ltd (2)James Findlay Ltd (3)Mpanga TF Ltd (4)TAMTECO	Buzirasagama Hyma Mundowa Kiko Mpanga Kiamara
44	UGANDA	Warugo (river)	2	100	1,500	(1)Uganda Tea Development Agency (2)James Finlay Ltd	Igara Ankole
45	UGANDA	Nchewera (river)	1	60	450	(1)Uganda Tea Development Agency (2)James Finlay Ltd	Igara Ankole
46	UGANDA	Kandekye (river)	tbv	tbv	tbv	(1)Uganda Tea Development Agency (2)James Finlay Ltd	Igara Ankole
47	MALAWI	Pwera (river)	0.7 to 1.4	90	500 - 1000	Eastern Produce Malawi Ltd	Limboli & 2 communities (Thakiwa & Maliera)
48	MALAWI	Chiluoguni (river)	0.7 to 1.4	200	500 – 2,500	Eastern Produce Malawi Ltd	Chisambo & 1 community (Songwe)

no°	Country	River	Average flow (m3/s)	Net head (m)	Installed power (kW)	Tea Company	Tea Factory
49	MALAWI	Upgrading Lujeri (river)	1	30	320 - 640	Lujeri Tea Estate	Lujeri Blommfield
50	MALAWI (**)	Upgrading Ruu (river)	0.65	100	650 – 1,300	Lujeri Tea Estate	Lujeri Blommfield
51	KENYA	Kimari		32	575	Unilever	Kimari
52	KENYA	Yala		116	4,691	EPK, Williamson, Nandi Tea Estates, Koisagat, KTDA	EPK : Savani, Kapsumbeiwa, Kipkoimet, Kepchomo, Chemomi, Siret, Kibwari, Williamson : Tinderet, Kapchorua, Kaimosi Nandi Tea Estates : Nandi, Koisagat : Koisagat KTDA : Mudete, Chebut
53	KENYA	Tagabi		33	450	Unilever	Unilever
54	MOZAMBIQUE	Malema	8.8	107	5,700	SDZ+JFS	UP-5-8-9-10-12
55	MOZAMBIQUE	Lua	24.5	17	2,500	Sonil Ltd	Cha Socone
56	MOZAMBIQUE	Licungo	1.28	335	2,500	CDM Ltd	UP 4-6

Appendix G: Preliminary Results Survey of Tea Factories

As of today, UNEP has received replies from 106 tea factories in the Eastern Africa Region, see attached list. There are no definite records with the East African Tea Trade Association, as some EATTA members are associations and therefore represent more than one tea factory but it is assumed that there are around 150 tea factories in the region. Some first observations:

- 1) Of the 106 tea factories it appears that 74 factories are aware of existing hydro potential at locations within 10 km away from the tea processing plant. In 32 cases there is either no hydro potential, or the hydro potential is not (yet known).
- 2) Fuel to meet Thermal Energy needs of tea factories: It is obvious that throughout the region tea factories generally grow their own wood fuel, generally considered to be a sustainable practice. In a number of cases wood is also purchased either from tea farmers (factories often distribute eucalyptus seedlings) or from third parties. Purchases especially from third parties are considered less sustainable (renewable).
- 3) With an odd exception, it appears that only factories managed by the Kenyan Tea Development Agency (KTDA) use fossil fuel (furnace oil) to meet thermal energy requirements of the tea factory. In Kenya there are around 55 KTDA tea factories that are each cooperatively owned by the tea farmers.

TableG1

Country	Tea Factory	Company	Quest. No.	Fuel	Hydro. Pot
Burundi	OTB	OTB	99	F + Wo + Wp	?
Kenya	Nyamache Tea Factory	KTDA	40	F + Wp	10
	Litein	KTDA	39	F + Wp	10
	Kathangariri Tea Factory	KTDA	38	F	5+10
	Ikumbi Tea Factory Co.	KTDA	43	F	3
	Imenti	KTDA	36	F + Wp	4
	Kapset	Kapset Tea Factory Limited	35	F + Wp+ Wo	3
	Theta	KTDA	34	F + Wp	?
	Keritor	Sasini Tea & Coffee Limited	33	Wo	?
	Nandi	Nandi Tea Estates	31	Wo	?
	Iriaini Tea Factory	Iriaini Tea Factory Limited	29	Wp	?
	Nyansiongo	KTDA	28	F + Wp	3 + 5
	Ngere Tea Factory	KTDA	26	F	10
	Ragati	KTDA	25	F + Wp	?
	Kymulot	James Finlay (Kenya) Limited	24	Wo	3+5
	Mara Mara	James Finlay (Kenya) Limited	23	Wo	3+5
	Changana	James Finlay (Kenya) Limited	22	Wo	3+5
	Kitumbe	James Finlay (Kenya) Limited	21	Wo	3+5
	Saosa	James Finlay (Kenya) Limited	20	Wo	3+5
	Chomogonday	James Finlay (Kenya) Limited	19	Wo	3+5
	Kiru Tea Factory	KTDA	18	Wo	20
	Arocket	Sotik Tea	17	Wo	3
	Mettarora	Sotik Highlands	16	Wo	5
	Maramba	Maramba	15	Wo	?
	Changoi	Williamson Tea (K) Limited	14	Wo	5+10
	Chagaik	Unilever Tea Kenya Limited	8	Wo	10
	Tagabi	Unilever Tea Kenya Limited	7	Wo	1+3+5+10
	Kericho	Unilever Tea Kenya Limited	6	Wo	3+5+10
	Kimari	Unilever Tea Kenya Limited	5	Wo	3+5
	Kimugu	Unilever Tea Kenya Limited	4	Wo	10
	Koruma	Unilever Tea Kenya Limited	3	Wo	10
	Mabroukie	Unilever Tea Kenya Limited	2	Wo	?
	Jamji	Unilever Tea Kenya Limited	1	Wo	1+3+10

Country	Tea Factory	Company	Quest. No.	Fuel	Hydro. Pot.
	Kanyenyaini	KTDA	44	F + Wp	5+10
	Kipkebi	Sasini Tea & Coffee Limited	45	Wo	?
	Nduti	KTDA	61	F	5
	Gathuthi Tea Factory	KTDA	60	Wp	10
	Siret	Kakuzi Limited	62	Wo	10
	Savani	Eastern Produce Kenya Limited	63	Wo	10
	Kapsumbeiwa	Eastern Produce Kenya Limited	64	Wo	1
	Kipkoimet	Eastern Produce Kenya Limited	65	Wo	?
	Kibwari	Kibwari Limited	66	Wo	10
	Kepchomo	Eastern Produce Kenya Limited	67	Wo	?
	Chemoni	Eastern Produce Kenya Limited	68	Wo	5
	Tinderet	Williamson Tea (K) Limited	72	Wo	10
	Karirana	Karirana	73	Wo + Wp	1 + 3
	Kaimosi	Williamson Tea (K) Limited	74	Wo	?
	Kiegoi	KTDA	75	F + Wp	?
	Kapchorua	Kapchorua Tea	76	Wo	?
	Kaisugu	Kaisugu Ltd.	78	Wo	20
	Kiamokama	KTDA	80	F + Wp	5 + 10
	Githongo	KTDA	81	F + Wp	5 + 10
	Kangaita	KTDA	82	F + Wp	5 + 10
	Mogogosiek	KTDA	83	F + Wp	3 + 5 + 10
	Rukiriri	KTDA	84	F + Wp	1 + 10
	Nidma	KTDA	85	F + Wp	10
	Kinoro	KTDA	86	F + Wp	3
	Kionyo	KTDA	87	F + Wp	5 + 10
	Gacharage	KTDA	88	F + Wp	?
	Githambo	KTDA	89	F + Wo + Wp	?
	Weru	KTDA	90	F + Wp	5
	Kagwe	KTDA	91	F + Wp	1
	Kerugoya	KTDA	92	F + Wp	3 + 5 + 10
	Chebut	KTDA	93	Wo + Wp	10
	Kambaa	KTDA	94	F + Wp	5
	Kaptatet	KTDA	95	F + Wp	10
	Chinga	KTDA	96	F + Wo	1
	Gitugi	KTDA	98	F + Wp	3 + 5 + 10
	Njunu	KTDA	100	F + Wp	3
	Tegat	KTDA	106	F + Wp	3 + 5
	Sanganyi	KTDA	101	F + Wp	?
	Kebirigo	KTDA	102	F + Wp	10
	Kapkoros	KTDA	103	F + Wp	5
Malawi	Limbuli	Eastern Produce Malawi Limited	43	Wo	5+10
	Mini-mini	Eastern Produce Malawi Limited	42	Wo	5
	Ruo	Eastern Produce Malawi Limited	41	Wo	10
	Chinsunga	Makandi Tea and Coffee Estates Ltd	10	Wo + Wp	?
	Esperanza	Eastern Produce Malawi Limited	46	Wo	10
	Chisambo	Eastern Produce Malawi Limited	47	Wo	3+5+10
	Lauderdale	Eastern Produce Malawi Limited	48	Wo	3+5
	Gotha	Eastern Produce Malawi	49	Wo	?

Country	Tea Factory	Company	Quest. No.	Fuel	Hydro. Pot
	Kasembereka	Limited Eastern Produce Malawi	50	Wo	?
	Makwasa	Limited Eastern Produce Malawi	51	Wo	?
	Mianga	Limited Eastern Produce Malawi	52	Wo	?
Mozambique	UP-5	SDZ-CHA-SARAL	27	Wo	3
	Chazeiras de Mocambique LDA	Chazeiras de Mocambique LDA	13	Wo	10
Rwanda	Cyohoha-Rukert	Sorwathe s.a.v.l	32	Wo + Wp	10
Tanzania	Itona	Mufindi Tea Company Limited	30	Wo + Wp	50
	Kwamkoro	Amani-Muheza	9	Wo + Wp	10
	Katumba	Wakulima Tea Co Ltd.	77	Wp	5
	Kibena	Kibena Tea Ltd.	77	Wp	10
	Herkulu	Bombay Burmah	97	Wo	?
Uganda	Kijura	Kijura Tea Company	12	Wo + Wp	30-40
	Mpanga Growers	Mpanga Growers Tea Factory	11	Wo + Wp	?
	Igara Growers	Uganda Tea Development Agency	59	Wo + Wp	?
	Kayonza Growers	Uganda Tea Development Agency	58	Wo + Wp	10
	Mwenge	James Finlay (Uganda) Limited	57	Wo + Wp	50
	Muzizi	James Finlay (Uganda) Limited	53	Wo + Wp	3?
	Kiko	James Finlay (Uganda) Limited	56	Wo + Wp	?
	Bugambe	James Finlay (Uganda) Limited	55	Wo + Wp	15
	Ankole	James Finlay (Uganda) Limited	54	Wo + Wp	?
	Kiamara	TAMTECO	69	Wo + Wp	?
	Mityana	TAMTECO	70	Wp	?
	Toro/Kahuna	TAMTECO	71	Wo + Wp	?
	Mabale		104	F + Wo + Wp	1 + 3 + 5 + 10

Key

Wo – Wood Own

Wp – Wood Purchase

? – Hydro Potential not available or not known

Appendix H: Energy Requirements for Tea Processing

Total Electrical Energy Portfolio of Tea Production

TableH1

Country	Electrical Energy (kWh/tonne tea)	Electrical Energy Price (\$/tonne tea)
Kenya	590	60
Malawi	682	36
Mozambique	348	*
Tanzania	700	100
Uganda	743	118
Zambia*		
Burundi	*	65
Rwanda	120	*

Source: Scoping Reports, Innovation Energie Developpement (IED)

The cost of grid electricity is in general cheaper than electricity generated at the tea factories from diesel generators and thus in order to minimize costs diesel generators are operated for only a fraction of the total time required for tea processing. Diesel generators are operated only at times of necessity when grid electricity cannot be relied upon. The highest cost of thermal electricity can be seen in Kenya with \$0.49/kWh and the lowest is in Malawi at \$0.17/kWh. Grid electricity cost is highest in Rwanda at \$0.2/kWh and lowest in Mozambique at \$0.032/kWh.

It can be concluded from the figures in the tables that tea factories would be open to alternative forms of electrical energy that is cheaper than diesel generation and more reliable than the national grid electricity. The development of small hydropower plants to supply tea factories in the region can thus help the production process of the tea industry by lowering the cost of energy and ensuring reliable supply. It can also benefit the environment by displacing the need for thermal generation that is polluting and produces greenhouse gases.

Grid Electricity Cost for Tea Production

TableH2

Country	Grid Electricity Cost (\$/kWh)	Average Annual Grid Electricity Cost (\$)
Kenya	0.11	200,000
Malawi	0.043	*
Mozambique	0.032	*
Tanzania	0.084	130,000
Uganda	0.097	*
Zambia*		
Burundi	0.08	78,404
Rwanda	0.2	*

Source: Scoping Reports, Innovation Energie Developpement (IED)

Thermal Electricity Cost for Tea Production

Table H3

Country	Thermal Electricity Cost (\$/kWh)	Average Annual Diesel Consumption (litres)	Average Annual Thermal Electricity Cost (\$)
Kenya	0.49	15,000	15,000
Malawi	0.17	*	*
Mozambique	*	*	*
Tanzania	0.45	38,000	60,000
Uganda	0.23	*	*
Zambia*			
Burundi	0.29	34,153	38,299
Rwanda	0.27	*	*

Source: Scoping Reports, Innovation Energie Developpement (IED)

Apart from electrical energy, tea production requires considerable amount of thermal energy and in fact thermal energy requirements are much greater for tea production than electrical energy requirements. Tea factories mostly rely on firewood for their thermal energy requirements. Some factories especially in Kenya also use furnace oil and the average annual furnace oil consumption for a tea factory comes to around 560,000 litres. Average firewood requirement per tonne of tea made ranges from 1.3 tonnes in Uganda to 3 tonnes in Tanzania. Tea factories either have their own plantations for firewood supply or buy them. The cost of firewood in the countries ranges from \$7/tonne in Tanzania to \$29/tonne in Uganda and the existence of this wide variation in the cost of firewood between the different countries is unclear.

Thermal Energy Portfolio of Tea Production

Table H4

Country	Fuel Used	Thermal Energy Requirement (kWh/tonne tea)	Average Firewood Requirement (tonne/tonne tea)	Cost of Firewood (\$/tonne)
Kenya	Firewood, Furnace Oil	8,400	1.6	20
Malawi	Firewood	*	*	20.2
Mozambique		*	*	*
Tanzania	Firewood	*	3	7
Uganda	Firewood	*	1.3	29
Zambia		*	*	*
Burundi*		*	5 m ³ /t	*
Rwanda	Firewood	*	*	*

Source: Scoping Reports, Innovation Energie Developpement (IED)

A few of the tea factories in some of the countries have installed small hydropower plants to meet some of their electrical energy requirements. Three factories in Kenya, two in Malawi and one each in Tanzania and Rwanda have small hydropower plants. The largest installed capacity of SHP is 2.4 MW in James Finlay tea factory in Kenya. In most of the tea growing areas of these countries the terrain and rainfall ensures hydropower potential close to the tea factories. As mentioned, some of this potential has been harnessed but largely tea factories are yet to tap the hydropower potential in their vicinity. Small hydropower development would not only be beneficial for the tea factories but also for the environment.

Appendix I: Economic Analysis of Hydropower Investment for Tea Factories

Energy cost in tea production

Results of surveys at a number of tea factories in Kenya and other EATTA countries show that energy costs can be a major component of the cost of production of tea. At a typical factory in Kenya it was noted that the specific energy requirements to produce 1 kg of made tea are: 0.65 kWh of electricity and 1.8 kg of firewood.

At a price of US\$ 0.095 per kWh of KPLC electricity and \$0.032 per kg of firewood, this brings the cost of energy to $\$0.062 + 0.058 = \0.12 per kg of made tea. If we assume that the average cost of production of tea across factories is around US\$1.00 per kg of made tea, this would imply that energy makes up around 12% of the cost of production.

In factories that use fuel oil in place of some of the firewood, the thermal energy costs can be two times as high.³ This would increase the energy cost to $\$0.062 + \$0.116 = \$0.178$ per kg of made tea increasing the percentage energy cost to around 17% of total production cost which would now have increased to \$1.06 per kg of made tea.

Diesel consumption for power generation at the factories during interruption of the KPLC grid comes to an average of 13% of KPLC power consumption at Kenyan tea factories (IED/KTDA study). The cost of diesel generation is around \$0.20 per kWh at current prices of diesel. This supplemental use of diesel for electricity increases the cost of energy to $\$0.07 + \$0.060 = \$0.13$ per kg of made tea using firewood and $\$0.070 + \$0.116 = \$0.19$ using fuel oil. The unreliability of the grid, and the switchover to diesel backup, directly increases the total energy cost by 3 to 6%. The impact of this appears rather minor as it would increase the total cost of production of tea by less than 1%. However, there are additional costs from frequent interruptions on the grid in terms of wastage and lowered quality of the particular batch of tea under process at the time of the interruption. The financial losses incurred to the factory over the year from having to switch over to the diesel backup come to around 15% a year.

For factories that are not connected to the grid and must source all their electricity from diesel generators, the electricity costs go up to $0.65 \text{ kWh} * \$0.20/\text{kWh} = \text{US } 13 \text{ cents per kg}$, increasing total energy costs to: $\$0.130 + \$0.058 = \$0.19$ per kg of made tea using firewood for thermal energy resulting in the percentage energy cost climbing to 18% of total production cost which would now have increased to \$1.07 per kg of made tea. The percentage of energy costs in made tea would be significantly higher in factories that are both off-grid and also use fuel oil for thermal energy. However, the responses to the EATTA Questionnaires show that factories that are off-grid use firewood exclusively and not fuel oil for thermal energy.

We can see from this analysis that energy costs in Kenya range from 12% to 18% of the total cost of production (COP) of tea. It must be noted here that many corporate tea plantations set aside around a quarter of their estate lands or more to growing trees to meet their firewood needs. The prices used in the analysis above are based on market prices of firewood. While plantations are likely to produce their own firewood at a lower cost than the market, new opportunities are opening up, particularly in Kenya to sell the grown trees on the market as timber rather than to use it for firewood, at a substantially higher price. It is thus likely that the costs of thermal energy at tea estates will likely stay high and comparable to the expenses for grid electricity unless investments are made to install new boilers with higher efficiencies and more investment made to improve the insulation of the steam pipes.

Although these calculations show that energy costs in tea production should be less than 20% of project cost, actual surveys at tea estates in Tanzania and Uganda showed that costs can be as high 40%. This may be because of inefficiencies in the way energy is used in these factories. It could also be because the actual cost of diesel is much higher in areas where it has to be transported large distances across international borders and to the interior. The relatively high energy cost of production would make it immediately attractive for these tea factories to invest in small hydropower to substitute for the high cost of energy.

³ Eucalyptus is costed at \$2.22 per GJ in Kenya whereas fuel oil costs \$7.65 per GJ at current fuel costs. This gives a price ratio between the two fuels of 1: 3.44. However, the KTDA report shows that normally only one out of three boilers is fired with fuel oil with the other two burning firewood. Burning fuel oil in one boiler roughly doubles the cost of the fuel being used at the factory.

Hydropower investment analysis

Table 10 shows that in the case of the KTDA factories the IRR for the small hydropower investment can be around 14% for the option to develop the best three projects with a total power output of 5.5 MW producing 45 GWh per year. The assumption is, however, that while 21 GWh of power can be sold to the 8 tea factories at US cents 7.00 per kWh, the 'surplus' 24 GWh of energy would be purchased by KPLC at a price of US cents 5.48 per kWh.

Some of this 'surplus' power could be sold to local communities, instead of to KPLC, to meet a clear demand for rural electrification. The prices for the electricity to the communities at the assumed rates of 9.48 cents to commercial consumers and 4.18 cents to lifeline consumers could provide a similar revenue to the SHP operators as selling to KPLC on the energy sold, as long as the ratio of commercial customers to lifeline customers can be maintained at a ratio of 1:3 or higher. It would thus seem that rural electrification would be a good alternative to selling power to the national grid. However, rural electrification does not, unfortunately, present a uniform demand for power to the small hydropower plant. Most of the demand is concentrated during the peak hours of 7:00 PM to 10:00 PM with minimal demand during other times of the day. This means that the load factor of the power plant drops from around 0.48 when it is only supplying the tea factories to 0.43 when it also supplies a rural electrification load. This is because the power output of the SHP plants will have to be increased to 11.25 MW to meet the additional demand during peak hours from rural electrification. Once again, the system will only be commercially viable if KPLC will purchase the unsold energy. In fact the addition of rural electrification requires KPLC to purchase an even larger percentage of the produced energy. Even with KPLC purchasing the extra energy, the IRR comes down to 8.3% and 6.6% with the rural electrification component option since the additional cost of the distribution network have to be added to the project costs.

A second option for the electricity unsold to the factory could be for it to be used to meet thermal energy needs of the tea factories. In principle this could be a very attractive option as it would take away the dependency of having to sell power to KPLC to make the small hydropower projects financially feasible. The IED study has looked at replacing fuel oil used with surplus electricity produced by the small hydro plants. In the typical KTDA factory, while the monthly electricity purchased from KPLC averages at 170 MWh per month with a peak of around 200 MWh per month during the high season the electricity required to replace fuel oil comes to around 900 MWh per month.

The second option in Table 10 is to develop 4 small hydropower sites to generate 7.48 MW to produce 59 GWh, all of which would be used in the factories to provide both motive power and thermal energy. The IRR for this option looks quite attractive at 14.5% and even more attractive at 16% with sales of carbon credits through the Clean Development Mechanism (CDM) for replacing the use of greenhouse gas intensive fuel oil. The weakness of this option is that the IRR is dependent on the assumed price of US cents 7.00 per kWh for all electricity purchased by the tea factories, including that for thermal energy needs. While 7 cents per kWh is a very reasonable price for motive power needs, the electricity used for thermal needs must be priced lower as it is avoiding the use of fuel oil whose energy cost is 7.65 cents per GJ or 2.75 cents per kWh. The higher efficiency of the electric boiler over the fuel oil boiler might increase the effective cost of fuel oil displaced up to 3.30 US cents per kWh. Where firewood is being used to provide thermal energy, the cost of the fuel displaced by electricity would come to only one US cent per kWh. As a result, the IRR for this option will drop below the attractive level as this price is significantly less than the 7 cents per kWh used in the analysis. It is also lower than the 4.58 cents per kWh if the energy were to be sold to KPLC.

We can draw a number of conclusions from this analysis:

1. Energy costs should theoretically make up 12 to 18% of the cost of production of tea in EATTA countries, the main variation depending on the choice of fuels and the reliability of the grid. Use of fuel oil for thermal energy and longer periods of diesel backup increase energy costs. In practice some factories spend up to 40% of their production cost on energy. For these highly energy intensive factories, investment into energy efficiency and substitution by small hydropower would be immediately attractive.
2. While unreliability of the electricity grid supply increases cost of tea production, the bigger financial losses, in the order of 15%, are incurred through lowering of quality of the produced tea.

3. Small hydropower investment can benefit tea factories by increasing power reliability and reducing diesel costs. It can also provide rural electrification to neighboring communities and surplus energy can be used to replace fuel oil where it is used. However, the financial attractiveness of the SHP investment depends on the following parameters.
 - a. Rural electrification provides local benefits and increases the sustainability of the project; however it increases capital costs and also lowers the overall load factor of the SHP plant by increasing demand during peak hours and using small amounts of power during the rest of the day. In order to provide a reasonable return on investment, the capital cost of rural electrification needs to be covered by partial or full grants by the government or donors.
 - b. Surplus electricity from SHP plants can be used to meet thermal energy needs at the tea factory. However, the energy used in this way will be priced at the avoided cost of fuel oil or firewood, which comes to around US cents 3.30 for fuel oil and US cents 1.0 for firewood. Both these prices are lower than what the utility is likely to pay if the power can be sold to the national grid. Using electricity to meet thermal energy needs will mean a lower IRR than selling surplus power to the grid.
 - c. A key criterion for small hydropower to be financially attractive is for it to be able to sell the surplus power to the grid after the needs of the factories and rural electrification are met. This supports the barrier analysis that the largest barrier to the development of small hydropower in the EATTA countries is the market uncertainty for the excess energy.

Appendix J: Power Sector Information of the Various Countries

Kenya

i) Power Sector Information

Table J1: Institutional set-up of the power sector

Institution	Area of jurisdiction/ Function
Ministry of Energy	Energy policy formulation and development
Kenya Power & Lighting Company	National utility responsible for Electric power transmission and distribution and management of national electricity grid
Kenya Energy Generation Company (KenGen)	National utility responsible for electric power generation and management
Electricity Regulatory Board (ERB)	Regulation of electric power sub-sector
Independent Power Producers (IPPs)	Electricity Generation and sale to the national grid

iii) Country-wide Installed generating capacity by fuel

Table J2

Fuel/ source	Capacity in MWe (Year 2000-2004)				
	2000	2001	2002	2003	2004
Fuel oil	149	149	149	149	
Diesel	278	278	278	278	
Coal	Nil	Nil	Nil	Nil	Nil
Natural gas	Nil	Nil	Nil	Nil	Nil
Geothermal	45	58	58	128	128
Hydropower	674.5	677.2	677.2	677.2	677.3
Other renewables	0.4	2.4	0.4	0.4	0.4
TOTAL	1146.9	1164.6	1162.6	1232.6	

Source:

iv) Power generation mix by fuel

Table J3

Fuel/ Source	Power generated in MWh (year 2000 – 2004)				
	2000	2001	2002	2003	2004
Fuel oil					
Diesel					
Coal	Nil	Nil	Nil	Nil	Nil
Natural gas	Nil	Nil	Nil	Nil	Nil
Geothermal					
Hydropower	1325000	2402000	3120000	3259000	2869000
Other renewal	100	0	300	400	400
TOTAL					

Source:

v) National grid power plants & breakdown of individual installed capacity

Table J4

Name of power plant	Type of power plant	Fuel	Capacity (MWe)
Tana	Hydro		14.4
Wanjii	Hydro		7.4
Kambura	Hydro		97.2
Gitaru	Hydro		225.0
Kindaruma	Hydro		40.0
Small station	Hydro		6.3
Masinga	Hydro		40.0
Kimbera	Hydro		104.0
Turkwell	Hydro		106.0

Kipeyu stenn	Thermal	Fuel oil	63.0
Kipeyu Diesel	Thermal	Diesel	73.5
Fiat Nairobi South	Thermal	Fuel oil	13.5
Kipeyu GTs	Thermal	Fuel oil	60.0
Garis & Lama	Thermal	Diesel	4.2
Olkaria I	Geothermal		45.0
Olkaria II	Geothermal		70.0
Ngong Wind	Wind		0.4
REP Station	Thermal	Diesel	5.1
IberAfrica	Thermal	Diesel	56.0
Tsavo	Thermal	Diesel	74.0
Orpower	Geothermal		13.0
TOTAL			1118.0MWe

Source: Kenya Power & Lighting, 2005.

vi) Independent power producers

Table J5

Name of power plant	Type of power plant	Owner	Fuel	Installed capacity (MWe)	Contracted capacity (MWe)	Terms of contract (years)
IberAfrica	Thermal	IberAfrica	Diesel	56	56	Defunct
Tsavo	Thermal	Tsavo Power Co.	Fuel Oil	74	74	
Orpower	geothermal	Orpower Inc.	Geothermal	13	13	
Mumias Sugar	Cogeneration	Mumias Sugar co.	Bagasse	2		

Source:

viii) Electricity demand/consumption

Table J6

Type of customer	Electricity demand in 000 MWh (Year 2000 – 2004)				
	2000	2001	2002	2003	2004
Residential	679.0	768.0	831.0	892.0	956.0
Commercial	960.9	1105.9	1163.0	1255.0	1362.0
Industrial	1362.0	1514.0	1558.0	1679.0	1778.0
Agricultural	33.0	36.0	38.0	38.0	45.0
Others	59.6	61.2	65.8	62.2	60.7
TOTAL	3094.5	3485.1	3655.8	3926.2	4201.7

Source:

Malawi

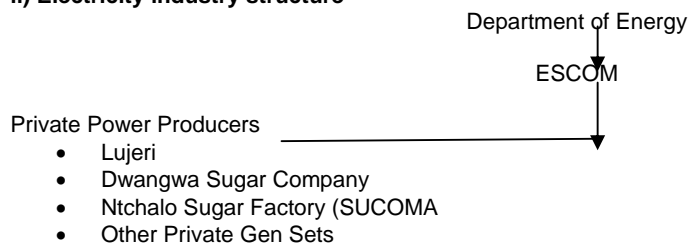
i) Power Sector Information

Institutional set-up of the power sector

Table J7

Institution	Area of jurisdiction/Function
ESCOM	National
Lujeri Tea Estate	For own use at the Tea Estate
Dwangwa Sugar Company	Cogeneration at the Sugar Factory
Ntchalo Sugar Factory (SUCOMA)	Cogeneration at the Sugar Factory
Private Gen Sets	Stand by Generators in major companies banks and donors

ii) Electricity industry structure



iii) Country-wide Installed generating capacity by fuel

Table J8

Fuel/Source	Capacity in MWe (Year 2000 – 2004)				
	2000	2001	2002	2003	2004
Fuel oil	none	none	none	none	none
Diesel	19MW	25MW	36MW	45MW	50MW
Coal	none	none	none	none	none
Natural gas	none	none	none	none	none
Geothermal	none	none	none	none	none
Hydropower	285MW	285MW	285MW	285MW	285MW
Other renewables	0.5MW	0.7MW	0.9MW	2.0MW	4.5MW
TOTAL	304.5MW	310.7MW	321.9MW	332.0MW	339.5MW

Source: Energy Policy, 2003

iv) Power generation mix by fuel

Table J9

Fuel/Source	Power generated in MW (Year 2000 – 2004)				
	2000	2001	2002	2003	2004
Fuel oil	none	none	none	none	none
Diesel	19MW	25MW	36MW	45MW	50MW
Coal	none	none	none	none	none
Natural gas	none	none	none	none	none
Geothermal	none	none	none	none	none
Hydropower	285MW	285MW	285MW	285MW	285MW
Other renewables	0.5MW	0.7MW	0.9MW	2.0MW	4.5MW
TOTAL	304.5MW	310.7MW	321.9MW	332.0MW	339.5MW

Source: Energy Policy, 2003

v) National grid power plants & breakdown of individual installed capacity

Table J10

Name of power plant	Type of power plant	Fuel	Capacity (MWe)
Nkula A and B	Hydro	Hydro	128
Tedzani 1,2 and 3	Hydro	Hydro	92.7
Kapichira 1	Hydro	Hydro	64
Wovwe	Hydro	Hydro	4.5

Source: ESCOM Annual Report, 2001

vi) Independent power producers

Table J11

Name of power plant	Type of power plant	Owner	Financing banks	Fuel	Installed capacity (MWe)	Contracted capacity (MWe)	Term of contract (Years)
Lujeri Tea Estate	Hydro	Private	Corporate office	Hydro	320 kVA	none	na
Dwangwa Sugar Company	cogeneration	Private	Corporate office	Bagasse	7	none	na
Ntchalo Sugar Factory (SUCOMA)	cogeneration	Private	Corporate office	Bagasse	14	none	na
Private Gen Sets	Thermal	Private	owners	Diesel	50	none	na

Source:

vii) Regulations for Independent hydropower generation and distribution

Table J12

Regulations	Requirements	Average time taken	Responsible authority
Licensing (generation)	For different capacity ranges		NECO (now to be MERA)
	Required for captive use or only for sales to utility		NECO (now to be MERA)
	Fees	n.a	NECO (now to be MERA)
	Valid time period	n.a	NECO (now to be MERA)
Licensing (distribution)	Allowed to distribute directly or must sell to utility	n.a	NECO (now to be MERA)
	Fees		NECO (now to be MERA)
	Subsidies available		NECO (now to be MERA)
	Valid time period	n.a	NECO (now to be MERA)
PPA	Standard offer or negotiation by project		NECO (now to be MERA)
Taxes and Levies	Customs on imported equipment	n.a	NECO (now to be MERA)
	Taxes on construction contracts, income taxes	n.a	Malawi Revenue Authority
	Royalty fees for use of site	n.a	NECO (now to be MERA)
Environmental Regulations	EIA (water rights, public hearing)		Environmental Affairs
	Ecological flow to be left in river after water diversion	n.a	Environmental Affairs

n.a - Not applicable

Source: New Energy Laws

Mozambique

i) Power Sector Information

Institutional set-up of the power sector

Table J13

Institution	Area of jurisdiction/Function
Ministry of Energy (ME)	EnerPolicy and regulation
National Directorate of Electric Energy (DNEE)	Policy and regulation
National Directorate of New and Renewable Energies (DNENR)	Policy and regulation
National Directorate of Fuels (DNC)	Policy and regulation
National Energy Fund (FUNAE)	Financing
Technical Unit for Hydropower Projects Implementation (UTIP)	Studies and projects implementation
Electricidade de Moçambique (EDM)	Public power utility
Petroleum of Mozambique (PETROMOC)	Public fuels distribution company

iii) Country-wide Installed generating capacity by fuel

Table J14

Fuel/Source	Capacity in MWe (Year 2000 – 2004)				
	2000	2001	2002	2003	2004
Fuel oil					
Diesel	198.8	198.8	127.33	127.33	127.33
Coal					
Natural gas					
Geothermal					
Hydropower	108.85	108.85	108.85	108.85	108.85
Other renewables					
TOTAL	307.65	307.65	236.18	236.18	236.18

Source: EDM Annual Statistical Reports (2000-2004)

Note: Data on hydropower here given do not include the ones of the hydroelectric scheme HCB, which produces 2075 MW, 300 MW of which are for internal consumption, and the rest for export.

iv) Power generation mix by fuel

Table J15

Fuel/Source	Power generated in GWh (Year 2000 – 2004)				
	2000	2001	2002	2003	2004
Fuel oil					
Diesel	41.6	42.6	33.8	33.5	38.6
Coal					
Natural gas					
Geothermal					
Hydropower	254.6	257.8	262.6	243.1	108.8
Other renewables					
TOTAL	296.2	300.4	296.4	276.6	147.4

Source: EDM Annual Statistical Reports (2000-2004)

Note: Data on hydropower here given do not include the ones of the hydroelectric scheme HCB, which produces 2075 MW, 300 MW of which are for internal consumption, and the rest for export.

v) National grid power plants & breakdown of individual installed capacity

Table J16

Name of power plant	Type of power plant	Fuel	Capacity (MWe)
Mavuzi	Hydro		52
Chicamba	Hydro		38.4
Corrumana	Hydro		16.6
Cuamba	Hydro		1.1
Lichinga	Hydro		0.75
Angoche	Thermal	Diesel	0.91

Beira	Thermal	Gas	12
Inhambane	Thermal	Diesel	6.12
Lichinga	Thermal	Diesel	1.844
Lionde	Thermal	Diesel	3.43
Maputo	Thermal	Gas	78.5
Tete	Thermal	Diesel	0.82
Mocuba	Thermal	Diesel	0.84
Cuamba	Thermal	Diesel	0.42
Nacala	Thermal	Diesel	9.9
Nampula	Thermal	Diesel	6.4
Pemba	Thermal	Diesel	8.5
Quelimane	Thermal	Fuel oil	6.88
Xai-Xai	Thermal	Diesel	2.67

Source: EDM Annual Statistical Report 2004 (some of them are inoperational)

Note: Data on hydropower here given do not include the ones of the hydroelectric scheme HCB, which produces 2075 MW, 300 MW of which are for internal consumption, and the rest for export.

vi) Independent power producers

Table J17

Name of power plant	Type of power plant	Owner	Financing banks	Fuel	Installed capacity (MWe)	Contracted capacity (MWe)	Term of contract (Years)
Hidroeléctrica de Cahora Bassa (HCB)	Hydro	Mozambique & Portugal			2,075	300	Long term

Source: HCB and EDM publications

vii) Regulations for Independent hydropower generation and distribution

Table J18

Regulations	Requirements	Average time taken	Responsible authority
Licensing (generation)	For different capacity ranges		Ministry of Energy
	Required for captive use or only for sales to utility		"
	Fees	n.a	"
	Valid time period	n.a	"
Licensing (distribution)	Allowed to distribute directly or must sell to utility	n.a	"
	Fees		"
	Subsidies available		"
	Valid time period	n.a	"
PPA	Standard offer or negotiation by project		"
Taxes and Levies	Customs on imported equipment	n.a	"
	Taxes on construction contracts, income taxes	n.a	Ministry of Finances
	Royalty fees for use of site	n.a	"
Environmental Regulations	EIA (water rights, public hearing)		Ministry for Coordination of Environmental Affairs
	Ecological flow to be left in river after water diversion	n.a	"

n.a - Not applicable

Source: Verbal information from the Ministry of Energy

viii) Electricity demand/consumption

Table J19

Type of customer	Electricity demand in MWh (Year 2000 – 2004)				
	2000	2001	2002	2003	2004
Residential (LV-Domestic)	391,904	442,121	413,935	411,420	447,428
Commercial (LV-Commercial)	119,776	129,349	132,218	131,607	131,610
Industrial (MV-HV)	444,414	429,839	449,013	494,783	496,435
Agricultural (LV-Big Consumers)	56,862	63,302	58,216	57,015	69,657

Agricultural (LV- Low consumers)					34
Others (Public Light)*	23,557	27,562	30,185	27,049	32,057
Others (EDM Consumption)*	10,863	15,871	15,249	10,829	10,172
TOTAL	1,047,376	1,108,044	1,098,816	1,132,703	1,187,393

Source: EDM Annual Statistical Reports (2000-2004)

LV - Low Voltage ≤ 1 KV

MV - Medium Voltage > 1 KV & ≤ 66 KV

HV High Voltage > 66 KV

* Not Invoiced

ix) Demand-supply forecast

Table J20

Forecast	Capacity in MWe (Year 2006 – 2010)				
	2006	2007	2008	2009	2010
Peak demand (Low Growth Scenario)	302.2	317.7	333.8	350.7	368.3
Peak Demand (Medium Growth Scenario)	396.3	438.9	482.9	518.9	556.6
Peak Demand (High Growth Scenario)	427.9	484.2	543.6	597.0	654.0
Supply					
- Fuel oil					
- Diesel					
- Coal					
- Natural gas			60	120	120
- Geothermal					
- Hydropower	466	511	516	516	551
- Other renewables					
Reserve Capacity (Maintenance, largest unit)	64	67	72	105	108

Peak Demand Includes 0.9 coincidence factor

Supply - Medium Load Growth Scenario considered

Source: EDM Electricity Master Plan Study 2004

x) Electricity selling price by utility

Table J21

Category	US cents/kWh
Agricultural	7.5
Residential	7.5
Commercial	9.0
Industrial	4.5
Others	

Source: Verbal information from EDM

Tanzania

i) Power Sector Information

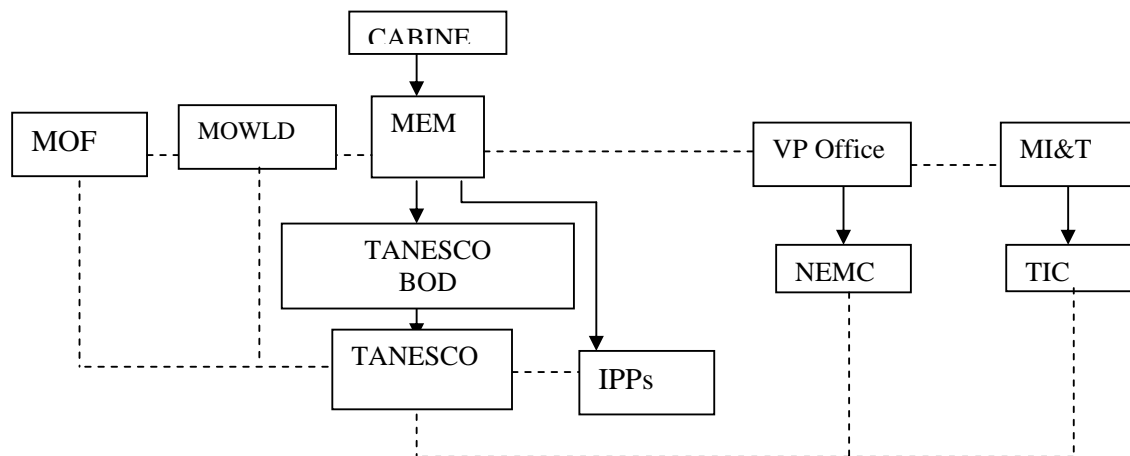
Institutional set-up of the power sector

Table J22

S/N	Institution	Area of jurisdiction/Function	Remarks
1	Ministry of Energy & Minerals	Energy Policy issues, Licensing	Government instrument
2	Ministry of Water and Livestock Development	Water Rights Issuance	Government Instrument
3	Tanzania Revenue Authority (TRA)	All Taxation issues	Government Agency
4	Energy & Water Utilities Regulatory Authority (EWURA)	Regulatory function for generation & transmission & distribution	EWURA Act 2001 in place, physical installation underway.
5	Rural Electrification Fund (REF)	The REF is to be a financial instrument that the REA will be able to use to stimulate the development of rural energy projects. It will provide capital subsidies to buy-down the cost of energy services, and to reduce the risks to project developers.	Not operational, Establishment Bill yet to be submitted to the Parliament. Currently their supposed functions are under MEM
6	Rural Electrification Agency (REA)	The REA is to be the institution with the task of facilitating the development of projects, which ultimately will be owned and implemented by private sector and other non-governmental and community organisations.	Not operational. Establishment Bill yet to be submitted to the Parliament. Currently their supposed functions are under MEM
7	Tanzania Investment Center	Facilitator for all Foreign Investors for all sectors	Operational
8	National Environmental Management Council (NEMC)	For all matters w.r.t Environmental impacts, gives clearance on compliance	Operational

ii) Electricity industry Structure *(Provide diagram here showing linkages between agencies)*

- CURRENT ELECTRICITY STRUCTURE IN TANZANIA



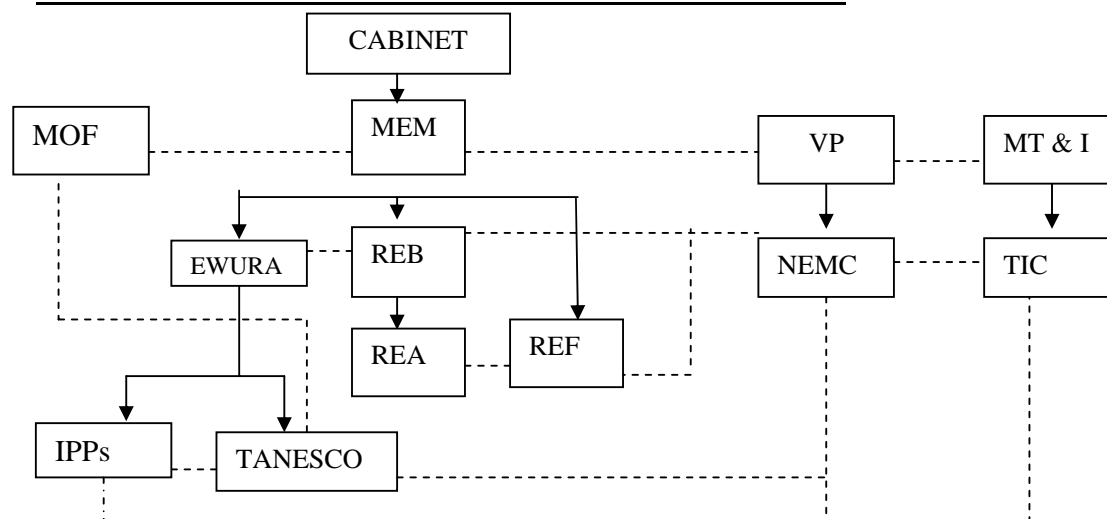
Key:

- CABINET: Council of Ministers
- MEM: Ministry of Energy and Minerals
- MOWLD: Ministry of Water and Livestock Development

- MOF: Ministry of Finance
 - MN&T: Ministry of Natural Resources and Tourism
 - MI&T: Ministry of Industries and Transport
 - VP: Vice President's Office
 - TANESCO: Tanzania Electric Supply Company Limited
 - BOD: Board of Directors
 - NEMC: National Environmental Management Council
 - TIC: Tanzania Investment Council
 - IPP: Independent Power producers
- • Line of Command
- Line of Communication

Source: Author's knowledge

- **POSSIBLE FUTURE ELECTRICITY STRUCTURE IN TANZANIA**



Key:

- CABINET: Council of Ministers
- MEM: Ministry of Energy and Minerals
- MOWLD: Ministry of Water and Livestock Development
- MOF: Ministry of Finance
- MN&T: Ministry of Natural Resources and Tourism
- MI&T: Ministry of Industries and Transport
- VP: Vice President's Office
- TANESCO: Tanzania Electric Supply Company Limited
- NEMC: National Environmental Management Council
- TIC: Tanzania Investment Council
- IPPs: Independent Power Producers
- REB: Rural Energy Board
- REA: Rural Energy Agency
- REF: Rural Energy Fund
- EWURA: Electricity and Water Utilities Regulatory Authority

Source: Some information extracted from the AFREPREN paper #310 by Mwiha, et al (June 2003)

iii) Country-wide Installed generating capacity by fuel

Table J23

Fuel/Source	Capacity in MWe (Year 2000 – 2004)				
	2000	2001	2002	2003	2004
Fuel oil	0	0	0	0	0
Diesel: grid (100 mw IPTL) + isolated	164	0	0	0	0
Coal	6	0	0	0	0
Natural Gas (SONGAS)	0	0	0	0	185
Geothermal	0	0	0	0	0
Hydropower (Kidatu, Kihansi, Mtera, Pangani, Hale, NYM)	561	0	0	0	0
Other renewable	27.06				
TOTAL	758.6	0	0	0	185

Source: Tanesco

iv) Power generation mix by fuel

Table J24

Fuel/Source	Power generated in MWh (Year 2000 – 2004)				
	2000	2001	2002	2003	2004
Fuel oil	n.a	n.a	n.a	n.a	n.a
Diesel (Grid & Isolated)	340,654.4	171,895.6	97,253.5	141,395..8	214,379.4
Coal (Kiwira)	23,004.1	18,798.2	16,435.5	17,489.2	1,040.9
Natural gas	n.a	n.a	n.a	n.a	101,298
Geothermal	n.a	n.a	n.a	n.a	n.a
Hydropower (Grid & Isolated)	2,147,739.10	2,559,843.71	2,670,939.30	2,493,079.29	2,013,227.03
Other renewable (Isolated – TANWAT by Biomass Fuel)	4,537.05	4,415.59	4,350.24	3,735.32	5,167.29
TOTAL	2,515,934	2,754,953	2,788.98	2,514.3	2,335.1

Source: Tanesco

v) National Grid Power Plants & Breakdown of Individual Installed Capacity

Table J25

Name of power plant	Type of Power Plant	Fuel	Capacity (Mwe)	Remarks
Kidatu	Hydro	Water	204	Com. Since 1975
Kihansi	Hydro	Water	180	Since 1999
Mtera	Hydro	Water	80	Since 1989
New Pangani Falls	Hydro	Water	68	Since 1995
Hale	Hydro	Water	21	Since 1964
Nyumba ya Mungu	Hydro	Water	8	Since 19?
- SUBTOTAL HYDRO			561	
IPTL	Thermal	Diesel	100	IPP (see vi)
SONGAS	Gas Turbine	Natural Gas	185	Since 2004, IPP (see vi)
ZUZU/Dodoma	Thermal	Diesel	7.4	Standby
TABORA	Thermal	Diesel	10.199	Standby
NYAKATO/Mwanza	Thermal	Diesel	12.5	Out/shutdown
Ubungo (TANESCO)	Thermal	Diesel	34	Available 7 MW
SUBTOTAL THERMAL			349	
GRAND TOTAL			910	

Source: Tanesco

vi) Independent power producers

Table J26

Name of power plant	Type of power plant	Owner	Financing banks	Fuel	Installed capacity (MWe)	Contracted capacity (MWe)	Term of contract (Years)
Songas	Gas Turbine	Songas Ltd by Canadian & Tanzania firms	?	Natural gas	181	?	?
IPTL	Medium speed Turbine	IPTL Ltd, Malasian Investors & VIP Engineering and Marketing	?	Diesel Fuel	100	?	20
Kiwira Coal Mine	Coal Fired Plant	Kiwira Coal Mine Co. Ltd	Chinese	Coal	6	?	?
Kilombero Sugar Company K1	Steam Turbine	Kilombero Sugar Company	?	Bagasse	0.6	?	?
Kilombero Sugar Company K2	Steam Turbine	Kilombero Sugar Company	?	Bagasse	3	?	?
Mtibwa Suga Estate	Steam Turbine	Mtibwa Suga Estate	?	Bagasse	4	?	?
Tanganyika	Steam	Tanganyika Planting	?	Bagasse	4.96	?	?

Planting Company	Engine and Steam Turbines	Company					
Kagera Sugar Company	Steam Turbine	Kagera Sugar Company	?	Bagasse	5	?	?
Sao Hill Saw Mill	Steam Turbine	Sao Hill Saw Mill	?	Saw Mill Waste	1	?	?
TANWAT	Biomass Fuelled Plant	Tanganyika Wattle Co. Ltd	?	Wood logs	2.5	?	?
TOTAL					308.06		

Source: Tanesco Ltd + Afrepren paper # 310 by Mwihava 2003

vii) Regulations for Independent hydropower generation and distribution

Table J27

Regulations	Requirements	Average time taken	Responsible authority
Licensing (generation)	For different capacity ranges	?	MEM
	Required for captive use or only for sales to utility		MEM
	Fees	?	MEM
	Valid time period	?	MEM
Licensing (distribution)	Allowed to distribute directly or must sell to utility	?	MEM
	Fees	?	MEM
	Subsidies available	?	MEM
	Valid time period	?	MEM
PPA	Standard offer or negotiation by project	?	MEM/TANESCO
Taxes and Levies	Customs on imported equipment	?	TRA
	Taxes on construction contracts, income taxes	?	TRA
	Royalty fees for use of site	?	LANDS MINISTRY
Environmental Regulations	EIA (water rights, public hearing)	?	NEMC
	Ecological flow to be left in river after water diversion	?	NEMC

Source: Author

- **Box 'X'**
- **TANESCO's TARRIF CATEGORIES**

Domestic Low Usage Tariff (DI)

This applies to domestic customers who consume very little electricity (below 50 kWh). The tariffs are subsidized and carry no service charge.

General Usage Tariff (T1)

This applies to general users of electricity including residential, small commercial light industrial, public lighting and billboards use. The tariffs apply where the average consumption is more than 236 (kWh) per meter reading period. Power is given at low voltage single phase (230V), and three phase (400V).

Low Voltage Usage Tariff (T2)

Applicable to general users where power is metered at 400 Volts and the average consumption is more than 7,500 kWh per meter reading period and demand does not exceed 500 KVA per meter reading period.

High Voltage Usage Tariff (T3)

Applicable to general users where power is metered at 11KV and above.

- **COSTS**

Domestic low usage Tariff (DI)

Tshs Low energy charge per kWh (0-50 kWh)

38/-

High energy charge per kWh (above 50 kWh)

115/-

General usage Tariff (T1)	Tshs
Service charge per month	1,700/-
Energy charge per kWh	95/-
Low Voltage Maximum Demand Tariff (T2)	Tshs
Service charge per month	6,300/-
Demand charge per KVA	6,900/-
Energy charge per kWh	63/-
High Voltage Maximum Demand Tariff (T3)	Tshs
Service charge per month	6,300/-
Demand charge per KVA	6,400/-
Energy charge per kWh	58.50/-
Source: www.tanesco.com	
Exchange Rate: 1 US\$ = TSHS 1149.88 as at December 19, 2005	

xiii) Hydropower industry Information
Table J28

	Names and contact	Capability (type of projects done in past)	Size of projects (MW, US\$)	Remarks
Hydro equipment Manufactures (turbines, penstock pipes, gates, controls)	A B B TANELEC LTD, P.O. Box 7156 Arusha. Tanzania			Electrical Contractors, Electrical Engineers, Switchgear Manufacturers & Suppliers only
	Tanzania Daesung Cable. Co., Ltd) PO Box 508 - Plot 31, Dar es Salaam - Tanzania			For Transmission and Distribution cables
	Tanzania Steel Pipes Ltd, Dar es Salaam. Tanzania			Penstock pipes
Civil Contractors (including experience in irrigation and other water conveyance systems)	Tanzania Building Works, P.O. Box 2962, Dar es Salaam.			
	Shabbirdin & Co. Ltd, P.O. Box 2235, Dar es Salaam.			
	M/S Lukumburu Investments, P.O.Box8651, Dar es Salaam.			
	Sound Contractors (T) Ltd, P.O. Box 78539, Dar es Salaam.			
	Gwemah Decorators Co. Ltd, P.O. Box 22231, Dar es Salaam.			
	Daka Contractors Co.Ltd, P.O. Box 1517, Dar es Salaam.			
Electrical Contractors (with experience in transmission and distribution lines)	M/S Vision Engineering & Technology, P.O. Box 23227, DSM.			
	M/S SNM Engineering Services Ltd, P.O. Box 71294, DSM			
	M/S TAN Country Power System Ltd, P.O. Box 76374, DSM			
	M/S Ngole Engineers Ltd, P.O. Box 60596 DSM.			For Transmission and Distribution Lines construction
	M/S Power Magic Electrical Contractors & Supplies Ltd, P.O. Box 40713, DSM			

	M/S L.J. Electrical Contractors & Engineering, P.O. Box 3046, DSM			
	M/S Si Compact Electricity, P.O. Box 70620, DSM			
	M/S Urban & Rural Engineering Services Ltd, P.O. Box 25101, DSM			
	M/S Siemens Tanzania Ltd, P.O. Box 1477, DSM			

Source: Personal communication

Uganda

i) Hydropower Industry Information

- Provision of the key small-hydro experts in tea industry and respective contacts

The list given below under section “Hydro equipment Manufactures (turbines, penstock pipes, gates, controls)” is not necessarily key small-hydro experts in tea industry but is a list of the manufacturing base in India for the full range and type of small hydro equipment. The hydro manufacturing establishments supply various types of turbines, generators, and control equipment to Uganda as indicate by Ministry of Energy & Mineral Development.

Table 1: List of Hydro Power programme Manufacturers, Civil and Electrical Contractors
Table J29

	Names and contact	Capability (type of projects done in past)	Size of projects (MW, US\$)
Hydro equipment Manufactures (turbines, penstock pipes, gates, controls)	1. M/s Bharat Heavy Electricals Ltd., Piplani, Bhopal-462022, Tel 0755-546100, 540200, Fax 0755-540425 Source: www: http://mnes.nic.in/shp90mnf.htm accessed on 06/01/2006: Small Hydro Power Programme-Manufactures	It has been not possible to get this information through out for the rest of blank spaces left	It has been not possible to get this information through out for the rest of blank spaces left
	M/s Bharat Heavy Eletriclas Ltd., Hydro power Commercial, Integrated Office Complex, Lodi Road, New Delhi-100 003, Tel 011-4698167, 4618215, Fax: 011-4626555, 4618837 2. M/s Boving Fouress (P) Ltd., Plot No. 7, KIADB, Industrial Area, Banglalore-562114, Tel 08111-71263/71455, Fax: 08111-71399, 080-8395176 3. M/s Sulzer Hydro, Sulzer Flovel Hydro Ltd., 13/1, Mathura Road, Faridabad-121 003, Tel 011-274319, Fax: 0129-274320 4. M/s Jyoti Ltd., Industrial Area, P.O., Chemical Indusiries, Vadodara-39003, Tel. 0265-380633, 380627, 381402, Fax: 0265-380671, 381871 5. M/s Steel Industrials Kerala Ltd., Silk Nagar, Athani P.O., Trissur (Kerala)-680771, Tel 048795-7335, 7360, 7735, Fax: 0487 40451 PCO, 048795-7732 6. M/s The Triveni Engg. Works Ltd., D-196, Okhla Industrial Area, Phase-1, New Delhi-110020, Tel 6811878, 6812930, 6819015 7. M/s Kirloskar Bros. Ltd., Udyog Bhawan, Tilak Road,		

Pune 411002, Tel 0212-453455, Fax: 0212-332780, 434198, 431156

8. M/s HPP Energy (India) pvt. Ltd., F-85 East of Kailash, New Dehli – 110 065, Tel 6289017/18/20/16, Fax: 011-6289019/6192787

Civil Contractors (including experience in irrigation and other water conveyance systems)

Source: Ministry of Energy & Minerals Development

Electrical Contractors (with experience in transmission and distribution lines)

Source: Ministry of Energy & Minerals Development

1. Salini Costruttori SpA, 00187 Roma, Italy, No. 39-6-677 6224 or 6776288

2. Impreglio SpA, Phone: (2) 262521, Via Marelli, 367, 20099 Sesto S. Giovanni (MI), Fax: (2) 262 27125

3. Energo Projekt Engineering & Contracting, Belgard, Yugoslavia

1. Siemens AG, Country Representatives: IET (U) Ltd., P.O. Box 23881, Kampala Uganda, Tel 256 (0) 41251105-6, Fax: 256(0) 41251107

2. Grichting and Valterio S.A 54, Rue Oscar Bider, C.P. 475, CH-1951 Sion

3. Pihl – KI Contractors JV, Nybrovej 116, DK-2800 Lyngby, Denmark, Tel: +45 45 27 72 00, Fax: +45 45 27 71 00

4. National Contracting Company Ltd., Al-Khobar – C.R. No. 2051001976, P.O. Box 90 Al-Khobar 31952, Kingdom of Saudi Arabia, Tel: (03) 882 5700 / 8829248, Fax: (03) 882 8827099, Email:

ncc@ncc.com.sa, Office No. 208, Diamond Trusr Building, Plot 17/19, Kampala Road, Kampala. Uganda, Tel +256 41 253154 / +256 71 555 700, Fax: +256 41 253 154

5. ABB SAE Sadelmi

Owen Falls Extension Project 200MW

Owen Falls Extension Project 200MW

Not states Not stated

Masaka-Mbarara 132kV Transmission Line

Kampala North-Lugogo 132kV Line

Owen Falls Power Station (OFPS) – Lugog-Mutundwe 132kV

Transmission Line Rehabilitation of Owen Falls – Tororo – Malaba 132kV Transmission Line

Masaka – Mutukula 132kV Transmission Line

ii) Financing framework

Key financial institutions involved in financing of hydropower (or tea estates)⁴

According to all respondents interviewed, there aren't any financing institutions involved in financing of small hydro power for use in tea factories. However, below are some examples of the areas that some financing institutions are involved in.

⁴ Assumption: banks that are already investing in tea estates could provide financing for hydropower projects through either 'balance sheet financing' or 'project financing'.

Table J30: Examples of Financing Institutions for hydropower and History

	Names and contact	Financing history (power projects and/or tea estates) ⁵	Rules, procedures, terms (interest rates, time)
Commercial Banks	N/A	N/A	
Development Banks (WB, ADB, EADB)	World Bank	<p>The 225 million USD Azito project in west Africa. It was funded by following institutions in conjunction with World Bank:</p> <ul style="list-style-type: none"> i) International Finance Cooperation (IFC) ii) Commonwealth Development Cooperation (CDC) iii) African Development bank (ADB) iv) Netherlands development financial company (FMO) v) German Investment and Development company (DEG) 	
	ADB	<p>The Tungu-Kibiri Community Micro-hydro Power Project in Kenya</p> <p>An 18kW project that costed US\$3,495 per kW installed</p>	
	Private-Public Partnerships	<p>For the case of Uganda, most of the hydro power projects are operated on a private- public partnership. In other cases, the government gives out a concession to a firm on a BOOT (Build Own Operate Transfer) arrangement. In such a case, it's the firm that then looks around for the different financers across the world . This applies for most hydro power projects in Uganda including Bujagali.</p>	
Others (UNEP, UNDP, bilateral aid, global funds, NGOs)	N/A	N/A	

Source: Ministry of Energy & Minerals Development

⁵ For Development Banks and Others include guarantee funds, soft loans, or refinancing.

Zambia

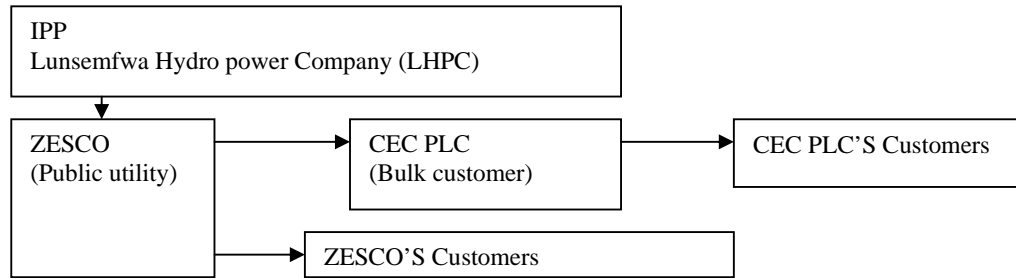
i) Power Sector Information

Institutional set-up of the power sector

Table J31

Institution	Area of jurisdiction/Function
Energy Regulation Board (ERB)	Regulation of all energy resources
Rural Electrification Authority	Rural Electrification
Ministry of Energy	Oversees the policy issues of the whole energy sector

ii) Electricity industry structure



ii) Country-wide Installed generating capacity by fuel

Table J32

Fuel/Source	Capacity in MWe (Year 2000 – 2004)				
	2000	2001	2002	2003	2004
Fuel oil					
Diesel	89.747	89.747		88.362	88.582
Coal					
Natural gas					
Geothermal					
Hydropower	1669.751	1669.75		1669.75	1669.75
Other renewables (Thermal)	20	20		20	20
TOTAL	1779.498	1779.497		1778.112	1778.332

Source: (ERB). All figures as at 31st March of the respective year as captured from ZESCO statistics year book of electric energy.

iii) Power generation mix by fuel

Table J33

Fuel/Source	Power generated in MWh (Year 2000 – 2004)				
	2000/01	2001/02	2002/03	2003/04	2004/05
Fuel oil					
Diesel	17,337		17,526	17,270	15,164
Coal					
Natural gas					
Geothermal					
Hydropower	8195776		8086879	8230952	8036630
Other renewables					
TOTAL					

Source:(ERB). These figures are for ZESCO's generation only. They don't include generation by other companies (i.e. Lunsemfwa Hydro Power Company, Copperbelt Energy Corporation and KCM plc). The figures were obtained from the ZESCO statistics yearbook of electric energy. 2004/05 implies April 2004 to March 31st 2005.

iv) National grid power plants & breakdown of individual installed capacity

Table J34

Name of power plant	Type of power plant	Fuel	Capacity (MWe)
KAFUE GORGE	HYDRO	Running water	900
KARIBA NORTH	HYDRO	Running water	600
VICTORIA FALLS	HYDRO	Running water	108
LUSIWASI	HYDRO	Running water	12

Source: ZESCO statistics yearbook of electric energy 2004/2005.

v) Independent power producers

Table J35

Name of power plant	Type of power plant	Owner	Financing banks	Fuel	Installed capacity (MWe)	Contracted capacity (MWe)	Term of contract (Years)
LHPC	HYDRO	Private		Water	38	27	

Source: (ERB). Requested information may be confidential, there may be need to contact the Independent Power Producers for a go ahead.

vi) Regulations for Independent hydropower generation and distribution

Table J36

Regulations	Requirements	Average time taken	Responsible authority
Licensing (generation)	For different capacity ranges	Varies	ERB
	Required for captive use or only for sales to utility	Case by case	ERB
	Fees	n.a	ERB
	Valid time period	n.a	
Licensing (distribution)	Allowed to distribute directly or must sell to utility	n.a	ERB
	Fees		ERB
	Subsidies available		Ministry of Energy and Rural Electrification Authority
	Valid time period	n.a	
PPA	Standard offer or negotiation by project		
Taxes and Levies	Customs on imported equipment	n.a	ZRA
	Taxes on construction contracts, income taxes	n.a	ZRA
	Royalty fees for use of site	n.a	
Environmental Regulations	EIA (water rights, public hearing)		ECZ
	Ecological flow to be left in river after water diversion	n.a	ECZ

n.a - Not applicable

Source: As laid down in different applicable laws;-Energy Regulation Act, Environmental Pollution Control Act, Zambia Revenue Authority Act

vii) Electricity demand/consumption

Table J37

Type of customer	Electricity demand in MWh (Year 2000 – 2004)				
	2000/01	2001/02	2002/03	2003/04	2004/05
Residential	1453068		1985530	2051822	2541530
Commercial			221388	268490	287399
Industrial			23215	24803	135905
Agricultural			82792	118601	110081
Others					
TOTAL					

Source: (ERB). ZESCO yearbook of electric energy

Rwanda

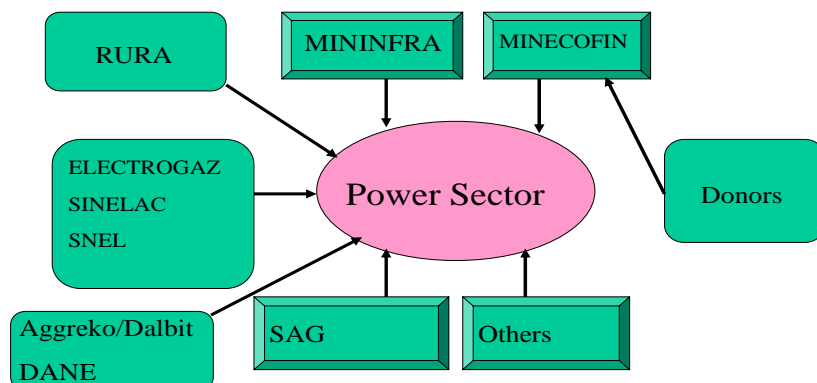
i) Power Sector Information

Institutional set-up of the power sector

Table J38

Institution	Area of jurisdiction / Fonction
1. Public institutions	
1.1. Ministry of Infrastructure/Directorate of Energy	In charge of Power Policy
1.2. Ministry of Finance and Economic Planning	In charge of Investment in sector of Energy
1.3. Rwanda Utility Regulation Agency (RURA)	Regulation and Licensing
2. Power Utilities	
2.1. ELECTROGAZ	Generation and Distribution of Power and Water
2.2. SINELAC	Generation of Power equally shared by DRC, Rwanda and Burundi
2.3. SNEL	Hydro Power Plant of DRC
3. IPPs	
3.1. DANE	Future power generation from methane gas
3.2. Aggreko/Dalbit	IPP with Thermal Power Generation as Rental Power
4.1. Entreprises	
RW Solutions (SAG)	Overhead Electric Line Construction
Entregele	Equipment dealer

ii) Electricity industry structure



iii) Country-wide Installed generating capacity by fuel

Table J39

Fuel/Source	Capacity in MWe (Year 2000-2004)					
	2000	2001	2002	2003	2004	2005 up December
Fuel oil	-	-	-	-	-	-
Diesel	0	0	0	0	9.6	22.57
Coal	-	-	-	-	-	-
Natural gas	-	-	-	-	-	-
Geothermal	-	-	-	-	-	-
Hydropower	38.5	39.12	38.6	36.7	25	15.3
Other renewables	-	-	-	-	-	-
TOTAL	38.5	39.12	38.6	36.7	34.6	37.87

Source: Electrogaz

iv) Power generation mix by fuel

Table J40

Fuel/Source	Power generated in MWh (Year 2000-2005)					
	2000	2001	2002	2003	2004	2005 up October
Fuel oil	-	-	-	-	-	-
Diesel	-	4.3	-	-	6,257	34,319
Coal	-	-	-	-	-	-
Natural gas	-	-	-	-	-	-
Geothermal	-	-	-	-	-	-
Hydropower	203	204.7	226	230	197,743	130,681
Other renewables	-	-	-	-	-	-
TOTAL	203	209	226	230	204	165

Source: Electrogaz

vi) National grid power plants & breakdown of individual installed capacity

Table J41

Name of Power Plant	Type Power Plant	Fuel	Capacity (MWe)
Mukungwa	Hydro	Water	12.45
Ntaruka	Hydro	Water	11.25
Gihira	Hydro	Water	1.84
Gisenyi	Hydro	Water	1.20
Gatsatal	Thermal	Diesel	1.8 (not in use)
Gatsata II	Thermal	Diesel	4.77

Jabana	Thermal	Diesel	7.8
Gikondo	Thermal	Diesel	10

Source: MININFRA

vii) Independent Power Producers

Table J42

Name of Power Plant	Type Power Plant	Owner	Financing banks	Fuel	Installed Capacity (MWe)	Contracted capacity (MWe)	Term of Contract (Years)
Rental Power I	Thermal	Aggreko/Dalbit	Private	Diesel	10	10	2

Rental Power I is operating since mi-October 2005

Source: Electrogaz

viii) Regulations for Independent Hydropower generation and distribution

Table J43

Regulations	Requirements	Average time taken	Responsible authority
Licensing (generation)	For different capacity ranges		
	Required for captive use or only for sales to utility		RURA
	Fees	n.a	RURA
	Valid time period	n.a	
Licensing (distribution)	Allowed to distribute directly or must sell to utility	n.a	RURA
	Fees		GoR
	Subsidies available		GoR
	Valid time period	n.a	GoR
PPA	Standard offer or negotiation by project		GoR
Taxes and Levies	Customs on imported equipment	n.a	Customs services
	Taxes on construction contracts, income taxes	n.a	GoR
	Royalty fees for use of site	n.a	GoR
Environmental Regulations	EIA (water rights, public hearing)		REMA
	Ecological flow to be left in river after water diversion	n.a	REMA

n.a: Not applicable

GoR: Government of Rwanda

REMA: Rwanda Environment Management Authority

Source: RURA

Development of Electricity Tariff since 1990 (without taxes)

Table J44

	1990	1991	1992	1993	1994	1997	2004
RwF/kWh	8.5	10.8	13.0	16.5	17.0	42.0	81.26

Since 1990 the electricity tariff has been a flat tariff except in 1997 the tariff of 70.0 was applied for MV consumers.

Monetary depreciation of the tariff in US dollar terms

Table J45

	1997	1999	2001	2004	2005	Dec, 1 st 2005
RwF/kWh	42.00	42.00	42.00	42.00	81.26	112.00
USc/kWh	13.79	12.02	9.15	7.23	14.25	19.60

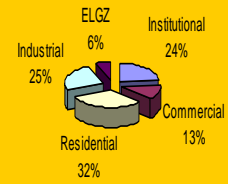
Source: EGZ

New generation Investment

Plant	Priority	Rwanda Share	Fuel	Capacity	Lead time (Years)	Approx Cost (\$m)	Cost \$m/MW
Lake Kivu	1	100%	Gas	25	2	25	1.0
Nyabarongo	2	100%	Hydro	28	4	77	1.5
Rusumo	3	33.3%	Hydro	61.5	5	170	1.5
Rusizi II	4	33.3%	Hydro	82	5	170	2.1

General overview

The Sectorial Electricity Consumption, 2003



Appendix K: Tea Industry Information of the various Countries

Kenya

i) Tea Factories and their Location

Table K1

Company	Location
KTDA (54)	
Chebut	Nandi Hills
Chinga	Nyeri
Gacharage	Maragwa
Gachege	Thika
Gathuthi	Nyeri
Gatunguru	Muranga
Gianchore	Nyamira
Githambo	Muranga
Githongo	Meru
Gitugi	Nyeri
Hyankoba	Kisii
Ikumbi	Maragua
Imenti	Meru
Iriaini	Nyeri
Kagwe	Thika
Kambaa	Thika
Kangaita	Kirinyaga
Kanyenyaini	Muranga
Kapkatet	Kericho
Kapkoros	Kericho
Kapset	Kericho
Kathangariri	Embu
Kebirigo	Nyamira
Kiamokama	Kisii
Kiegoi	Nyambene
Kimunye	Kirinyaga
Kinoro	Meru
Kionyo	Meru
Kiru	Muranga
Litein	Kericho
Makomboki	Maragua
Mataara	Thika
Michimikuru	Nyambene
Mogogosiek	Kericho
Momul	Kericho
Mudete	Vihiga
Mungania	Embu
Mununga	Kirinyaga
Ndimia	Kirinyaga
Nduti	Maragua
Ngere	Thika
Njunu	Thika
Nyamache	Gucha
Nyankoba	Kisii
Nyansiongo	Nyamira
Ogembo	Gucha
Ragati	Nyeri
Rukuriri	Embu
Sanganyi	Nyamira
Tegat	Kericho
Theta	Thika
Thumaita	Kirinyaga
Tombe	Nyamira
Weru	Meru
Unilever Kenya Ltd (8)	
Chagaik	Kericho

Tagabi	Kericho
Kericho	Kericho
Kimari	Kericho
Kimugu	Kericho
Koruma	Kericho
Jamji	Kericho
Mabroukie	Limuru
James Finlay Ltd (6)	
Kymulot	Kericho
Mara Mara	Kericho
Changana	Kericho
Kitumbe	Kericho
Saosa	Kericho
Chomogonday	Kericho
Eastern Produce Kenya Ltd (7)	
Savani	Nandi Hills
Siret	Nandi Hills
Kapsumbeiwa	Nandi Hills
Kipkoimet	Nandi Hills
Kibwari	Nandi Hills
Kepchomo	Nandi Hills
Chemomi	Nandi Hills
Williamson Tea Kenya (4)	
Changoi Tea Estate	Kericho
Tinderet Tea Estate	Songhor
Kapchorua Tea Estate	Nandi Hills
Kaimosi Tea Estate	Kaimosi
Sotik Tea Co. (2)	
Arocket	Sotik
Metarora	Sotik
Sotik Highlands (1)	
Sotik	
Kaisugu Limited (1)	
Kericho	
Ngorongo Tea Factory Ltd (1)	
SE Aberdares	
Karirana Tea Estates (1)	
SE Aberdares	
Nandi Tea Estates (1)	
Nandi Hills	
Sasini Tea & Coffee Ltd (2)	
Keritor	Sotik
Kipkebe	Sotik
Koisagat Tea Estate (1)	
Nandi Hills	
Kiptagich Tea Estate (1)	
Maramba Factory Ltd (1)	
SE Aberdares	

ii) Kenya Tea Production

Table K2

Month	Monthly Production				Cumulative Production			
	Monthly Production 2005 kgs	Monthly Production 2004 kgs	Monthly Production Variance	% Variance (+/-)	Cum. Production 2005 kgs	Cum. Production 2004 kgs	Cum. Production Variance	% Variance (+/-)
JANUARY	34,116,412	31,145,057	2,971,355	9.54%	34,116,412	31,145,057	2,971,355	9.54%
FEBRUARY	25,839,538	28,110,369	(2,270,831)	-8.08%	59,955,950	59,255,426	700,524	1.18%
MARCH	24,846,222	28,884,381	(4,038,159)	-13.98%	84,802,172	88,139,807	(3,337,635)	-3.79%
APRIL	29,115,120	29,381,625	(266,505)	-0.91%	113,917,292	117,521,432	(3,604,140)	-3.07%
MAY	28,781,242	28,387,185	394,057	1.39%	142,698,534	145,908,617	(3,210,083)	-2.20%
JUNE	24,045,399	23,978,132	67,267	0.28%	166,743,933	169,886,749	(3,142,816)	-1.85%
JULY	20,844,891	18,657,973	2,186,918	11.72%	187,588,824	188,544,722	(955,898)	-0.51%
AUGUST	21,789,639	18,885,279	2,904,360	15.38%	209,378,463	207,430,001	1,948,462	0.94%
SEPTEMBER	26,977,861	23,057,276	3,920,585	17.00%	236,356,324	230,487,277	5,869,047	2.55%
OCTOBER	32,258,551	27,423,830	4,834,721	17.63%	268,614,875	257,911,107	10,703,768	4.15%
NOVEMBER	30,080,980	32,067,682	(1,986,702)	-6.20%	298,695,855	289,978,789	8,717,066	3.01%
DECEMBER	29,801,769	34,629,781	(4,828,012)	-13.94%	328,497,624	324,608,570	3,889,054	1.20%
TOTAL	328,497,624	324,608,570	3,889,054	1.20%	328,497,624	324,608,570	3,889,054	1.20%

Malawi

i) Tea Companies and Factories and their Location

Table K3

Company	Tea Factory	District
Badanga Limited	Badanga	Thyolo
Chitakali (bankrupt)	Chitakali	Mulanje
Conforzi Plantations Ltd	Mboma	Thyolo
Eastern Produce Malawi Limited	Limbuli	Mulanje
	Mini-Mini	Mulanje
	Ruo	Mulanje
	Esperanza	Mulanje
	Chisambo	Mulanje
	Lauderdale	Mulanje
	Gotha	Thyolo
	Kasembereka	Thyolo
	Makwasa	Thyolo
	Mianga / Nasonia	Thyolo
Kawalazi Estate Company Limited	Kawalazi	Nkhata Bay
Lujeri Tea Estates Ltd	Nchima	Thyolo
	Bloomfield	Mulanje
	Lujeri	Mulanje
	Sayama	Mulanje
Makandi Tea and Coffee Estates Ltd	Chisunga	Thyolo
	Mindali	Thyolo
Namingomba tea estates Ltd	Namingomba	Thyolo
Satemwa Tea estates Ltd	Satemwa	Thyolo
Smallholder tea authority	Mateco	Mulanje
Tea research foundation	Nsuwadzi (out of order)	Mulanje
Zoa Tea Estate Ltd	Zoa	Thyolo

ii) Production Statistics for Made Tea (in kilograms)
Table K4

									SEASONAL YEAR				
AVERAGES					Previous Year (2004)		Current (2005)			2004/2005		2005/2006	
Month	10 year by month	Cumulative	5 year by month	Cumulative	Actual by month	Cumulative	Actual	Cumulative	Month	Month	Cumulative	Month	Cumulative
January	5,755,342	5,755,342	5,621,868	5,621,868	5,538,497	5,538,497	7,189,376	7,189,376	July	1,039,456	1,039,456	652,602	652,602
February	6,128,963	11,884,305	6,249,750	11,871,618	6,305,920	11,844,417	6,711,718	13,901,094	August	2,313,990	3,353,446	1,047,480	1,700,082
March	6,450,097	18,334,402	6,650,394	18,522,012	7,734,096	19,578,513	7,199,017	21,100,111	September	3,898,269	7,251,715	1,294,306	2,994,388
April	5,277,749	23,612,151	5,413,870	23,935,882	5,917,947	25,496,460	3,974,183	25,074,294	October	1,886,772	9,138,487	1,264,343	4,258,731
May	3,211,602	26,823,753	3,239,301	27,125,183	3,783,815	29,280,275	1,885,495	26,959,789	November	2,941,613	12,080,100	1,516,710	5,775,441
June	1,390,702	28,214,455	1,365,229	28,540,412	1,388,493	30,668,768	1,124,013	28,083,802	December	7,340,692	19,420,792		
July	823,765	29,038,220	855,549	29,395,961	1,039,456	31,708,224	652,602	28,736,404	January	7,189,376	26,610,168		
August	1,169,867	30,208,087	1,336,731	30,732,692	2,313,990	34,022,214	1,047,480	29,783,884	February	6,711,718	33,321,886		
September	2,095,977	32,304,064	2,351,370	33,084,062	3,898,269	37,920,483	1,294,306	31,078,190	March	7,199,017	40,520,903		
October	1,665,757	33,969,821	1,840,771	34,924,833	1,886,772	39,807,255	1,264,343	32,342,533	April	3,974,183	44,495,086		
November	1,599,803	35,569,624	1,848,612	36,773,445	2,941,613	42,748,868	1,516,710	33,859,243	May	1,885,495	46,380,581		
December	4,975,332	40,544,956	5,196,984	41,970,429	7,340,692	50,089,560			June	1,124,013	47,504,594		
Total	40,544,956	40,544,956	41,970,429	41,970,429	50,089,560	50,089,560			Total	47,504,594	47,504,594		

iii) Installed Small Hydro Plants in Tea Factories

Ruo Scheme

Table K5

Site	Net head (m)	Rated flow (m3/s)	Installed capacity (kVA)
Ruo	100	0,630	650

	Unit 1	Unit 2	Unit 3
Penstock Diameter	12" (300mm)	12" (300mm)	15" (380mm)
Turbine Turbine Manufacturer Power Rating Operating Head Rotational Speed Order No.	Gilkes 232 bhp (174 kw) 365' (111,25m) 1000 rpm 4617 (1946)	Gilkes 232 bhp (174 kw) 365' (111,25m) 1000 rpm 4029 (1934)	Gilkes 300 bhp (225kw) 355' (108,2m) 1000 rpm 5534
Generator Generator Manufacturer Power Rating Power Factor Voltage Rating Current Rating Mode Frequency Order No.	G.E.C. 200 kVA 0,8 410V 282A 3 Phase 50 Hz W0 56 865/I	G.E.C. 200 kVA 0,8 410V 282A 3 Phase 50 Hz B4 04 329	G.E.C. 250 kVA 0,8 400 / 440V 360 / 328A 3 Phase 50 Hz ST 19775/1
Transformer Transformer Manufacturer Voltage Step-Up Current Step-Down Power Rating	G.E.C. 440V / 6,6 kV 262A / 17,5A 200 kVA	G.E.C. 410V / 6,6 kV 262A / 17,5A 200 kVA	G.E.C. 410V / 6,6 kV 282A / 17,5A 250 kVA
Operating Condition On 15 February 2001 Voltage Cos Current Power Output Rotational Speed Reading Intake Pressure Reading (Gauge Head)	420V 1,0 210A 153 kVA 1000 rpm 375' (114,3m)	420V 1,0 240A 175 kVA 1100 rpm 370' (112,8m)	415V 1,0 330A 237 kVA 1200 rpm 375' (114,3m)

Lujeri Scheme

Table K6

Site	Net head (m)	Rated flow (m3/s)	Installed capacity (kVA)
Lujeri	31	1,08	319

	Unit 1	Unit 2
Turbine Turbine Manufacturer Power Rating Operating Head Rotational Speed Order No.	J.M. Voith (1928) 150 kw - Assumed 29,2m 1000 rpm 9781	Gilkes 180 bhp (135 kw) 30,48m 1000 rpm -

<u>Generator</u>		
Generator Manufacturer	Metropolitan Vickers	G.E.C.
Power Rating	169 kVA	150 kVA
Power Factor	0,8	0,8
Voltage Rating	440V	400 / 440V
Current Rating	222A	217 / 197A
Mode	3 Phase	3 Phase
Frequency	50 Hz	50 Hz
Order No.	649 424	ST 19604/1
<u>Transformer</u>		
Transformer Manufacturer	G.E.C.	
Voltage Step-Up	440V / 6,6 kV	
Current Step-Down	262A / 39A	
Power Rating	300 kVA	

Mozambique

Tanzania

i) Tanzania Tea Production Facts Table K7

Tea Fact File	
Tea production	25 000 tonnes
Tea types	black
Percentage exported	70%
World production ranking	in the top 20
Tea first grown	1905
Market Value USD/kg (Nov 2005)*	1,05
Source : http://www.twinings.com/en_int/world_of_tea/tanzania.html and *EATTA website	

ii) Tea Companies and their Location Table K8

No	Company / Tea Factory	District in which Tea Factory found
1	Bombay Burmah Trading Corporation Ltd	
	i. Herkulu	East Usambara
	ii. Marvera	East Usambara
2	Dhow Mercantile/Lushoto Tea company	
	i. New Mponde	West Usambara
	ii. Lushoto	West Usambara
	iii. Lupembe	Njombe
3	East Usambara Tea Co Ltd	
	i. Kwamkoro	East Usambara
	ii. Bulwa	East Usambara
4	George William Tanzania Ltd	
	i. Chivanjee	West Usambara
	ii. Musekera Tukuyu	West Usambara
	iii. Balangai	West Usambara
	iv. Dindira	West Usambara
	v. Amabangulu	West Usambara
5	Kagera Tea Company	
	i. Kagera	Kagera
6	Kibena Tea Ltd.	
	i. Kibena	Njombe
7	Mufindi Tea Company Limited	
	i. Itona	Mufindi
	ii. Luponde	Njombe
8	New Mponde Tea Factory Ltd	

	i. New Mponde	West Usambara
9	Unilever Tea Tanzania	
	i. Kilima	Mufindi
	ii. Kibwele	Mufindi
	iii. Lugoda	Mufindi
10	Wakulima Tea Co Ltd	
	i. Katumba	Tukuyu
	ii. Mwakaleli	Tukuyu

iii) Electrical Energy Requirements of Selected Tea Factories
Table K9

Tea Factory	Annual Power Consumption-MWh	Maximum TANESCO Demand (KVA)	Diesel Generator Installed Capacity (kVA)	Diesel in MWh	TANESCO Annual Electricity Bill (USD)	Annual Diesel Costs (USD)
Kwamkoro	2 800	800	1 230	198	257 511	41 202
Lupembe	N/A	-	1 297	1320	-	343 348
Kibwele + Kilima	1 548	1 000	1 293	131	114 490	23 034
Lugoda	1 826	1 000	1 068	276	160 515	52 479
Kibena	2 850	1 800	893	207	241 652	4 292
Katumba	2 200	1 000	1 450	34	180 258	858
Herkulu	205	-	130	11	17 479	2 481
New Mponde	591	500	350	36	55 794	7 853
Bukoba	-			0	45 072	
Luponde	1 043	630	488	120	88 002	20 016

iv) Thermal Energy Requirements of Selected Tea Factories
Table K10

Tea Factory	Wood source	Wood consumption (tonnes)	Total thermal equivalent (kWh)	Annual Thermal Operation costs (USD)
Kwamkoro	Own Production & Purchased	10 540	55 651 200	72 961
Lupembe	Own Production, Tea Growers & Purchased	3 500	18 480 000	30 043
Kibwele + Kilima	Own Production	4 774	25 206 720	25 362
Lugoda	Own Production	-		57 963
Kibena	Purchased	9 000	47 520 000	85 500
Katumba	Tea Growers & Purchased	8 000	42 240 000	41 202
Herkulu	Own Production	1 795	9 480 346	92 556
New Mponde	Own Production & Purchased	2 600	13 728 000	2 232
Bukoba	-	1 860	9 820 800	-
Luponde	Own Production	3 714	19 612 138	19 785

v) Tea Production Statistics of 2005 in Kgs
Table K11

Producer	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Total
Ambangulu	20,960	-	-	-	-	-	-	-	-	-	-	20,960
<u>Bombay Burmah</u>												
Herkulu	38,298	39,592	28,298	36,149	44,789	13,516	8,696	10,073	0	84,257	86,699	390,367
Marvera	41,820	26,865	14,100	32,485	52,440	37,099	16,925	12,395	11,930	25,215	43,880	315,154
BBTC – Total	80,118	66,457	42,398	68,634	97,229	50,615	25,621	22,468	11,930	109,472	130,579	705,521
Balangai/Dindira	5,869	0	0	-	-	-	0	0		0	0	5,869
<u>Unilever Tea Tz. Ltd</u>												
Kibwele	453,585	346,870	361,359	381,132	443,526	262,241	70,670	0	117,607	391,087	309,550	3,137,627
Kilima	438,661	299,276	336,510	381,977	85,597	4,675	-	44,913	363,628	388,922	253,934	2,598,093
Lugoda	678,478	563,107	575,346	731,941	513,159	476,309	270,782	242,736	0	652,280	291,813	4,995,951
BBTL – Ttotal	1,570,724	1,209,253	1,273,215	1,495,050	1,042,282	743,225	341,452	287,649	481,235	1,432,289	855,297	10,731,671
<u>East Usambara Tea Co.</u>												
Bulwa	96,068	74,600	63,931	142,760	159,036	87,808	60,475	116,335	69,652	217,449	242,829	1,330,943
Kwamkoro	285,999	138,815	55,004	225,771	209,942	233,922	186,603	100,615	216,853	278,549	340,868	2,272,941
EUTCO – Total	382,067	213,415	118,935	368,531	368,978	321,730	247,078	216,950	286,505	495,998	583,697	3,603,884
<u>Mufindi Tea Co. Ltd.</u>												
Itona	545,148	421,326	596,093	470,216	311,517	219,952	82,061	100,057	137,790	427,290	260,714	3,572,164
Luponde	225,061	201,710	199,586	203,537	161,378	104,968	57,598	34,117	40,606	123,422	159,388	1,511,371
MTC – Total	770,209	623,036	795,679	673,753	472,895	324,920	139,659	134,174	178,396	550,712	420,102	5,083,535
<u>Tukuyu Tea Estates</u>												
Chivanjee	-	-	-			-				-	-	-
Musekera	-	-	-			-				-	-	-
Tukuyu - Total	-	-	-	-	-	-	-	-	-	-	-	-
Kibena Tea Ltd	44,191	346,861	418,758	345,156	285,348	279,529	95,564	88,854	68,931	201,378	140,457	2,715,027
Kagera Tea Co. Ltd	61,345	39,979	50,192	61,663	50,157	44,679	31,962	22,867	20,695	29,182	38,418	451,139
Wakulima Tea Co. Ltd	385,211	415,572	520,303	340,947	254,878	266,255	129,535	170,307	236,729	223,603	140,457	3,083,797
New Mponde Tea Factory	137,961	85,295	65,521	83,851	111,799	54,325	32,104	36,163	79,693	172,887	106,008	965,607
Lupembe Tea Factory	180,081	181,181	58,851	126,192	-	5,855	26,923	12,896	14,758	1,053	-	37,790
National Grand Total	3,638,736	3,181,049	3,443,852	3,563,777	2,683,566	2,091,133	1,069,898	992,328	1,378,872	3,216,574	2,415,015	27,574,800

Uganda

i) Tea Companies and Factories and their Location
Table K12

Company	Tea Factory	District
Dayalbhai Madanji & Co	Mityana	Mubende
Eagle Investments Ltd	Moniko	Jinja
James Finlay (Uganda) Limited	Mwenge	Kyenjojo
	Muzizi	Kibale
	Kiko	Kabarole
	Bugambe	Hoima
	Ankole	Bushenyi
Kijura Tea Company	Kijura	Kabarole
Mabale Growers Tea Factory Ltd	Mabale	Kyenjojo
Mpanga Growers Tea Factory	Mpanga	Kabarole
Mwera Tea Estates Ltd	Mwera	Mubende
Rwenzori Commodities Ltd	Munobwa	Kyenjojo
	Buzirasagama	Kabarole
	Hyma	Kyenjojo
	Kygumba	Kyenjojo
TAMTECO	Kiamara	Kabarole
	Mityana	Mubende
	Toro/Kahuna	Kabarole
Uganda Tea Development Agency	Igara	Bushenyi
	Kayonza	Kanungu

ii) Tea Production and Export Report for Year 2005 (Kgs)
Table K13

	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Cum.
Prdn 2005	2,836,452	1,634,305	2,342,512	4,386,665	3,159,451	4,199,425	2,710,944	2,642,274	3,278,560	1,884,257	2,194,716	1,005,290	32,274,851
Prdn 2004	3,511,113	2,347,653	2,687,112	3,434,180	3,684,847	3,432,938	1,416,213	1,452,752	3,479,809	4,958,685	2,597,716	2,702,077	35,705,095
Expt 2005	2,442,563	1,756,518	1,816,807	3,038,365	2,746,501	3,716,617	2,340,282	2,825,918	2,800,018	1,364,844	2,096,140	394,480	27,339,053
Expt 2004	3,251,128	2,674,024	2,494,065	2,879,046	3,451,075	3,814,938	2,108,746	1,195,834	1,602,692	2,126,459	2,186,314	1,901,240	29,685,561
Prx 2005	1.41	1.39	1.2	1.2	1.16	1.09	1.08	1.08	1.15	1.13	1.14	1.14	1.14
Prx 2004	1.36	1.36	1.3	1.3	1.3	1.32	1.33	1.31	1.34	1.32	1.25	1.28	1.27
Lsale 2005	78,976	53,557	108,554	78,472	126,024	98,958	97,806	111,507	70,843	62,961	54,889	59,398	1,001,945
Lsale 2004	99,065	79,731	44,675	102,162	94,567	105,007	102,903	41,760	102,096	86,484	66,242	57,903	982,595

Prdn: Production

Expt: Export

Prx: Prices

Lsales: Local sales

Rwanda

i) Tea Plantations and Factories Table K14

RWANDA						Plantation		Production TS (kg)	
Factory name	Tea Company	Region	Distance from Kigali	Year of establishment	Year of privatisation	Tea plantat. (Ha)	Tree plantat. (Ha)	Capacity (T/year)	Production in 2005**
Mulindi	OCIR-THE	Byumba	81	1962	-	2298		3200	2.600.769
Nyabihu	OCIR-THE	Gisenyi	130	1980	-	658		900	705.047
Rubaya	OCIR-THE	Gisenyi	150	1979	-	989		1200	1.617.877
Mata	OCIR-THE	Gikongoro	240	1981	-	956		1200	1.136.097
Kitabi	OCIR-THE	Gikongoro	188	1977	-	1000		1200	937.388
Gisakura	OCIR-THE	Cyangugu	240	1975	-	1295		1400	1.897.469
Shagasha	OCIR-THE	Cyangugu	263	1969	-	1578		1400	1.988.870
Gisovu	OCIR-THE	Kibuye	229	1983	-	1072		1200	1.248.463
Pfunda	Pfunda	Gisenyi	160	1972	nov-04	989		1200	1.226.141
Cyohoha-Rukert	Sorwathe	Kinshira	65	1978	?	1050		?	?
Nshili-Kivu	OCIR-THE	Gikongoro	296	1981	?	965		under constr	(Mata)
Mushubi	OCIR-THE	Gikongoro		?		?		-	-
Nyamugari	OCIR-THE	Ruhengeri	155	?		?		-	-
Gatare	OCIR-THE	Cyangugu		?		?		-	-
						12.850	0	12.900	13.358.121

ii) Energy Requirements
Table K15

RWANDA		Load		EGZ			Diesel Gen nom power (kW)				Boiler (kg/h)	
Factory name	Installed capacity (kW)	Peak load (kW)	Rated transfor. (kVA)	Planned transfor. (kW)	Capac. (kVAR)	n°1	n°2	n°3	n°4	n°1	n°2	
Mulindi			630	1.000								
Nyabihu	300?	120?	430	1.000	?	550	(230)	(230)	(60)	3.500	-	
Rubaya	500	350	500	1.000	?	650	-	-	-	2.600	-	
Mata			400	1.000								
Kitabi	700	<550	630	1.000	136	550	(360)	(360)	(360)	4.500	4.500	
Gisakura			1.000	1.000								
Shagasha			1.000	1.000								
Gisovu			630	1.000								
Pfunda	?	360	630	1.000	360	550	125	-	-	3.200	-	
Cyohoha-Rukert	1.000	800	1.000	?	?	651	470	275	60	14.500	7.000	
Nshili-Kivu	-	-	-	1000	-	-	-	-	-	-	-	
Mushubi	-	-	-	1000	-	-	-	-	-	-	-	
Nyamugari	-	-	-	-	-	-	-	-	-	-	-	
Gatare	-	-	-	-	-	-	-	-	-	-	-	
2.200		1.510	6.850	11.000	496	2.951	595		60	28.300	11.500	

iii) Energy Consumption and Costs

Table K16

RWANDA	EGZ consumpt. (2005)		Diesel consumption (2005**)			Firewood (2005**)		Energy and production costs (2005)				
Factory name	Active energy (kWh/yr)	Annual bill* (RWF/yr)	Running time (h/yr)	Fuel consum. (l/yr)	Annual bill* (RWF/yr)	Firewood consum. (ster)	Annual bill* (RWF/yr)	Production TS in 2005 (kg)	Total energy bill (RWF/yr)	Energy cost /kg TS (RWF/yr)	Electricity cost /kg TS (RWF/yr)	Diesel cost share
Mulindi								2.600.769				
Nyabihu	271.811	26.063.078	1.301	51.709	31.025.455	2.371	11.378.618	705.047	68.467.151	97	81	54%
Rubaya	629.820	60.391.424	2.918	153.910	92.345.891	5.641	27.077.236	1.617.877	179.814.552	111	94	60%
Mata								1.136.097				
Kitabi	364.909	34.879.755	3.965	135.206	81.123.709	2.908	13.960.145	937.388	129.963.610	139	124	70%
Gisakura								1.897.469				
Shagasha								1.988.870				
Gisovu								1.248.463				
Pfunda	1.219.418	116.926.107	0	0	0	4.183	20.078.836	1.226.141	137.004.944	112	95	0%
Cyohoha-Rukert	1.727.068	165.603.030	431,9	64.944	38.966.400	0	0	?	204.569.430			19%
Nshili-Kivu								-				
Mushubi								-				
Nyamugari								-				
Gatare								-				
	4.213.026	403.863.395	8.617	405.769	243.461.455	15.103	72.494.836	13.358.121	719.819.686	459	394	2

Appendix L: Small Hydropower Experience in South Asia

Micro-hydro powered mini-grids are often the least cost option to supply electricity and mechanical power to remote rural communities that are unlikely to be connected to the national grid in the near future. They produce constant power through the day and night and do not require storage of power as to intermittent renewables like solar PV or wind energy. They have the advantage over diesel of very low running costs once the initial capital costs can be covered. These systems typically provide power for milling and other productive uses in the day time and electricity for lighting in the evening. However, the load factor, defined as percentage use compared to full availability, on isolated electricity generators is generally less than 50% and this makes it expensive for users to pay the full cost of electricity supply. Government programs, as per their commitments to rural electrification, will often provide grants to buy down capital costs of micro-hydropower plants so that off-grid users do not have to pay electricity tariffs much higher than lifeline rates on the national grid. Active government programs exist in Nepal, Sri Lanka and Afghanistan to promote mini-grid electrification through micro-hydropower.

Larger systems in the mini (100-1000 kW) and small (1 MW to 10 MW) hydropower range can power small towns and industries, such as tea factories, through local grids. Demand from diverse commercial and industrial loads results in higher load factor for these larger systems, improving their financial viability, reducing or completely removing the need for a grant to make the project viable. Mini and small hydropower projects are used extensively in tea estates in Sri Lanka. The return on investment of a SHP project is thus sensitive to the percentage of the produced energy (kWh) that can be used in the tea factories. Mini hydro projects that substitute for electricity that the factory would otherwise have to purchase from the grid or would have to provide through burning diesel, can be financially very attractive.

The additional cost to produce power from a SHP plant 24 hours a day and year round is minimal. If there is a market to sell the produced energy beyond the demand from immediate users, this increases revenue at little additional expense. Market arrangements that allow projects to sell all the energy they can generate create a conducive environment to develop SHP. If the SHP plant is close enough (generally within 10 km), connecting it to the national grid provides a natural market for the surplus electricity. The grid is often able to avoid the use of fossil fuels, usually diesel or natural gas, by purchasing power from small hydro generators. Small hydropower can be competitive with larger hydropower and other generation on the national grid if it can sell its surplus power to the national grid. Government subsidy is generally not needed for these systems to be feasible. In fact these investments can be quite profitable and present an opportunity for commercial investment by the private sector, providing attractive returns on investment.

Worldwide there has been the most substantial growth in small hydropower development by the private sector in countries that have, as part of the power sector reform and liberalization process, publicized clear rules and a fixed price for the national grid to purchase all the electricity (kWh) that small Independent Power Producers (IPPs) produce. The fixed rates typically apply to systems below 5 MW or in some cases 10 MW. This pre-announced Power Purchase Agreement 'standard PPA' clause substantially reduces transaction costs and up front risks to prospective investors. The investor can submit the 'standard PPA' to a bank together with the site feasibility study without having to wait for a negotiated offer from the utility. The 'standard PPA' can often be identified as the single most important policy change that has resulted in dramatic increase in private investment into small hydropower, and similarly in other renewable energy sectors like wind energy or biomass generation. In countries like Thailand this takes the form of net metering, where an industry can connect their dedicated power generator to the grid and the meter registers net energy sold to the factory or fed into the grid every month.

The sections below describe the growth of private investments in small hydropower in two countries in South Asia: Nepal and Sri Lanka, of similar size and grid capacity to the EATTA countries included in this Brief. While China has the most extensive experience in small hydropower development to date of any country, the size of the country and the centrally planned governance structure makes the experience rather unique and not particularly relevant to the situation in Eastern and Southern Africa. The Nepal and Sri Lanka examples are meant to demonstrate the critical role of clear policies and the importance of measures to increase confidence of investors and banks in increasing private investment into the small hydropower sector.

Table L1

Country	Population (million)	GDP (billion \$)	Small hydro installed (MW)	Grid Capacity (MW)	Date of 'standardized PPA'
Nepal	26	5.9	57	614	1999
Sri Lanka	20	18.2	70	2,483	1996

Sources: Population and GDP figures obtained from HDR Statistics, 2003 data, www.statistics.gov.lk

Note: Plants below 10 MW are considered small. Small hydro in Nepal includes private sector (9 projects) and public sector (30 projects) invested projects.

Small Hydropower in Nepal

As a direct result of the liberalization in the power sector brought about by the Electricity Act (1992), international Independent Power Producers (IPPs) invested in two medium hydropower projects in 1995: the Khimti Hydro Electric Project (60 MW) and Bhote Koshi HEP (36 MW). The PPAs for these projects were negotiated on a case by case basis between the utility and the IPP. In October 1998, the government of the time announced that the national utility, Nepal Electricity Authority (NEA), would purchase all energy produced by small producers (5 MW or below) at a 'standard PPA'⁶. By early 1999, the first small hydro IPPs began to carry out feasibility studies and approach financial institutions with the standard PPA in hand. The first financial closure by local banks took place in 2000 and the Syange project (183 kW) was on line in January 2002 and the Piluwa Khola (3 MW) project by October 2003.

Even after the standard PPA was announced, prospective IPPs remained skeptical about the credibility of the utility's offer. There was only limited confidence that small hydropower could be developed into a profitable sector at the rates being offered. Support was provided by Winrock International and GTZ to entrepreneurs and their engineering consultants by sharing feasibility costs, providing free technical reviews of feasibility studies and site construction, and by helping them negotiate with the utility, banks and insurance companies.

After the 'standard PPA' was announced over 50 feasibility studies have been completed, 20 PPAs signed, 10 projects have reached financial closure, 7 projects have commenced construction resulting in 5 completed projects. The projects that were financed after the 'standard PPA' came into force are marked in bold in the table below. Once the barrier of market uncertainty for the produced electricity was removed through the standard PPA and developers gained confidence in the sector, hydropower has become attractive as an investment sector to both private developers and financing institutions, despite the ongoing insurgency in the countryside. All financing for these hydropower projects has come from local banks. Nepal has seen an investment by local banks of some \$47 million in new small hydropower projects in the last 7 years, of which \$13 million has gone to smaller projects under the 'standard PPA'.

Private sector investment in Small Hydro in Nepal

Table L2

Projects	Size (MW)	Date of Commissioning	Total cost (US\$M)	Local financing (US\$M)
Khudi	4.0	June 2006	\$6.36	\$4.47
Sisne	0.75	2006	\$1.4	\$0.99
Chaku	1.5	Jun 2005	\$1.64	\$1.15
Sun Koshi	2.6	Mar 2005	\$3.6	\$2.51
Rairang	0.5	2004	\$0.45	\$0.29
Piluwa	3.0	Oct 2003	\$5.5	\$3.16
Chilime	20	Aug 2003	\$30	\$19.86
Indrawati	7.5	2002	\$20.5	\$14.29
Syange	0.2	Jan 2002	\$0.3	\$0.16
Jhimruk	12	1995	\$20	Norwegian grant
Andhi Khola	5.1	1991	\$3.8	Norwegian grant

Note: Jhimruk and Andhi Khola have been privatized and are now operated by the Butwal Power Company.

Small Hydro Origins in Tea in Sri Lanka

Sri Lanka has many similarities with Kenya. The two countries compete neck to neck to be the third largest tea producer in the world. Colonial planters used micro- and mini-hydro plants on tea and rubber plantations in Sri Lanka in the late 1800's and early 1900's with some 500 plants reported to be functioning at the turn of the century. Many of these plants were located next to the tea factories and produced mechanical power to directly drive machinery in the factories. They began to produce power in the first few decades of the 20th century as electricity generation technology became more widespread. The electricity grid of the Ceylon Electricity Board (CEB) was extended to the plantations in the 1960s and low prices were offered to factories to increase the load on the grid. This resulted in the closing down of micro-hydro plants on the estates. In the 1980s increase in grid electricity prices as a result of increased fuel prices enhanced interest in reviving some of these plants. Some 60 plants were rehabilitated and began operating in tea estates to reduce electricity bills. These were found to be attractive investments as the costs of rehabilitation were relatively much lower than building a brand new project and returns on investment from the reduced electricity bills were high. Most of these plants were upgraded during the rehabilitation process but still remained smaller, typically 100-300 kW, than the peak demand for the tea factories and were able to use almost all the energy they produced right in the factory itself and buying power from the grid only during a few hours of peak demand.

As part of the liberalization in the power sector started in 1994 by the Sri Lankan government, in 1996 the CEB allowed grid connection of private small hydro (<10 MW) and issued a standard PPA starting in 1997 and revised annually. The rate on the PPA was determined by the avoided cost of fuel at the CEB thermal plants and tied to

⁶ The rate was Rs 3.00 (4 UScents) for the dry season and Rs 4.25 (5.7 UScents) with an escalation of 6% per year for 5 years on the local currency rate.

the international price of petroleum fuel. The international fuel prices were averaged over three years to avoid large spikes which often occur in petroleum prices. This means that private small hydropower developers are paid only for the energy (MWh) they produced and not for the capacity (MW) which they also contribute to the system. Despite this, returns on investment were found to be attractive with simple payback periods typically around 3-4 years or less. The published tariff is shown in the table below. It is likely that continued high petroleum prices will improve returns to investors even more.

PPA tariff rates in Sri Lanka paid to small hydropower developers by CEB

Table L3

	Dry Season (Feb-April) Rs/kWh	Wet Season (balance months) Rs /kWh
1997	3.38	2.89
1998	3.51	3.14
1999	3.22	2.74
2000	3.11	2.76
2001	4.20	4.00
2002	5.13	4.91
2002*	5.90	5.65
2003	6.06	5.85
2004	5.70	4.95
2005	6.05	5.30

US\$1 = SL Rs 100 so the Rs can be read as US cents.

The standard PPA was very effective in overcoming the market uncertainty barrier for larger small hydropower projects. The World Bank funded Energy Service Delivery (ESD) Project (1997-2002) played a crucial role in overcoming a second barrier: the financing barrier. ESD provided lines of credit for small hydropower projects through local banks participating in the project: Participating Credit Institutions (PCIs). Until ESD provided them the line of credit, local banks were very hesitant to invest in hydropower. The Renewable Energy for Rural Economic Development (RERED) is a continuation of the ESD project (2003- 2007) and has further expanded the small hydropower sector in Sri Lanka. Both ESD and RERED had GEF components to remove barriers standing in the way of off-grid micro-hydropower and solar home systems.

The table below shows a pipeline of 121 MW of small hydro projects either completed or under construction under the RERED. A more detailed listing of each small hydropower project under the RERED project is listed in Appendix C. Many of the hydropower projects being developed today have their beginnings in tea estates. Today these projects are being developed primarily to sell power to the national grid although most started out meeting the needs of the tea factories.

Small hydropower projects commissioned and under construction under the RERED in Sri Lanka

Table L4

Commissioned Year	Number of Project	Total kW	Average size of projects (kW)
2002	2	1,560	780
2003	2	4,470	2,235
2004	11	33,090	3,008
2005 and WIP	30	81,687	2,723
Total	45	120,807	2,685

WIP = work in progress

Policy Analysis

The successes in bringing substantial private investment into the small hydropower sector in Nepal and Sri Lanka were achieved through overcoming a number of key barriers. The most important of these are the barriers of Government Policy, Market Uncertainty, Investment Confidence, and Financing.

Both countries were going through a power sector reform process and opening up the sector to private sector investment. Both countries had effectively done away with the need of obtaining a license for development of small and micro-hydropower to meet the needs of rural areas where power was generated. First in Sri Lanka and then in Nepal the respective governments recognized the importance of small hydropower for its potential importance to contribute electricity generation for the grid. Sri Lanka already had an active 'estate hydro' sector with small hydropower projects reducing electricity bills of tea factories, from the mid 1980s onwards with

technical support from ITDG, and increasing access to reliable power. The 'standard PPA' announced in 1997 opened up the grid supply option as well. In Nepal the 'standard PPA' announced in 1998 was more central as other markets for power had been limited and the possibility of electricity sales to the grid overcame the Market Uncertainty.

Subsequent to the market uncertainty barrier being overcome, it was important to address the other two barriers: investment confidence and financing. The investment confidence barrier is the unwillingness of the private sector to invest in a project from a sector that they are not familiar with. The investor can not always be confident that the regulatory and market risks are really overcome until he tries it himself. Going through the process involves some early investments to conduct the feasibility study and time and effort to approach the utility for the PPA and credit institutions for a loan. These "pre-investment" expenses can pose a barrier disproportionate to their actual magnitude. Although the pre-investment expenses might be 5-10% of the total project investment, the large uncertainty at the early stage in the project about government regulations, the feasibility of the particular project itself, and finally the uncertainty that the investor can eventually find financing for the project can lead to investors shying away from committing to covering the pre-investment expenses and in effect from the sector itself.

After the first few investors can demonstrate the feasibility of the sector, this barrier is automatically removed for subsequent investors. For the first investors this barrier can be partially overcome by providing financial assistance to carry out feasibility studies and providing confidence in any studies the developer carries out by having them reviewed by experienced consultants. Secondly a new investor would like some confidence in the sector itself, that the projects can indeed be done within the time and resources predicted in the feasibility study. One way to provide this confidence is to see similar projects having been tried out by other entrepreneurs, in-country or in another similar country.

Finally financing is a major barrier to any infrastructure type of investment like small hydropower. Most commercial banks in-country are not used to providing loans to power projects. The sector is new to them and they do not have experience in carrying out due diligence for these projects. Commercial banks are generally not used to providing loans for projects that have a long construction time (hydropower projects will typically take around 2 years to build) or need a long payback period. These banks are seldom prepared to lend under a 'project finance' modality where the collateral is the value of the project itself.

In Nepal the investment risks for prospective developers were overcome through technical support provided by Winrock International and the Small Hydropower Promotion Project of GTZ. Risks to developers were partially mitigated through a 'cost-share' mechanism where up to half the investment of feasibility studies was shared by the project. The investment would be repaid by the developer when the project reached financial closure. This mechanism allowed the early risk to the investor to be reduced by half at the early stage of the project but was not a subsidy as it had to be repaid when the project was able to mobilize the full costs of the project, of which the pre-investment amount was a small percentage. Feasibility studies carried out by developers at their own expense were reviewed gratis by experienced consultants and inputs given to improve the project technically. Developers and hydropower consultants were also provided regular technical training. Risks to financing institutions were partially overcome by providing them assurances that the projects had been reviewed technically by a competent third party. The concept of project finance was also elaborated to banks interested in financing small hydropower projects. This included informing them about insurance instruments available in the market to reduce risks.

In Sri Lanka, the financing barrier was addressed through the World Bank ESD project (followed later by the RERED) which provided a line of credit to participating banks (called Participating Credit Institutions or PCIs). The fact that a World Bank project was carrying out due diligence on the small hydropower projects and was providing up to 80% of the project debt as refinance provided a lot of confidence to the banking sector. The investors in Sri Lanka apparently did not need too much support once the other two barriers were effectively overcome, most likely because they already had experience with estate hydro.

Table L5

Project Name and District	Location	PCI	Project Developer	Capacity kW	Status
Mini Hydro					
1. Atabage Oya	Udawalpala	DFCC	Agrodynamics (Pvt) Ltd	450	wip
2. Atabage	Udawalpala	DFCC & HNB	Hydrodynamics (Pvt) Ltd	2,000	Commissioned Dec 2004
3. Barcaple & Penrose Estate	Pasbage Korale	DFCC & Seylan	Didul (Pvt) Ltd	6,500	wip
4. Korawaka Oya	Pasbage Korale	DFCC	Suntack Power (Pvt) Ltd	1,500	wip

5. Palle Deltota	Deltota	DFCC	Weswin Power Galaha (Pvt) Ltd	950	wip
6. Sanquhar Estate	Udawalatha	HNB	Hydro Power Free Lanka (Pvt) Ltd	1,600	Commissioned 12 Dec 2003
7. Hulu Ganga	Panwila	HNB & CBC	Eco Power (Pvt) Ltd	2,870	Commissioned 3 Jun 2003
8. Delta Estate	Pussellawa	HNB	Hydro Power Free Lanka (Pvt) Ltd	1,600	wip
Sub-total Kandy District				17,470	
1. Maliboda Estate	Deraniyagala	CBC, HNB & NDB	Magal Ganga Power Co. (Pvt) Ltd	9,900	wip
2. Panakura Oya Minuwanella (expansion)	Deraniyagala	DFCC	Sunro Company (Pvt) Ltd	160	Commissioned 3 Jul 2002
3. Kandureliya	Deraniyagala	DFCC	Kandureliya Hydropower Ltd	750	Commissioned 26 Jan 2004
4. Wee Oya	Yatiantota	DFCC & NDB	Powerbase Technology (Pvt) Ltd	6,000	Phase 1 (2 MW) Commissioned In May 2005
5. Nakkawita	Deraniyagala	DFCC & HNB	Weswin Construction Nakkawita (Pvt) Ltd	1,200	Commissioned 17 August 2004
6. Miyanawita	Deraniyagala	HNB	Midland Energy (Pvt) Ltd	600	Commissioned Nov 2004
7. Gurugoda Oya	Galigamuwa	HNB & Seylan	Bhoruka Power Lanka (Pvt) Ltd	4,500	wip
8. Assupiniella	Aranayaka	NDB, CBC & HNB	Nividhu Assupiniella	4,000	wip
9. Ritigaha Oya	Yatiantota	NDB	Kalupahana Power Company (Pvt) Ltd	997	wip
10. Deiyaniwala, Gantelgoda Ela	Aranayaka	Sampath	Hydrojet	1,400	Commissioned Sep 2002
11. Amanwala	Yatiantota	Sampath	Hiran Power (Pvt) Ltd	1,000	wip
12. Kuda Oya	Aranayake	Seylan	Hydro Trust Lanka (Pvt) Ltd	2,000	wip
Sub-total Kegalle District				32,507	
1. Kiruwana Oya, Anilkanda	Kotapola	DFCC	Nilawalabase Hydropower (Pvt) Ltd	600	Commissioned 1 Feb 2005
Sub-total Matara District				600	
1. Kiriwaneliya	Norton Bridge	CBC & Sampath	Country Energy (Pvt) Ltd	4,650	wip
2. Henfold Estate	Nuwara Eliya	CBC, DFCC & HNB	Senok Mark Hydro (Pvt) Ltd	2,600	wip
3. Brunswick Estate	Maskeliya	DFCC & HNB	Maskeliya Plantations Ltd	600	Commissioned 18 Apr 2004
4. Kahawathura Oya	Ginigathhena	DFCC	Coolbawn Hydro (Pvt) Ltd.	1,200	wip
5. Kehelgamuwa Oya-Degampitiya	Ambagamuwa	DFCC & HNB	Pams Hydro (Pvt) Ltd	3,000	wip
6. Wewalthalawa	Kadawala	DFCC	Saman Jala Viduli Company (Pvt) Ltd	1,600	wip

7. Kadawala	Kadawala	DFCC	Blackwater Power (Pvt) Ltd	1,600	wip
8. Carolina Estate	Kadawala	DFCC	Unit Energy Lanka (Pvt) Ltd	6,000	wip
9. Sheen Estate	Kotmale	DFCC	Elpitiya Plantations Ltd	560	wip
10. Radella	Nuwara Eliya	HNB	Thalawakelle Plantations Ltd	200	wip
11. Henfold Estate	Nuwara Eliya	NDB & CBC	Senok Mark Hydro (Pvt) Ltd	2,600	wip
12. Labuwewa Oya	Nuwara Eliya	NDB & Sampath	Acqua Power (Pvt) Ltd	2,000	wip
13. Dunsinane	Kotmale	Sampath	Dunsinane Power Company (Pvt) Ltd	2,700	wip
Sub-total Nuwara Eliya District				26,710	
1. Didul	Pelmadulla	DFCC	Didul (Pvt) Ltd	9,000	Commissioned 27 May 2004
2. Gampolawalakanda	Kalawana	DFCC	Pantak Power (Pvt) Ltd	3,800	Commissioned 15 October 2004
3. Erathna	Kuruwita	DFCC, Sampath & CBC	Zyrex Power Co Erathna Ltd	9,900	Commissioned 15 Jul 2004
4. Gulumwana	Ratnapura	DFCC, Sampath & Seylan	Samangiri Hydroelectric Company(Pvt) Ltd	2,400	wip
5. Hemingford Estate	Kuruwita	DFCC	Hemingford Estate	180	wip
6. Seethagala	Balangoda	HNB	Energy Reclamation (Pvt) Ltd	800	Commissioned 16 Apr 2004
7. Rathganga-Phase I	Ratkurugala	HNB	Pan Asian Power (Pvt) Ltd	2,000	Commissioned 5 Jul 2004
8. Rathganga-Phase II	Rathkurugala	HNB		1,500	wip
9. Belihul Oya	Imbulpe	HNB	Ceypower Cascades (Pvt) Ltd	2,400	wip
10. Alupola	Wewalwatte	NDB, CBC & HNB	Eco Power (Pvt) Ltd	2,449	Commissioned 16 Jun 2004
11. Adawikanda	Kuruwita	Sampath	Alternate Power Systems (Pvt) Ltd.	6,500	
Sub-total Ratnapura District				40,929	
Total Hydro				118,216	
Wind				-	
Bio-Mass					
Walapane	Nuwara Eliya	NDB	Lanka Transformers Ltd	1,000	Commissioned Nov 2004
Total Bio-Mass				1,000	
Total Grid Connected (kW)				119,216	

Appendix M: A (global) Indication of Development Costs of Micro Hydropower Plants

Costs per kW installed capacity:

Between USD 1,000 – USD 1,500 low (very attractive site)

Between USD 1,500 – USD 2,000 medium (average site)

Between USD 2,000 – USD 3,000 high (complicated site)

- Civil works comprise about 50 % of the development costs. Main components are intake and sand trap, headrace and penstock. All civil works are site specific and depending on whether the scheme is high or low head;
- Electro-Mechanical equipment is about 35 % of the total development cost with as main components the turbine (~ 10 %), generation (~ 10 %) and control system and switchgear (~ 15 %);
- Engineering, planning and design etc. will add up to 15 % of the development costs.
- Transmission is not included as length of transmission lines varies.*

* Source: JAMPS (SECO/ENTEC), Jakarta 2004

Appendix N: Project Timelines for Project Development

Typical Timeline for Small Hydro Power Development (Where tea factory has own source of funds/Loans)

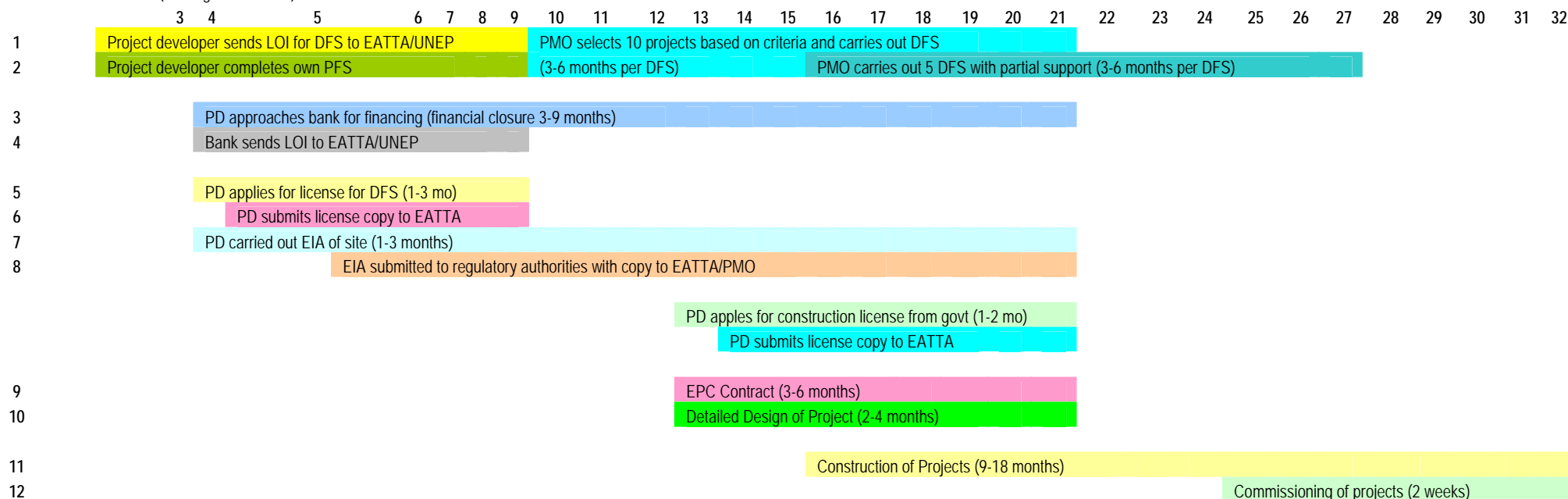
Table N1

Stage of development	Estimated Duration	Estimated Cost (US\$)	Potential EATTA/UNEP Project Support to Developers through the PMO
Reconnaissance study	1 week	Time and effort	Training and instructions
Pre-Feasibility Study	0.5 - 1 month	\$ 10,000 – 20,000	Review of pre-feasibility study
License application from Ministry of Energy/Regulator	1-3 months	Depends on country's laws/regulations	Provide information regarding license application requirements
Detailed Feasibility Study	3-6 months	\$ 70,000 – 120,000	- Conduct of detailed feasibility study on demand - Review of DFS carried out by external consultants
Environmental Impact Assessment (EIA) / Initial Environmental Enquiry (IEE)	1-3 months	\$ 5,000 - 10,000 (can be done in-house)	Review of EIA carried out by external consultants
Financial Closure*	3-9 months	\$ 5,000	Technical support to respond to financial institutions' requirements
Preparation of tender document and identification of Contractor	3-6 months	\$ 10,000 - 15,000	- Provide sample tender document - Review tender documents & tenders on demand
Detailed Engineering	2-4 months	\$ 25,000 – 60,000	Review detailed engineering design on demand
Project Construction	9 - 18 months	\$ 2 million per MW	Provide relevant technical support/advise during construction

* - Not applicable to tea factories using internally sourced funds
PMO - Project Management Office based at EATTA, Mombasa

Time line for first projects to be supported by EATTA-PMO

Months (starting March 2006)



PD Project Developer
PFS Pre-feasibility study
DFS Detailed feasibility study
EIA Environmental Impact Assessment
EPC Engineering Procurement Construction

Expenses for the different components

	Full cost	cost to PD	
PFS	\$15K	\$15K	
DFS	\$100K	\$30K	substantial support
		\$70K	partial support
			possible to do in house
EIA	\$5-10K	\$5-10K	
Detailed Engineering	\$50K	\$50K	
Survey license	time and effort		
Construction license	time and effort		
Project construction	\$2M/MW	30% equity 70% loan	

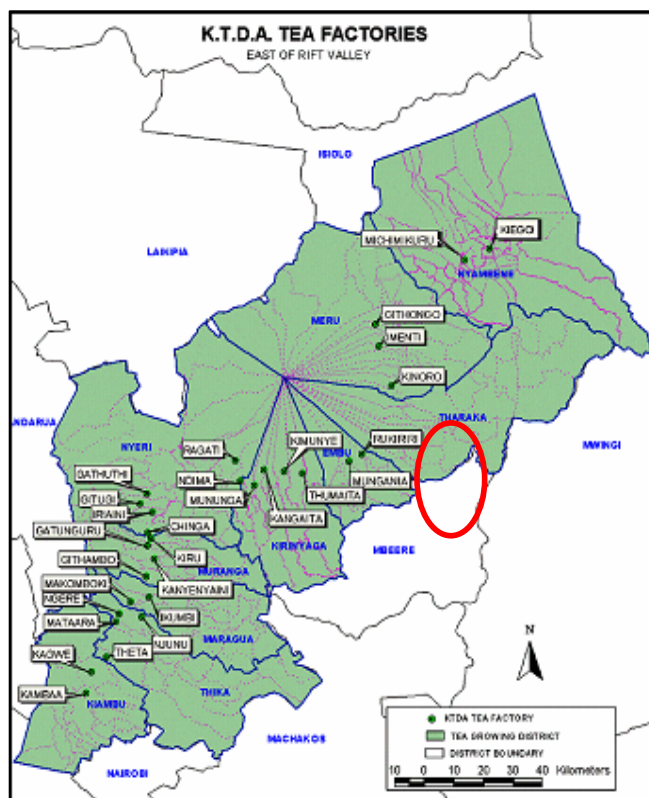
Appendix O: Summary Hydro Mission KTDA/ADEME, Northern Aberdares, Kenya

PRE-FEASIBILITY STUDY: SMALL HYDRO DEVELOPMENT IN TEA CATCHMENT AREAS OF KENYA

A team of experts from an international consultancy firm based in France, Innovation Energie Développement, IED, in collaboration with the Kenyan Tea Development Authority (KTDA) is working towards the identification of small hydro sites in tea catchment areas of Kenya.

The overall objectives are to tap local hydrological energy resources so as to increase the availability and reliability of power and reduce costs for tea factories which are members to the KTDA management scheme, and to ensure increased access to electricity services to communities residing in the proximity of the Tea Factories.

The work will act as a pre-feasibility study, it will comprise of the following main components:
technical pre-feasibility
demand analysis and load forecast (tea factories, surrounding villages, commercial activities, public services and households)
financial feasibility and
project packaging, including discussions with CDCF



The project as a first phase is looking at a cluster of 8 of Tea factories and their tea catchment areas situated in the eastern Aberdares region.

Githambo, Kanyenyaini, Gatunguru, Chinga, Kiru, Iriaini, Gitugi and Gathuthi Tea Factories fall within two zonal offices (Zone 3 and 4) as categorized by KTDA services. This cluster of Tea Factories is home to a total of 50,500 tea growers – equivalent to an approximate population of 252,500.

This brief, provides an indication of the findings to date, specifically in terms of the technical viability.

These findings result from a 10 day mission conducted between the 18th to 28th October 2004 by a team of 4 experts.

Technical Pre-Feasibility

The technical pre-feasibility study began by an in depth analysis of maps, hydrological and meteo data so as to pre-identify potential sites given the

location of the factories location and the natural potential of each rivers (mainly : head, discharge, FDC and geographical localization).

In proximity of the 8 Factories the hydrologic characteristics of the rivers, the topographic characteristics, the general lay-out (grid, roads), the natural risks and the main geological features were noted and following the global MHP schemes lay-out, the technical sizing, the potential power and yearly output, the technical feasibility, the implementation financial estimations and the optimization of each system were assessed.

The mission focused on nine rivers out of more than fifteen between Gathuthi (the furthest northern site) and Githambo (the furthest southern site). Amongst these, 7 MHP schemes have been identified with a significant potential shared between 5 rivers.

The 7 sites range between 0.15 to 2.5 MW, totaling an installed capacity of more than 10 MW, the local potential for MHP development is considered to be extremely optimistic.

Watershed areas for these rivers vary from 32 up to 117 km² and are characterized by smooth flow duration curves throughout the year. In addition, the geological and topographic conditions make the sites accessible posing little problem for implementation. The only complication identified is the need for long canals that would run on tea growers land, due to the small slope gradient of rivers.

To conclude, the relative homogeneity in the potential sites, make it feasible to supply the 8 tea factories and their surrounding communities, both considering a local private grid or a connection to the existing KPLC grid.

Appendix P: EATTA Status, Management Structure and Small Hydro Programme Implementation

East Africa Tea Trade Association is a voluntary membership organization that brings together Tea Producers, Buyers (Exporters), Brokers, Packers and Warehousemen, affording them a disciplined environment in which to interact commercially, and to promote the best interests of the trade in Africa. EATTA has been in operation for over 47 years representing tea stakeholders from Kenya, Uganda, Tanzania, Ethiopia, Rwanda, Burundi, The Democratic Republic of Congo, Malawi, Mozambique, Madagascar, Zambia and Zimbabwe. Tea Producer members are located in countries that produce tea in the region whereas Tea Buyers, Brokers, Packers and Warehousemen all operate from the port of Mombasa, where the Association is based. In some cases individual tea manufacturers are EATTA members, in other cases entire groups or associations are registered as single members. Example: In Kenya, the KTDA – Kenya Tea Development Agency – with 56 tea factories is classified as one single member. Current membership consists of about 280 member companies, with linkages to other key sub-sectors of the economy such as shipping, overland transport, packaging and banking.

The tea industry in the region relies on the East African Tea Trade Association to:

- Market its tea to the rest of the world through the Mombasa tea auction.
- Facilitate effective access to market and other relevant industry information
- Promote industry interests through proactive lobbying and advocacy measures.

The primary functions of the Association are:

- To promote the interests of the tea trade in Africa.
- To foster closer working relations among members of the tea industry.
- To establish facilities for the orderly sale of teas of African origin in a centralized format, at the international auction in Mombasa.
- To facilitate the settlement of disputes within the trade.
- To collect and circulate statistics and trade information, and to maintain such records as may be of assistance to members in the conduct of their business affairs.
- To act as a link, between the trade and government and related bodies.

The association has had remarkable successes in the past especially in marketing of teas through the Mombasa auction. The Mombasa auction center, established and managed by the EATTA is a success story. Unprecedented growth by over 300% in the last 20 years; Overtook Colombo as the world's largest tea auction center in 2004; Efficient auction operation and governance by EATTA; Good perception of service and delivery standards; Teas offered include those from several other African countries.

Mombasa is the only auction center in the world trading in straight-line teas originating from more than one country. Major tea producing and consuming countries focus attention on the weekly auction activities in Mombasa, which assist them to gauge market trends and to create benchmarks for international tea prices.

The affairs of the Association are monitored and directed by a Management Committee, which meets bimonthly. The committee consists of six producer representatives, six buyers, three brokers and one warehouseman, formally elected each year at the Annual General Meeting. The Management Committee elects its Chairman and Vice Chairman, co-opts additional members and appoints sub-committees as it may deem fit. Among the co-opted members is the Managing Director of the Kenya Tea Board. The Uganda Tea Association and Tea Association of Tanzania are each represented on the Management Committee.

The functions of the Association are coordinated by a Secretariat, which operates on funds raised from members' entrance fees and annual subscriptions. The Secretariat, which also houses the auction rooms, is based at the Tea Trade Center on Nyerere Avenue, Mombasa.

East Africa Tea Trade Association has not suffered any material adverse change in its business prospects or condition, nor, has it incurred any substantial or unusual loss or liability. East Africa Tea

Trade Association is not engaged in or, threatened by any litigation, arbitration or administrative proceeding, as plaintiff or defendant, the outcome of which might materially affect its business or financial position.

Up to this day, the EATTA has not (even) been engaged in any project that bears any similarity with the proposed “Greening the Tea Industry in East Africa”. It is proposed that UNEP (as Implementing Agency) collaborates with the EATTA (as Executing Agency) in the realization of the proposed tea factory based hydro project. A Steering Committee shall consist of representatives of the tea manufacturers, as represented in the EATTA – Board, but only of those countries that actually will participate in the execution of the Full Size Projects (actual demo project realized).

EATTA shall host a Project Management Office, in which (international) experts shall work on all the tasks defined, creating an enabling environment for mini-hydro development in tea factories, rural electrification, hydro pre-feasibility and feasibility studies including detailed design, training of technical staff in Civil Engineering and Electrical Engineering sector as well as tea factory technical staff and liaise with Ministry of Energy /Industry etc. and national utilities. After the PDF-B a number of tea factories shall be invited for actual demo project mini hydro power plant implementation. In that moment these shall be direct linkages between the EATTA Project Management Office and the individual tea factory. Hands-on training sessions shall be considered with the entire national tea sector as well as civil engineering/electrical engineering sectors (industry associations, consulting/engineering firms etc). The PDF-B experts are invited to design these procedures and linkages in detail.

Appendix Q: Minutes of Consultative Meetings

Regional Consultation Meeting Brief

Background

The Regional Consultation Meeting was convened by EATTA and UNEP/GEF on 13th – 14th February 2006 at UNEP Headquarters in Nairobi. The meeting was attended by participants from the tea sector in participating EATTA member countries, local and international financiers as well as project consultants. The objectives of the meeting were to:

- Provide information pertaining to the project and the tea sector
- Update participants on the status of the project and the next steps
- Present the findings of the scoping studies
- Present the criteria for selection of sites for full feasibility studies
- Explain the important role played by the tea factories as developers of the proposed small hydropower development
- Establish a forum for interaction with potential local, regional and international financiers

The meeting commenced with remarks from the chair and a brief session of participants' introduction. Peerke de Bakker (Programme Officer, Energy, UNEP/DGEF), then presented the meeting objectives. This was followed by the following presentations and panel discussion sessions:

Presentation on EATTA

This presentation was made by George Waireri, the Chairperson of EATTA Steering Committee. His presentation gave a background on EATTA, presented key achievements of the tea sector in Eastern and Southern Africa as well as notable challenges facing the tea industry in the region.

Overview of the project and current status

The project's Senior Technical Coordinator, Stephen Karekezi, presented on behalf of AFREPREN/FWD and EATTA. His presentation demonstrated the importance of the project to the tea industry, especially tea factories, and the benefits that would accrue to the industry if the project is implemented. He also indicated that preliminary findings strongly demonstrate a case for the project. Other key highlights in this presentation included the following:

- Major barriers identified in the project and measures to mitigate them
- Work progress and the status in the main outputs in the project
- Brief introduction to the project Expert's Team and their relevant past experiences

Proposed Project Implementation

Bikash Pandey, the Lead Small Hydro Expert, and Ashington Ngigi, a financial consultant hired to develop the financing mechanism for the project presented the proposed implementation plan. In his presentation, Mr. Pandey highlighted the potential of small hydro in EATTA member countries and the existing major barriers that hinder exploitation of small-hydro in the region and how the project is likely to overcome them. The barriers to be overcome include:

- Investor confidence in small hydropower development
- Technical capability in conducting feasibility studies and installations of small hydropower
- Appropriate models for public private partnership for rural electrification
- Regulatory framework supportive of small hydropower development
- Lack of a standard PPA

Mr. Pandey used the examples of micro-hydropower development in Nepal and Sri Lanka as success stories from which the small hydro projects in EATTA member countries can draw important lessons. Other key highlights in the presentation included the following. :

- Role of Project Management Office (PMO) in SHP implementation and financing

- Financing Modalities
- Potential sources of finance

Annex 4 provides the complete presentation of Mr. Pandey.

One of the key proposed financing options of the project was presented by Ashington Ngigi. He illustrated in detail how the “Clean Energy Fund for Agro-industry in Africa” (CEFA). His presentation highlighted the potential co-financiers, the operation and management of the fund as well as how the developers (tea factories) could obtain the requisite financing from it

Panel Session Discussion

After the presentations, there was a panel session during which the lead panelists made key observation pertinent to the workshop. After the panellists’ presentations, the chair opened the floor for any comments, clarifications or questions the workshop participants had on the issues presented by the presenters or panelists. The lead panellists’ remarks are summarized below:

Jackson Maina (Ag. Director, Renewable Energy department, Ministry of Energy, Kenya): Mr. Maina delivered a speech highlighting on the current status of electrification and challenges facing the electricity sector in Kenya. He highlighted the barriers to small, mini and micro-hydro systems in the East and Southern African region and current intervention measures the Government of Kenya has or intends to put in place to overcome them. Specifically, his speech addressed the legal and regulatory framework that is envisaged to create favourable environment for the successful implementation of the “Greening the Tea in East Africa” project especially in Kenya.

Ali Abdirizack, Group Development Engineer, KTDA: Mr. Abdirizack gave a brief overview of Kenya Tea Development Agency (KTDA). KTDA is a major stakeholder in the Kenyan tea industry. Currently, the Agency has 54 operational factories, which exist as clusters, and the number is expected to increase to 61 by 2008. Pre-feasibility studies on some of the company’s sites have shown that significant micro-hydro potential exists and is in excess of demand of the tea factories. He highlighted that these aforementioned pre-feasibility studies are included in the UNEP/EATTA project for consideration for full feasibility studies. The energy strategy of the company focuses on energy efficiency and alternative energy sources, mainly small-hydro where enormous potential has been shown to exist. In addition, Mr. Abdirizack further mentioned that the key challenge the company faces are addressing thermal energy requirements as due to the escalating cost of fuel oil and unreliable woodfuel supply.

Eng. Martin Ogada, Engineer, Unilever Tea Kenya: Mr. Ogada highlighted benefits the company has derived from the use of micro-hydro power plants installed. This is not only in terms of financial gains (savings estimated at US\$ 1 million per year) but also in electrifying about 2,000 rural households. In addition, Mr. Ogada stated that his company has about 3,000 hectares of fuelwood plantation and thereby adequately meets its thermal energy requirements.

Key Comments Questions and Issues Raised during the First Panel Session

- Peerke de Bakker informed participants that full feasibility studies to prove the commercial viability of the projects will be undertaken at the start of the project implementation phase.
- Ephraim Murenzi (First Counsellor, Rwandan Embassy) commented that the project comes at an opportune time when the region is experiencing drought. He further noted that Rwanda is experiencing chronic shortage of power and that unlike Kenya the potential for mini hydro in Rwanda has not been very well ascertained.
- Responding to Denis Measson’s question on whether tea factory representatives could react to the issues raised on the financing schemes, P.S. Shaw (Director General, Pfunda Tea Factory) stated that the financial models need to be simplified to make them easier to understand.
- Responding to Jackson Maina’s question on whether Unilever has a standard PPA arrangement with KPLC, Martin Ogada (company Electrical Engineer, Unilever Tea Kenya) stated that Unilever

has a 25-year licence to purchase power from KPLC through the interconnected system. This licence is renewable.

- Youssef Arfaoui (Renewable Energy Expert, Private Sector Department, AfDB) enquired if MoE, Kenya has set any specific commitments to facilitate the implementation of the micro-hydro project in Kenya, for instance PPA or any other conducive legal framework. The Ministry representative, Mr. Jackson Maina, indicated that the Government is considering putting in place policies to enhance micro-hydro projects in the country. So far, no PPA has been put in place for micro-hydro. However, there is PPA for thermal generation and further, the government is currently experimenting such an approach with wind energy.
- Regarding cost of developing micro-hydro, Youssef asked the lead expert, Bikash Pandey if power line expansion would significantly increase cost per kW. Mr. Pandey stated that normally, tea factories are fairly closely located to the generation source at a distance of less than 15 km and the distribution cost is reasonable. Stephen Karekezi further noted that some factories already have facilities, which mainly require rehabilitation to increase their efficiency.
- Hadija Shakombo enquired if due diligence could also be subjected on the other institutions involved in the project and not only on the fund borrowers (tea companies). In response, Mr. Ashington Ngigi clarified that all the institutions involved have to meet the required competence and qualifications.
- Responding to the question by Birju Sanghrajka (Head, Structured Finance-East Africa, Standard Chartered) on some of the difficulties encountered in Sri Lanka and Nepal cases, Mr. Bikash indicated that utilities are slowing down on signing PPA with power developers due to increased hydro-power supply. However, Bikash noted that the venture is still profitable due to replacement cost benefits.

Overview Status, Findings of the Pre-feasibility Studies and Criteria for Pilot Projects Selection

This presentation was made by Denis Rambaud Measson (Managing Director, IED). The following were the main highlights:

- IED's scope of work and status of progress
- Criteria used for selection of projects for pre-feasibility
- Methodology used for pre-feasibility studies
- Key preliminary findings of the pre-feasibility
- Proposed criteria for selection of sites for full feasibility studies
- Suggestions on the way forward

Presentations by Financial Institutions

African Development Bank (AfDB): Youssef Arfaoui (Renewable Energy Expert, Private Sector Department of AfDB) presented on the various types of financial instruments that the bank offers such as loans, guarantees, equities, lines of credit and loan syndicates. He further stated that the bank offers flexible and customised instruments and is currently considering renewable energy utilization as an appropriate response to energy needs in Africa. He emphasised that his AfDB was interested in supporting the UNEP/EATTA project.

Standard Chartered Bank: Birju Sanghrajka (Head, Structured Finance, East Africa) provided a background on Standard Chartered Bank and sectors the bank has provided financial assistance. Specifically, the bank is a major investor in agriculture in the region and has financed wind power projects through balance sheet lending and project finance.

Triodos Bank: Ashington Ngigi (Managing Director, Integral Advisory Limited), whose company is an affiliate of Triodos, gave a background on Triodos Bank and the various facilities that the bank offers.

Kenya Commercial Bank: Michael K. Kyambati (Corporate Relationship Manager) gave a background on KCB and the extensive coverage of the bank network. Mr. Kyambati mentioned that the bank is a major investor in tea, coffee as well as sugar sectors and has provided support to small-scale producers through a wide range of products such as 10-year loan facility with 2-year grace period.

Stanbic Bank: David Wafula (Relationship Manager, Corporate Banking) provided this presentation. Key areas mentioned included the bank's involvement in the tea sector and the various facilities that the bank offers.

Key Comments, Questions and Issues Raised during the Second Panel Session

- Peerke de Bakker explained that UNEP/GEF's sponsorship, on approval of the project for implementation phase, will be limited to a functional Project Management Office (PMO) and feasibility studies for the pilot projects. Investments by the tea factories and co-financing from other financing institutions will meet the cost of plant establishment. The role of the PMO will be to provide co-ordination and technical support. This was also in response to Ross Lindsay's question on what a factory needs to put in place before it can start soliciting funding for the project.
- Responding to Peerke's comment on whether standard PPA is a major requirement for project viability, Denis Rambaud Measson explained that due to replacement cost benefits, the project remains viable to tea factories. He, however, noted that in an ideal situation, a standard PPA makes a project more attractive especially where there is good hydrology. Bikash Pandey, adding to Mr. Measson's point, explained that a site may be attractive even where the electricity demand for a factory is less than production, plant design may ensure a-smaller-than-optimum-capacity production hence eliminating standard PPA complications, at least in the short run.
- Mr. Arfoui observed that bundling of the projects would make it more viable for the AfDB's funding. However, the bank can still evaluate the projects independently, on a case by case basis.

Project Timelines

Mr. Pandey gave a presentation on the various steps in developing a small-hydro power project. He also highlighted the specific roles of the envisaged Project Management Office (PMO) expected to coordinate the implementation phase.

Sustainable Agriculture in Unilever Tea Kenya

Mr. Kip-Utich Kaptich, General Manager, Technical and Development made this presentation on behalf of Unilever Tea Kenya limited. He highlighted major sustainable agriculture principles employed in the company, the indicators for measuring the sustainability, as well as the initiatives the company has taken or plans to undertake to ensure sustainability of Agriculture.

"Greening the Tea Industry in East Africa" Project Website

John Kimani (Assistant Technical Coordinator, AFREPREN/FWD) gave a brief presentation on the project website. The presentation highlighted the broad structure of the website, contents and how to access the website. Mr. Kimani also responded to questions from the workshop participants regarding accessing the website and its content.

Key Action Points on the Way Forward

Peerke de Bakker gave a summary of the key activities already undertaken and those yet to be undertaken during the current phase of the project. He also summarised the next steps as follows:

- Finalise estimation of small hydro potential through scoping and pre-feasibility studies
- Formal demonstration of interest by the tea companies through Letters of Interest/Support
- Prepare Logical Framework of Activities detailing the objectives, requirements and expected outcome of each activity
- Select of sites for full feasibility studies or pilot projects

- Assess global impacts of the pilot projects through CO₂ reduction as well as possibility of replication
- Establish a workplan to keep track of the project activities
- Get supporting statements/commitments from the relevant government Ministries
- Obtain endorsement letters from GEF focal points
- Letters of Interest/Support from the banking sector
- Have sample documents uploaded on the project website such as Letter of Interest/Support, Letter of Recommendations etc.

The following dates were highlighted as critical in the current project phase:

- **February 28, 2006:** Submission of final draft FSP Brief to UNEP/GEF for internal review
- **March 1 – 15, 2006:** GEF/STAP review of the proposal
- **March 16 – April 30, 2006:** Incorporation of review comments from STAP
- **May 1, 2006:** Submission of FSP-B proposal to GEF Council in Washington
- **June 6 – 9, 2006:** GEF Council meeting
- **September/October 2006:** Mobilization for the project implementation phase subject to approval

More on Regional Consultation Meeting: <http://greeningtea.unep.org/ConsultationMeetings>

Annex 1: Meeting Agenda



‘Greening the Tea Industry in East Africa Project’ Regional Consultative Meeting

13th – 14th February 2006
Nairobi, Kenya

Day 1: 13th February 2006

Chairperson: Mr. G. Ngugi Waireri, (EATTA)

- | | |
|--------------------------------|--|
| 8:30 a.m. – 9.00 a.m. | Registration |
| 9:00 a.m. – 9:15 a.m. | Remarks by Chairperson |
| 9:15 a.m. - 9:30 a.m. | Opening/Welcoming Remarks (<i>Olivier Deleuze, Officer-in-Charge, Division of Global Environment Facility Coordination</i>). |
| 9:30 a.m. – 9:50 a.m. | Introduction of the Meeting’s Objectives and Participants (<i>Peerke de Bakker, UNEP/GEF</i>) |
| 9:50 a.m. – 10:20 a.m. | Overview Presentation of the EATTA Project and Update of the Current Status (<i>EATTA and AFREPREN/FWD</i>) |
| 10:20 a.m. – 11:00 a.m. | Panel Session (<i>Lead Panelists: Jackson Maina, Acting Director, Renewable Energy, Ministry of Energy, Kenya; Ali Abdirizack, Group Development Engineer, KTDA, Martin Ogada, Engineer, Unilever Tea Kenya</i>) |
| 11:00 a.m. – 11:30 a.m. | Tea Break |
| 11:30 a.m. – 12:10 p.m. | Presentation on Proposed Project Implementation and Financing Approach (<i>Bikash Pandey, Lead Small Hydro Expert, and Ashington Ngigi, Integral Advisory Limited</i>)) |
| 12:10 p.m. – 1:00 p.m. | plenary discussion and feedback from EATTA members on Potential Co-financing. |
| 1:00 p.m. – 2:00 p.m. | Lunch Break |
| 2:00 p.m. - 3:00 p.m. | Overview Status, Findings of the Pre-feasibility Studies and Criteria for Pilot Projects Selection (<i>Denis Rambaud Measson, IED</i>) |
| 3:00 p.m. – 4:00 p.m. | Presentations by Potential Co-financiers & Plenary Discussion (<i>Triodos Bank, Standard Chartered Bank, Stanbic Bank, DEG, Grofin, E+Co, KCB, EADB et al</i>) |

4:00 p.m. – 4:20 p.m.	Tea Break
4:20 p.m. – 5:00 p.m.	Plenary Discussion and Feedback from EATTA members on project overview status and potential co-financing.
5:15 p.m.	Departure

Day 2: 14th February 2006

Chairperson: Mr. G. Ngugi Waireri, EATTA

9:00 a.m. – 9:30 a.m.	Next Steps for Project Implementation Concept Development (<i>Peerke de Bakker, UNEP/GEF</i>)
9:30 a.m. – 10:30 a.m.	plenary discussion and feedback from EATTA members on collaboration between stakeholders. (<i>Lead Panelists: Stephen Karekezi, Bikash Pandey, Denis Rambaud-Méasson, Ali Abdirizack, Martin Ogada</i>)
10:30 a.m. – 11:00 a.m.	Tea Break
11:00 a.m. – 12:45 p.m.	wrap up Panel Discussion <ul style="list-style-type: none"> ○ Q/A with experts ○ Key Concerns ○ Project website presentation
12:45 p.m. – 1:00 p.m.	Closing Remarks
1:00 p.m.	Lunch

Other Information:

- Note 1:** Presentations made at the meeting will be made available afterwards.
- Note 2: For more information on the project, see <http://greeningtea.unep.org>
- Note 3: Airport pick up will be arranged by Hotel if you provide flight details when confirming attendance to the EATTA Secretariat.
- Note 4: Confirmation deadline is Thursday 9th February 2006.

Meeting Brief for the 'Greening the Tea Industry in East Africa' Project Steering Committee Meeting

Background

The subject meeting was convened by EATTA and UNEP/GEF at the UNEP Headquarters, Gigiri, Nairobi, Kenya. It brought together 19 participants drawn from the EATTA Management Steering Committee, UNEP/GEF representatives, AFREPREN/FWD, Lead Small Hydro Expert for the project as well as the Lead Pre-feasibility Experts (See Annex 1). The objectives of the meeting were to:

- Update the Steering Committee on the status of the project and the next steps
- Present the proposed of the Full Size Project Brief
- Present the findings of the pre-feasibility studies and the criteria for pilot projects selection
- Approve the criteria for the selection of sites for full scale feasibility studies
- Discuss and approve the initial shortlisting of potential sites for full scale feasibility studies

As per the Meeting Agenda (see Annex 2), the meeting commenced with the Chair's opening remarks and self-introductions. This was followed by the following presentations:

Full Scale Project Brief Document: This presentation was made by Mr. Bikash Pandey, Lead Small Hydro Expert. The presentation covered the proposed project implementation design, including the organisational structure of the Project Management Office and the proposed budget for the project implementation.

Findings of the Pre-feasibility Studies and Criteria for Pilot Projects Selection: Mr. Denis Rambaud Measson on behalf of the Lead Pre-feasibility Experts' Team presented the interim findings of the 19 pre-feasibility studies conducted. His presentation provided detailed information regarding the methodology used. The criteria for the selection of pilot projects was also presented and approved by the Committee.

Process, Timeline and Major Milestones for Selection of Full Feasibility Studies and Pilot Projects: This presentation was made by Mr. Peerke de Bakker, the representative of UNEP/GEF. His presentation highlighted the tight deadlines that the project was facing. He also reiterated the urgency of obtaining the Letters of Endorsement/Support from the GEF Focal Points, tea industry and the financial sector.

COOPENER and other Potential Co-financiers: Mr. Stephen Karekezi made this presentation on behalf of EATTA and AFREPREN/FWD. The presentation highlighted the status of co-financing in terms of the financial institutions contacted as well as those that have indicated support for the project. An in-depth discussion of COOPENER was made a potentially key co-financier of the planned project implementation.

Key Action Points:

The meeting came up with several action points the key of which are summarised below:

Logistical Issues for Follow-up:

1. Reword sample Letter of Intention for the tea factories to make it less stringent on "dollar" commitments.
2. Scoping studies and other project reports should be circulated to members by email.

3. Request Tea Associations affiliated to EATTA to follow-up on the Endorsements and Letters of Support (from MoE + Tea Associations).
4. Prepare and distribute/upload sample Letters of Endorsement (GEF) + Support (for MoE; Banks; Tea Associations).
5. Double check that the headings and wording of Letters of Endorsement support the Full Size Project implementation.
6. EATTA, AFREPREN/FWD and UNEP/GEF are expected to provide a Letters of Interest for the COOPENER proposal.
7. Encourage tea factories to submit tentative letters of support/intention.

Thematic Issues for Incorporation into the Project Brief and Pre-feasibility Studies:

1. Include Ministry of Energy/Regulators in the Project Steering Committee.
2. Clarify how high levels of demand will be dealt with by the projects with a rural electrification component.
3. Discuss implications of interconnections/power pools on the viability of the SHP.
4. Incorporate support to tea factories to develop CDM proposals as an activity for the PMO.
5. Tea factories require guidance on timelines and associated cost estimates of project implementation.
6. Clarify to the tea factories on what GEF will support and what is their specific role in the project.
7. EATTA's co-financing of PMO: Office space + some support personnel.
8. Lujeri Tea Factory sites should be removed from pre-feasibilities studies list as the factory is not an EATTA member.
9. The Lead Pre-feasibility Experts Team was requested by the Malawi representative to include a scenario to establish the viability of having 100% dependence on small hydropower in Malawi.

Co-financing-Related Issues for Follow:

1. EATTA + UNEP are expected to provide a Letters of Interest for the COOPENER proposal.
2. Followup with Barclays and AfD/Proparco in Tanzania as they are active in Tanzania.
3. Followup with IFC - Tanzanian participant could provide contacts

Annex 1 List of Participants

List of Participants - EATTA Steering Committee Meeting, 21st February 2006							
Name	Title	Institution	Physical Address	Postal Address	Telephone	Fax	Email
Representatives from the Tea Industry							
1	George Waireri	Member, Management Committee	East Africa Tea Trade Association (EATTA)	Tea Trade Centre, Nyerere Avenue, Mombasa, Kenya	P.O. Box 85174, Mombasa 80100, Kenya	254 21 2225823	254 41 2225823 george.waireri@tetley.co.ke
2	Ali Abdirizack	Group Development Manager	Kenya Tea Development Agency	KTDA Farmers Building, Nairobi, Kenya	P.O. Box 30213 GPO 00100 Nairobi, Kenya	254 20 221441/2/3/4 ext 7953	254 020 211240 aabdirizack@kdateas.com
3	Hadija Shakombo	Administrative Secretary	East Africa Tea Trade Association (EATTA)	Tea Trade Centre, Nyerere Avenue, Mombasa, Kenya	P.O. Box 85174, Mombasa 80100, Kenya	254 41 2220093 or 2228460	254 21 2225823 hadija@eatta.co.ke
4	John Mbugua	Managing Director	Venus Tea Brokers LTD	Mbuyuni Road, Off Kaunda Avenue, Mombasa, Kenya	P.O. Box 99954, 80107, Mombasa, Kenya	2222196/7	2221002 info@venustea.com
5	Danton Vorster	Regional Marketing Manager	Linton Park Plc	4th Floor, New Rehema House, Rhapta Road, Westlands, Nairobi, Kenya	P. O. Box 14213, 00800 Nairobi, Kenya	254 20 4440399	254 20 4440118 d.vorster@lintonpark.co.ke
6	Sangwani Hari	Chairman	Tea Association of Malawi			265 16 71355	tea@kawalazi.sdn.org.mw
7	Bimb Theobald	Chairman	Tea Association of Tanzania			007 22 211 3838	bimb@chaibora.com
8	Jones Sikira	Executive Director	Tea Association of Tanzania	5th Floor, Twiga Hse, Samora Avenue, Dar es Salaam, Tanzania	P.O. Box 2177, Dar es Salaam, Tanzania	255 22 2121964 or 255 22 2122033	255 22 2113838 trit@kicheko.com
9	Isaac Munabi	Executive Secretary	Uganda Tea Association	Mitchell Cotts Bldg - Annex, Plot 8, Burton Street, Kampala, Uganda	P.O. Box 4161, Kampala, Uganda	256 41 576495	256 41 231003 utasso@africaonline.co.ug
10	Martin Ogada	Company Electrical Engineer	Unilever Tea Kenya Limited	Kericho - Nakuru Road, Kenya	P.O. Box 20 - 20200, Kericho, Kenya	254 0 52 20120/1	254 0 52 30103 martin.ogada@unilever.com

Project Consultants

	Name	Title	Institution	Physical Address	Postal Address	Telephone	Fax	Email
11	Bikash Raj Pandey	Country Representative	Winrock International	1103/68 Derkota Marg, Kathmandu, Nepal	1312, Kathmandu, Nepal	977-1 4467087, 4476101	977-1 4476109	Bpandey@winrock.org.np
12	Denis Rambaud Measson	Managing Director	Innovative Energie Developpment	2 Chemin de la Chauderaie 69340 Francheville, France	2 Chemin de la Chauderaie 69340 Francheville, France	33 0 472 59 13 20	33 0 4 72 59 13 39	d.rambaudmeasson@ied-sa.fr
13	Stephen Karekezi	Director	African Energy Policy Research Network (AFREPREN)	Elgeyo Marakwet Close off Elgeyo Marakwet Road, Adams Arcade, Nairobi	P.O. Box 30979 00100 Nairobi, Kenya	3866032 or 3871467	3861464	arrepren@africaonline.co.ke
14	John Kimani	Senior Program Manager	African Energy Policy Research Network (AFREPREN)	Elgeyo Marakwet Close off Elgeyo Marakwet Road, Adams Arcade, Nairobi	P.O. Box 30979 00100 Nairobi, Kenya	3866032 or 3871467	3861464	afrepren@africanonline.co.ke
15	Samuel Muthamia	Trainee Project Officer	African Energy Policy Research Network (AFREPREN)	Elgeyo Marakwet Close off Elgeyo Marakwet Road, Adams Arcade, Nairobi	P.O. Box 30979 00100 Nairobi, Kenya	3866032 or 3871467	3861464	afrepren@africanonline.co.ke

Representatives from UNEP/GEF

	Name	Title	Institution	Physical Address	Postal Address	Telephone	Fax	Email
16	Olivier Deleuze	Officer in Charge	Division of Global Environment Facility Coordination (UNEP/DGEF)	UNEP, Gigiri, Nairobi, Kenya	P.O. Box 30552 00100 Nairobi, Kenya	254 20 762 4686	254 20 762 4042	olivier.deleuze@unep.org
17	Peerke de Bakker	Programme Officer, Energy	UNEP/DGEF	UNEP, Gigiri, Nairobi, Kenya	P.O. Box 30552 00100 Nairobi, Kenya	254 20 7623967		peerke.bakker@unep.org
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Representatives from Government

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Annex 2 - Meeting Agenda



‘Greening the Tea Industry in East Africa Project’ Project Steering Committee Meeting

21st February 2006
UNEP Headquarters, Gigiri, Nairobi, Kenya
Conference Room No. 8

Meeting Agenda

Chairperson:	Mr. G. Ngugi Waireri, (EATTA)
7:30am	Bus leaves for Gigiri
9:00am – 9:05am	Opening remarks by Chairperson
9:05am - 9:35am	Full Scale Project Brief Document (<i>Bikash Pandey, Lead Small Hydro Expert</i>)
9:35am – 9:50am	Plenary Discussion
9:50am - 10:35am	Findings of the Pre-feasibility Studies and Criteria for Pilot Projects Selection (<i>Denis Rambaud Measson, IED</i>)
10:35am – 11:00am	Plenary Discussion
11:00am – 11:15am	Tea Break
11:15am – 11:45am	Process, Timeline and Major Milestones for Selection of Full Feasibility Studies and Pilot Projects (<i>Peerke de Bakker, UNEP/GEF</i>)
11:45am – 12:00pm	Plenary Discussion
12:00pm – 12:30pm	COOPENER and other Potential Co-financiers (<i>EATTA and AFREPREN/FWD</i>)
12:30pm – 12:45pm	Plenary Discussion
12:45pm – 1:00pm	A.O.B.
1:00pm – 2:00pm	Lunch

Appendix R: Specific Policy Statements from the Regulatory Framework and National Communications of the EATTA Countries

Kenya:

Kenya has clearly stated national policies to promote small hydropower, geothermal and other renewables to reduce dependence on imported fuel and to increase access to electricity to its population. Some of the key policy statements are reproduced below. Kenya has also made its commitment to renewable energy technologies and mitigation of climate change clear in the National Communications it has submitted to the UNFCCC.

The Draft National Energy Policy of 2004 is clear on encouraging private sector involvement in the small hydropower sector:

6.4 Rural Energy: *The government will encourage and promote private sector initiatives in entering the renewable energy market. The government recognizes the side of development partners in finding specific programs and will continue to seek their support especially in areas less attractive to the private sector. Furthermore the government will allocate resources to complement self-help groups and private sector efforts in rural energy supplies.*

6.5.2 Fiscal policies: *The government in recognition of the need to lower the electricity tariffs will grant a 15 year income tax holiday for hydroelectric projects whose installed capacity will not be less than 50 MW; 10 years for projects between 20 MW and 7 years for those below 20 MW but not less than 1 MW.⁷ The tax holiday system is to be reviewed in a new Energy Policy. For the rest, 6.5.2 also specifies the duty and tax-free procurement of plant, equipment and related accessories for generation and transmission. Public electricity supplies will also be exempt from income tax.*

6.7 Legal and Regulatory framework: Specifies Electricity Regulatory Board (ERB) to license electric power producers as a one stop office for facilitating permits and licenses; enabling renewable energy systems not exceeding 3 MW⁸ to operate in any area without license irrespective of any other existing distribution license. The National Energy Policy would make it mandatory for a licensed public electricity supplier operating in an area where power generation is being undertaken by parties other than those with agreements or arrangements with such public electricity suppliers to buy such power on terms approved by ERB.

6.14.2 Renewables: *The government recognizes that most of the renewable energy sources; solar, wind, small hydro, co-generation, biogas and municipal waste energy have potential for the creation of opportunities and employment generation. In order to encourage private sector participation in harnessing these sources of energy the government will therefore pursue the following policy strategies:*

- *Collection of hydrological data and undertaking of pre-feasibility and feasibility studies on small hydro;*
- *Packaging and dissemination of information on renewable energy systems to create investor and consumer awareness and community based pilot projects;*
- *Review of Electric Power Act 1997 to facilitate rural electrification based on supply on a limited scale using renewable energy technologies;*
- *Allowing duty free importation of renewable energy hardware as to promote widespread usage;*
- *Provision of tax incentive to both users and producers of renewable energy technologies and related accessories based on the degree of maturity and market presentation;*

⁷ Note: the project obviously has a task in the formulation of incentives for small-scale power generation, or lumping together a number of mini hydro in one project.

⁸The newly published Sessional Paper on Energy (March 2005) spells out Kenya's new energy policies: Whereas before the limit was set at 1MW (and obligatory hybrid - a reflection of a national lack of confidence in renewable energy technologies), the new threshold is set as a ceiling of 3 MW and below (and not necessarily hybrid) for power generation that has no requirement to be licensed by the Ministry of Energy. Provided tariffs are approved by the Energy Regulatory Board, power producers can now access customers directly. For hydro projects clearing from the water authority and environmental Management Agency (Environmental Impact assessment and regular audits) remain compulsory. Environmental safety standards for transmission are under preparation. Whereas before it was required to follow KPLC prudent practices, now a new grid code allows for independent mini grids.

- *Encouraging financial institutions to provide credit facilities for up to a maximum period of 7 years to consumers and entrepreneurs through fiscal incentives;*
- *Enforcing protection of the catchment areas.*

First National Communications (June 2002):

The following statements are found in the First National Communication of Kenya submitted to the UNFCCC that demonstrate the government's commitment to renewable energy and hydropower investment.

5.6.10. Policy Options (p. 82)

Policy options that would ameliorate the adverse impacts of climate change on terrestrial ecosystems include:

- a) Promotion of energy efficiency and renewable energy sources.

5.8.8.1. Biomass (p. 94)

The government in collaboration with other stakeholders intends to:

- f) Support and/or promote the production and marketing of digesters for biogas production.

5.8.8.2. Electrical Power Production (p. 94)

The government in collaboration with relevant stakeholders will:

- a) Support efforts to expand hydropower generation to different parts of the country taking advantage of the different rainfall regimes.
- b) Expand and intensify rural electrification programs in order to reduce reliance on biomass.
- e) Encourage installation of wind power generating equipment for use in generating electricity and pumping water and driving power mills especially in rural areas.
- f) Popularize the use of solar energy for electricity generation and water heating.
- g) Expand installation of solar water heaters.

6.2.6. Current Policy (p.100)

- g) Encourage, wherever possible, domestic fuel substitution.
- h) Promote alternative energy sources to broaden the national energy mix and lessen dependence on imported energy.

6.2.7. General Steps (p.100)

- c) Rapid Development of Domestic Hydro and Geothermal Resources: The government supports continued exploration and development of hydro and geothermal resources. Since both sources emit low levels of greenhouse gases, their development will result in the avoidance of emissions compared to fossil fuel based electricity sources.
- d) Rural Electrification: Rural electrification efforts have been strengthened with the aim of providing electricity to all parts of the country. If rural electrification can result in the reduced burning of kerosene for cooking and lighting then there will be reduced potential emissions of greenhouse gases.
- i) Encouraging Domestic Fuel Substitution and Development of Renewable Sources of Energy: The policy supports the development of alternative energy sources, including solar, wind, biogas, and mini/micro hydro. Development of these sources should ultimately increase the share of clean energy in the overall energy supply and thereby result in GHG emission avoidance.

6.2.8. Ongoing and Planned Activities (p. 102)

- e) Feasibility studies on mini/micro hydro technology: In areas with suitable sites mini/micro hydro technology can be a useful alternative source of power for neighbourhoods.
- f) Development of renewable energy technology standards: standards are being developed for solar batteries, solar cells and wind generators.
- g) Wind energy resource atlas (WERA): the wind resource atlas will inventory suitable wind energy potential sites and will also rank them based on detailed site investigations. Increased investment in the development of wind energy resource will increase Kenya's total clean energy supply.

6.5.4. Planned Projects (p. 115)

- d) Cogeneration of electricity: in some tea growing areas there is potential for mini-hydroelectricity generation. Sugar factories are being encouraged to go into cogeneration as a means for reducing production costs by using the readily available bagasse to generate electricity.

7.10. Proposed Areas for Climate Research (p. 135)

g) Studies on environmental friendly technologies including the use of alternative energy sources such as wind, solar, hydro, geothermal and biogas.

Tanzania:

Tanzania recently revised its national energy policy to accommodate power sector reforms, promote renewables and advance rural electrification. Under the power sector-restructuring program, independent power producers can generate power and sell to TANESCO. An important strategic objective in the national policy is to reduce fossil fuel dependency through increased use of renewables and improving energy efficiency. Some renewable energy and rural electrification projects have been implemented with assistance from various agencies. However most of the past efforts have been targeted at households and not at the rural industrial sector.

The National Energy Policy, 2003: The government of Tanzania is aware that renewable energy resources so far have remained under-utilized: (1.1.2. Energy situation) *electricity needs to be made available for economic activities in rural areas, rural townships and commercial centers. Rural electrification is therefore a case of long-term national interest and a pre-requisite for a balanced social economic growth for all in Tanzania.*

Policy Statement 35: *Introduce appropriate rural energy development, financial, legal, and administrative institutions.*

Policy Statement 36: *Establish norms, codes of practice, guidelines and standards for renewable energy technologies, to facilitate the creation of an enabling environment for sustainable development of renewable energy sources.*

Policy Statement 38: *Ensure inclusion of environmental considerations in all renewable energy planning and implementation and enhance co-generation with other relevant stakeholders.*

Policy Statement 39: *Support research and development of renewable energy technologies.*

Policy Statement 43: *Support research and development of rural energy*

Policy Statement 45: *Promote entrepreneurship and private initiatives in the production and marketing of products and services for rural and renewable energy*

Policy Statement 46: *Ensure continued electrification of rural economic centers and make electricity accessible and affordable to low income customers.*

Policy statement 47: *Facilitate increased availability of energy services including grid and non- grid electrification to rural areas.*

National Communications: Initial National Communication (March 2003)

The following statements are found in the Initial National Communication of Tanzania that show the government's commitment to renewable energy and hydropower promotion.

3.5 Mitigation analysis for the energy sector (p. 20)

Interventions include: energy supply options, including development of renewable sources of energy and use of clean technologies in thermal electricity production.

3.5.1. The most important renewable energy options identified are hydropower generation, mini-hydropower, biogas, and solar energy.

6.3.3. Energy (p. 53)

The principal specific objectives of the national energy policy are:

To satisfy the energy demand of all sectors of the economy, not only for the productive sectors (i.e., agriculture, industry and mining) but also for the whole country;

To develop indigenous sources of energy (natural gas, coal, solar, wind, geothermal, hydropower and biomass fuels) to substitute for imported petroleum products.

(G) Energy (p. 62)

(iii) The promotion of appropriate and affordable renewable energy technologies.

(iv) Implementation of a national program to promote renewable energy technologies and energy conservation.

Uganda:

Uganda has among the most advanced regulatory framework for power development in the region to promote private sector investment into development of hydropower and renewable energy resources. The government has also provided substantial financial support to private investors proposing to expand rural electrification services through the Energy for Rural Transformation (ERT) and other national initiatives.

The Energy Policy for Uganda (2002) states:

1.2.4: Realizing that Uganda is endowed with a variety of renewable energy sources that include hydrological resources with only a meager fraction of the country's renewable energy potential being exploited, Uganda aims to develop the use of renewable energy resources for both single and large scale applications.

4.2.3: The Government has spelled out a number of strategies ranging from dissemination of technologies, including renewables in school curriculum, setting of standards, facilitating financing schemes, etc.

First National Communications (2002):

The following statements are found in the First National Communication of Uganda that demonstrate the government's support for renewable energy and hydropower promotion.

3.4. Mitigation Options and Measures (p. 63-64):

Uganda still has undeveloped hydroelectric resources mostly along the Nile River. Studies have proposed the development and implementation of an enhanced rural electrification program to improve the electrification coverage from the current 1% to 10% by the year 2012. This strategy is to be combined with grid extension, and development of small-scale hydropower in areas remote from the National grid as well as the use of solar photovoltaic systems. The Rural Electrification Strategy and Plan covering the period 2001 to 2010 incorporate the use of solar and wind energy.

5.1.7. Energy Policy (p. 84)

Promote the use of alternative sources of energy and technologies, which are environmentally friendly. Promotion of private sector participation in the development of both conventional and renewable energy resources

Malawi:

Malawi's energy policy and National Communications clearly support the development of small hydropower and other renewables from both the private and public sectors.

The White Paper on Energy Policy for Malawi – 2001 mentions the following:

Specific Policy Goals:

- *Create an enabling environment for investment, private enterprise, competition and operational efficiency with minimum adverse effects on wealth and environment;*
- *Promote wide spread efficient use of suitable and affordable new and renewable energy among rural, peri-urban and urban population.*

Being aware that past rural electrification efforts were inadequate, the government now is:

(3.1.6) committed to providing and supporting rural electrification as a means of poverty reduction and will intensify public sector investment to accelerate electrification activities in rural and peri-urban areas while ensuring the establishment of a dedicated funding mechanism and establishing an appropriate regulatory and legal framework to support arrangements for rural electrification.

3.3.4. The Government of Malawi pledged to increase access to and efficient use of sustainable new and renewable energy among the Malawi population, and make sure that (3.4.1) duties and taxes on renewable are not re-introduced. In addition the government will ensure appropriate financing mechanisms and credit schemes using existing financial institutions.

National Communications:

The following statements are found in the National Communication of Malawi that support renewable energy and hydropower investment.

Under Assessment of Mitigation Options:
Biogas technology for cooking, heating water and lighting

Under Impact of Technology Based Mitigation Options:
Apart from the biomass-based mitigation options analyzed above, there is potential for further GHG reduction through: Rural electrification through grid extension, mini/micro hydropower and solar heaters and cookers which would reduce use of biomass energy; wind water pumping instead of diesel and petrol engines.

Under Impact of Market Based Mitigation Options:
Removal of duty and surtax on Renewable Energy Technology RETs (energy pricing) and certification of RETs installers and inspection of installation (regulation and standardization) would result in the wider use and acceptance of the RETs, which are cleaner technologies.

Under Implementation Strategies:
The National Sustainable and Renewable Energy Program (NSREP) has ensured a coordinated approach to the financing and implementation of RETs in Malawi. The NSREP is being supported by GEF, UNDP, DANIDA, JICA and the World Bank. NSREP supports projects in solar home systems, biogas, biomass energy conservation, biomass briquettes, mini/micro hydro and wind energy. The current delivery modes ensures that the RET suppliers offer backup support and services to the users. Public media is also used to promote the awareness of the RETs.

8.2 Energy (Pilot) Projects

8.2.1 Project Title: Renovation and extension of Matandani Mini-Hydropower Station in Mwanza District. The objective of the 120 kW Matandani Mini-hydropower Project is to supply power to Neno Trading Centre and Matandani Rural Growth and surrounding rural areas in Mwanza District, and enhance reduction in greenhouse gas emissions.

Rwanda:

Government of Rwanda policies and the recently submitted Initial National Communications to the UNFCCC clearly support the country's support for private sector investment in small hydropower and other renewable energy technologies.

The Enhanced Structural Adjustment Facility Policy Framework makes mention of Rwanda's priorities in the energy sector:

The objective of the government in the energy sector are to expand and diversify energy supplies at competitive costs, promote the efficient utilization of Rwanda's energy resources, and minimize the potential adverse environmental impacts. The immediate priorities in the energy sector are to (i) rehabilitate key power facilities; (ii) restructure and privatize the part of ELECTROGAZ that supplies and distributes electricity and gas so as to improve its operational efficiency; (iii) build capacity for policy development and investment planning in key sub-sectors such as gas, hydropower, petroleum products, rural electrification, and (iv) promote the regeneration of forest resources damaged during the emergencies in the country.

The government is preparing a strategic and regulatory framework to address both urban and rural energy needs and to encourage private sector energy provision and distribution. This strategy will emphasize the efficient use of sustainable energy sources based on natural resources.

National Communications:

Initial National Communication (June 2005):

The following statements are found in the Initial National Communication of Rwanda that support increased investment into renewable energy and small hydropower.

1.5.2. Energy and Transport (p. 14)

Hydro electric stations in Rwanda produce only 4 % of total energy consumed while the country has an important hydroelectric potential from its rich hydrographical network.

3.1.1. Policy options and specific measures to reduce greenhouse gases:

Increase access rate to modern energy resources such as hydropower, new and renewable energies; To reach its objectives, the Government of Rwanda will have to rehabilitate the already existing network, install other hydropower stations, to promote technologies that save fuel wood as well as new and renewable energies.

Vision 2020 forecasts that Rwanda will have reduced the contribution of wood energy from 90% to 40 % of total energy supply by the year 2020. Development of hydraulic potential combined with methane gas energy would meet electricity needs for the whole country with additional production of 125 MWh compared to year 2000. In the poverty reduction strategy paper (PRSP), Rwanda has set the objective to ensure increased rate of electricity consumption by 9.6 % per year, to ensure rural electrification rate of 30 % and to increase from 6 % to 35 % the population with access to electricity.

3.1.2. Strategies to reduce GHG in energy sector

Photovoltaic equipment cost grants to allow development of decentralized electrification;
Alleviation of investment cost to be provided to industries for substitution of biomass and gas oil boilers by electric ones (tax exemption, taxes alleviation);
Favor the use of solar energy by encouraging measures for a wider use of solar panels (tax reduction, local production of solar panels, research);
Increase the number and capacity of hydropower dams⁹;
Increase the number of mini-hydropower stations particularly in rural areas;
Decentralized electrification by solar systems for rural households;
Extension of biogas digesters in institutions and the use of high performance peat kilns;
Maintenance of hydropower predominance in energy supply.

Under Strategies and Actions to Reduce GHG in the Energy Sector:

Strategy: Use of alternative sources of energy

Activity: To promote and extend use of biogas; to promote the use of solar power; to construct micro-hydropower stations.

4.2.1. Sector of Human Settlements, Energy and Industry

For energy sector, the following adaptation measures are considered:

Invest more in energy generation infrastructures sector by building other hydropower stations. Potentials exist on Nyabarongo river (Bulinga, 28 MW), Rusizi, Akagera and on smaller streams where there are potentials for micro-hydropower stations;
Promote new and renewable energies.

5.1.7. Energy Policy (p. 63)

Strategies, programs and planned activities for management of energy resources:

- Strategy: Reduction of fuelwood and charcoal consumption
Program: Research for alternative energies
Activities: Assessment of potentials in renewable resources, need and demand; Promotion of alternative energy projects (biogas, peat);
- Strategy: Extension of electricity grid
Program: Rural electrification by extension of existing grid
Activities: Study of rural electrification master plan; Project identification; Feasibility study; Project implementation
- Strategy: Isolated electricity grid supplied by micro-hydropower stations
Program: Rural electrification by micro-hydropower stations
Activities: Project identification; feasibility study; project implementation
- Strategy: Isolated electricity grid supplies by solar power
Program: Rural electrification by solar power stations
Activities: Electrification of remote public institutions

5.2.3. National Activities of Scientific Research (p. 64)

Research activities directly or indirectly related to aspects of climate changes are hereafter:

- Energy valorization (gasification) of biomass by using a biogas digester;
- Photovoltaic electrification in rural areas including water pumping by using solar energy;

⁹ Hydropower dams that supply the grid in the case of Rwanda are not necessarily large dams; they fall mostly under small hydropower.

- Solar drying of food products;
- Estimation of global solar radiation over Rwanda.

Zambia:

The Government of Zambia is very supportive of increased investment into small hydropower and other renewables. This is clear in the country's policies as well as in the National Communications submitted to the UNFCCC.

The National Energy Policy of 1994 of Zambia mentions:

1.3.5 Mini hydro is identified as one of the renewable energy resources that is greatly under utilized.

2.6 *New and renewable sources of energy:???*

Initial National Communications (2002):

The following statements are found in the Initial National Communication of Zambia that support additional investment into renewable energy and hydropower.

In the energy sector the supply mitigation options include the improvement of the charcoal production process, switching from use of diesel power generators to mini-hydros.

Renewable energy resources remain largely untapped. However, Government has introduced an energy policy that is aimed among other things to promote the use of renewable energy resources through private sector participation. The dissolution of the National Energy Council in 1996 gave rise to the establishment of the Energy Regulatory Board under the Electricity Act in 1995. This Act has done away with the monopoly of the Zambia Electricity Supply Corporation and opened the electricity industry to other participants.

Development of mini-hydro power stations where the potential exists, particularly as a replacement for diesel generators

Policy: Developing the hydro potential to take advantage of the strategic location of the country in the sub-region.

Programs: Examples of mini-hydros which are being considered include three in Northwestern province (i.e. West Lunga — 2.5 MW, Kabompo Gorge — 34 MW and Chikata Falls — 3.5 MW).

Policy: Promote the wider application of NRSE technologies

Program: Under a four-year pilot project launched in 1998 and coordinated by ESCO and DOE, some 400 housing units in Chipata, Lundazi, Nyimba and Petauke in Eastern Province will be provided with solar energy.

Mozambique:

The Renewable Energy sub-sector in Mozambique is rather new. The overall energy policy strategy aims to create *"a proper viable climate in order to attract all stakeholders and key players that could promote the renewable sub-sector"*. Based on the transcript of presentation at the Regional REEEP meeting, Southern Africa July 20-22, 2003, Johannesburg, there are proposals to start work in mini and micro hydro but there is a general lack of information on such systems and the related costs.

National Communications:

The following statements are found in the National Communication of Mozambique that are supportive of additional investment in renewable energy and hydropower.

5.6.1. Energy Potentialities of the Country

Mozambique has considerable potential in energy resources (hydrologic, etc.) not only to satisfy the internal needs but also of those of the Southern Africa region. Apart from the available resources mentioned, Mozambique possesses a significant potential for solar energy due to its geographical location. This energy can be vital for electrification of social infrastructures mainly in rural areas.

2.4.1. Energy

In fact, dissemination and promotion of the use of renewable sources of energy as prescribed in the energy strategy and policy, improvement of the efficiency of combustion systems, can allow the country to deal, in a long term, with greenhouse gases reduction in Mozambique which will help the country to comply with the United Nations Framework Convention on Climate Change ultimate objective.

5.2.3 Strategies for the Water Resources Sector

Mozambique has very few dams, therefore an effort to build these infrastructures for drainage control and production of energy will be necessary. For the near future, there is a plan to build a new hydroelectric dam on Zambezi River (Mepanda Uncua) upstream of Cahora Bassa. There are also plans to build new dams in the following places:

- Moamba in Incomati river, for irrigation and water supply to Maputo city;
- Bue Maria in Pungue river, for irrigation and water supply to Beira city;
- Mapai in Limpopo river, for irrigation;
- Alto Malema in Malema river; for electricity supply;
- Monapo in Monapo River, for irrigation and water supply to Nampula city.

5.6.3. Strategies for a healthy energy management

Among the several measures to improve access to energy in urban and rural areas the following stand out:

- Introduction of services for renewable energies, including training for installation, handling and maintenance of equipments;
- Implementation of a low cost national program of electrification of districts that have no access to electricity.

5.6 Identification of the interested parts in the implementation of climate adaptation measures

In the NAPA document the following sub-sectors that deserve a special attention were identified:

In the energy sector the Government should continue to expand the network of the electricity supply, to promote the use of alternative energies to biomass.

Burundi:

In the national communication for UNFCCC, Burundi states it has decided to take 3 potential options to reduce GHG:

- 1) Increase access rate to modern energy such as hydro electricity and renewable energy;
- 2) Supply of energy of sufficient quality and quantity for industry and cottage industry while improving the supply security for both electricity and petrol products;
- 3) Meeting domestic requirements while safeguarding the environment

To attain these objectives, the government will rehabilitate and extend the existing electricity network, plan hydropower plants and promote technologies that save wood fuel as well as promote renewable energy. The biggest constraint is the lack of finance for the sector's program. The government will adopt measures to reduce the cost of certain equipment to provide greater access to industries and households.

Furthermore the national communications talk about increasing energy efficiency in the manufacturing industry and energy efficiency (thermal power) in breweries and tea processing plants in order to reduce consumption of fossil fuel and biomass. For decentralized electrification of public infrastructure both solar PV and small ("pico") hydropower plants are envisioned, as this will contribute to a reduction in GHG emissions.

Project No. 3 Guiding Plan for Decentralized Electrification (p. 96)

The objective of the study is to prepare the decentralized electrification program on a large scale while evaluating the needs and in defining the mechanisms of the financial and institutional framework.

Project No. 7 Mpanda Irrigation and Hydroelectric Project

The project consists of the construction of the central one of Mpanda to increase the electricity generation capacity and to increase access to clean energy.

(p. 115)

Global Objective: Facilitate the access of a larger part of the population to modern energy.

Actions Take: Extension of the grid network; Promotion and dissemination of the renewable energy (clean energy).

Global Objective: Supply energy in sufficient quantity and quality for socio-economic activities (craft industry, industry, transportation, etc)

Actions to Take: Rehabilitation and construction of central and small grid-connected hydroelectric schemes; reinforcement and rehabilitation of the grid network.

Appendix S: Financing Modalities for Small Hydropower Projects

Balance Sheet Financing: Balance sheet or Corporate financing (Figure 1) implies that the bank can finance the loan for a SHP project on the strength of the hydropower developer's balance sheet alone. A well established, profitable tea company will be able to go to its normal banker and propose to invest in a hydropower project to provide power to one its factory and the surplus to the grid, if appropriate. The bank will approve the loan based on strong corporate performance of the project proponent on the tea sector. This works well when the yearly revenue of the company is several times as large as the proposed investment in the SHP project. The SHP project to power an individual tea factory will cost in the range of US\$1 million. A typical factory that produces 2,000 tons of made tea will have revenue of around \$2 million a year. The balance sheet of a single factory may not be sufficiently strong to justify a bank financing a small hydropower project there. However, the tea company proposing this investment may have on its balance sheet several tea factories and is proposing to install the hydropower project in only one of them.

Discussions with Cooperative Bank and Standard Chartered have shown willingness to consider any credit worthy proposal from long established companies. Discussions with Cooperative Bank and others revealed that the terms of loans are likely to be for years, at commercial interest rates and up to size limits. The bank will of course carry out due diligence on the detailed feasibility study of the SHP project. Banks in the region do not at present have direct experience in reviewing this type of project. International banks like Standard Chartered will typically have a core technical team in Hong Kong or London or some other financial centre that the feasibility study will be sent to for review.

It is likely that the majority of SHP projects at the larger corporate tea estates within the FSP period will be financed through Corporate financing. This is the most straightforward way of financing projects that are linked to existing enterprises such as the tea factory. The PMO will give confidence to the banks by supporting high quality bankable detailed feasibility studies. This will remove doubt on the part of the bank about the technical concerns about the proposed SHP investment. The GEF Project will also enhance the capability of bank officials in the participating EATTA countries to evaluate hydropower projects.

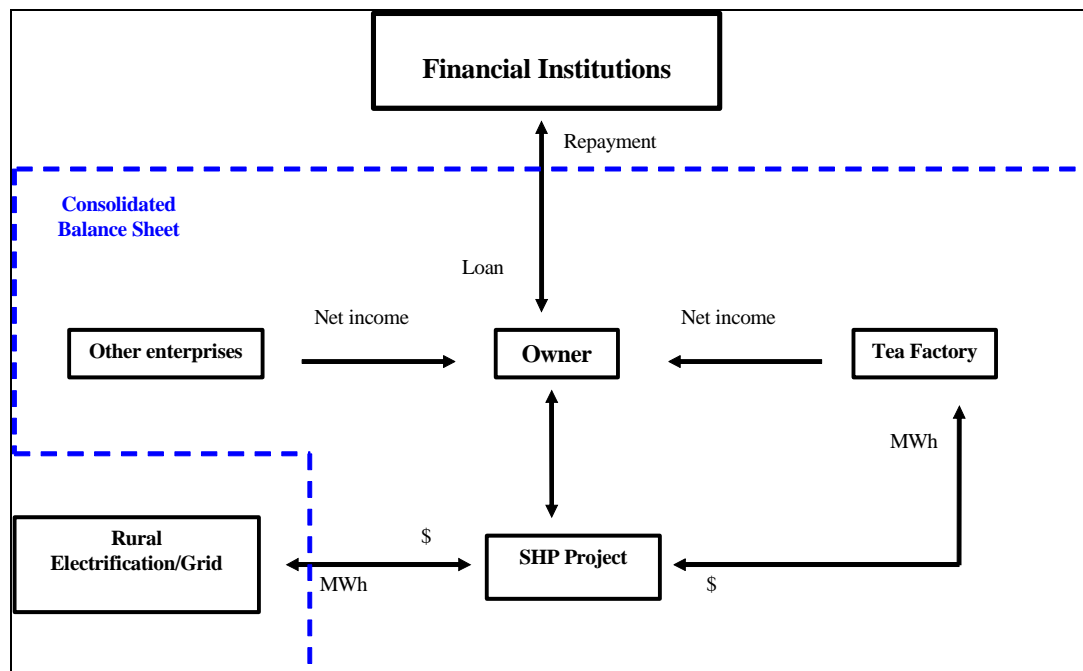


Figure 1: Balance Sheet Financing

Collateral financing: Tea factories can also receive loans from banks that specialize in financing infrastructure projects. The loans would be provided on the basis of collateral provided to the banks as guarantee for loan repayment. One such development bank that has shown willingness to finance small hydro projects in the tea sector is the East African Development Bank (EADB). The EADB lends to Kenya, Uganda, and Tanzania across a range of sectors including both to the tea sector and energy infrastructure on commercial terms. The Bank which is owned by the three countries with some equity investment from the African Development Bank (AfDB) as well. It receives lines of credit from the AfDB, European Investment Bank and the Nordic Development Fund. The Bank has made loans to the Kenya Tea Development Authority (KTDA) in the past. The bank can make loans from \$0.1 million up to \$15 million, which is consistent with the amounts that tea factory hydro projects would need. With the increase in fuel costs affecting its member countries, power sector lending is a priority area of the EADB. The loan size is appropriate for the size of projects being considered. In Uganda EADB has recently invested in the Kakira Cogen project (20 MW) on a loan refinanced from a World Bank IDA line of credit through the government of Uganda. EADB will make loan investment on the basis of collateral provided by the tea company.

Project Finance: Project finance (Figure 2) implies that the financing institution provides a loan for the proposed project based solely on the technical and financial merits of the project. The project will need to be able to cover its loan repayment obligations solely on the cash flow of the project. No additional collateral or robust balance sheet of the developer is required for such financing. Projects using the project finance route are developed borrowing funds based on the creditworthiness of the project alone rather than of the sponsor. All project assets such as the plant hardware and the equity shareholding would be pledged in support of the loan, as a security in the event of default. As the loan is not borrowed directly by the sponsor of the project, this transaction is not recorded on the balance sheet of the sponsor. Banks manage their risks in project finance by requiring the project developer to carry comprehensive insurance to cover all possible eventualities. This includes: *Contractor's All Risk, Erection All Risk, Transportation All Risk, Professional Liability, Third party Liability, Workmen's Compensation, Contractors' Equipment, and even Advance Loss of Profit.*

As the creditworthiness of the project depends on the merits of the project itself, many banks are reluctant to provide project finance in a sector they are not completely comfortable with. The PMO will provide confidence to prospective financiers that the projects that are proposed with technical support of the Project are indeed bankable.

Project finance will be particularly important if the proponent has only one factory and where the balance sheet is not strong enough to support investment into a project of the size proposed. It will also be important where a larger project is being proposed that plans to sell power to the national grid in addition to meeting the needs of the factory. Where one large project is being used to supply a number of tea factories (see example of Kenya) owned by different companies, project finance will be the preferred financing modality since no one single company will want to carry the project on its balance sheet.

Previous experience in other parts of the world demonstrates that banks are often reluctant to finance renewable energy projects, particularly through the project finance route. They are unfamiliar with the technology and often with the project finance modality. Most commercial banks will provide loans for less than 5 years and do not have the expertise to evaluate small hydropower projects with the rigour required to evaluate for project finance.

In addition to the support provided by the PMO, it will be most helpful to have a dedicated Renewable Energy Fund that can provide partial funding to small hydropower projects within the EATTA countries. Commercial or development banks are often more comfortable to invest in projects when they know that another financing entity more experienced in the sector is also investing in the sector and reducing the risk of investment. A dedicated Fund can play such a role. Such a dedicated Fund to finance the small hydropower project pipeline generated by the SHP GEF project has been proposed by the Triodos Bank of the Netherlands through its Triodos Renewable Energy Development Fund (TREDF).

While such a fund may take some time to be fully operational, there are certain funds worldwide dedicated to investing in renewable energy that are able to take equity positions or provide loans to small hydropower projects in the EATTA countries. Examples are E&Co and Triodos's TREDF.

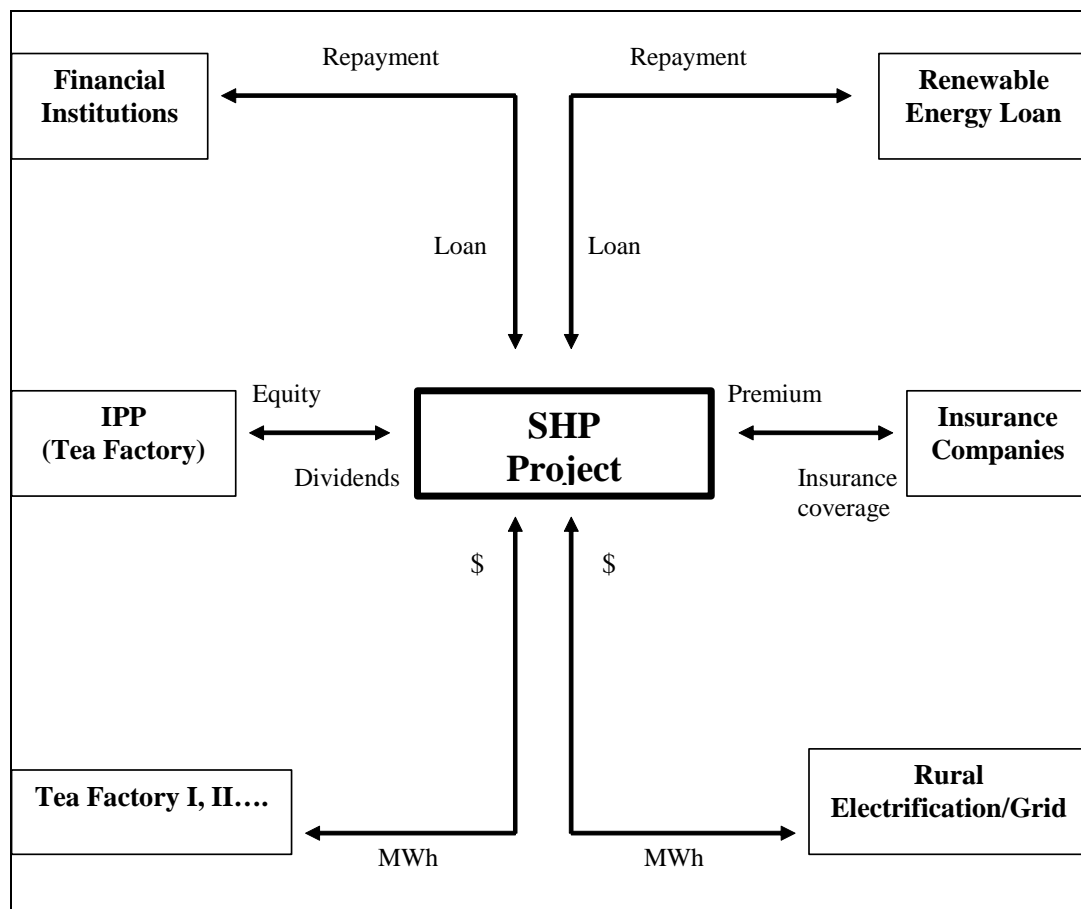


Figure 2: Project Finance

Portfolio Financing or Sector Financing: Larger financing organizations like the World Bank, European Investment Bank, AfDB, or the East African Development Bank can fund renewable energy projects if they can be bundled together to make a larger portfolio of projects (Figure 3). The Project envisions that towards the end of the Full Size Project there will indeed be a substantial project portfolio and an opportunity to invite these larger investors to provide financing to the small hydropower sector in EATTA countries with a fund in the \$100M range. The likelihood of this will be further improved when the portfolio of small hydropower and cogeneration projects¹⁰ can be added. In countries which can move to a 'Standard PPA' the small hydropower projects will by this time also include IPPs that may not be limited to the tea sector. The RERED project in Sri Lanka has developed a pipeline of small hydropower projects totalling 120 MW. These funds can be channelled through regional development banks, like the EADB or through expanding a private sector fund like the REFA which will have a ready portfolio by then. It is also possible that individual countries that have moved forward with the 'Standard PPA' legislation will approach the large international financial institutions for a country loan to finance renewable energy projects. The RERED model is that the central bank will channel these loans through local banks that agree to participate as Participating Credit Institutions (PCIs). The funding from the international finance organization is then used to refinance the loans made by the PCIs.

¹⁰ Being promoted through another under-preparation regional GEF project.

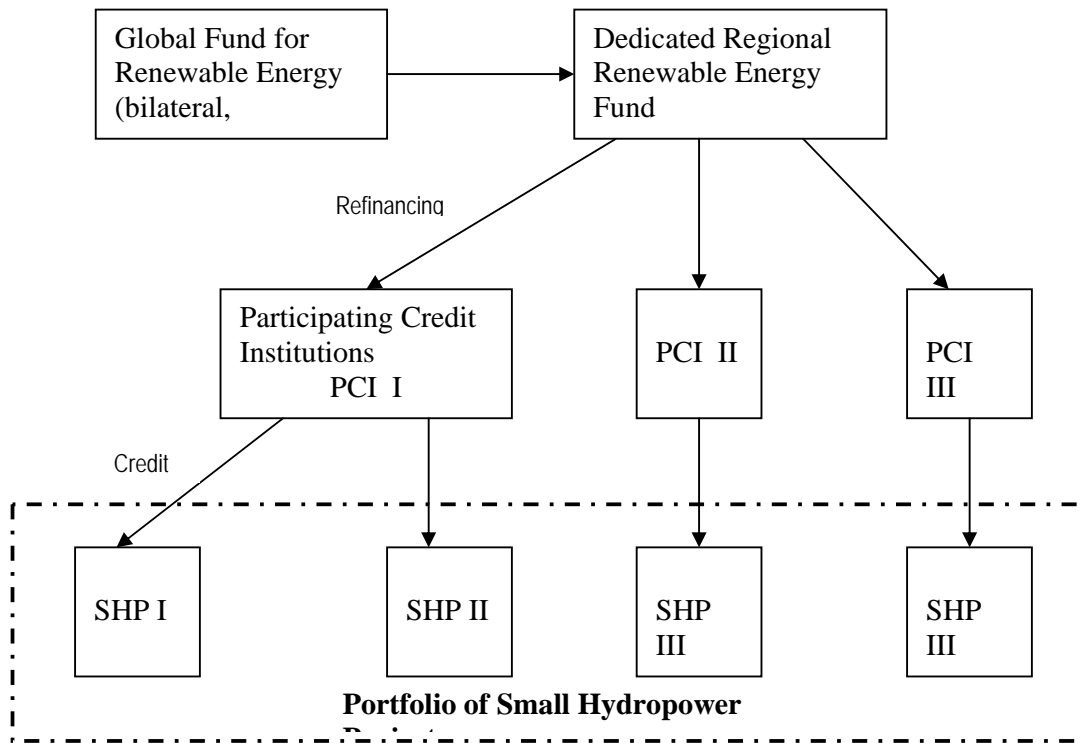


Figure 3: Portfolio or Sector Financing

In addition to commercial financing for the small hydropower projects, it is also anticipated that grant funds will be available from governments to cover any rural electrification expenses. The Ugandan government will even cover part of the cost of the investment into the hydropower project itself.

Appendix T: The Proposed Clean Energy Fund for Agro-Industry in Africa

The “Greening the Tea in East Africa” and Cogen for Africa projects are expected to generate a pipeline of small hydro projects estimated to require between USD 500,000 to over USD 20m per project. The project cycle is also expected to vary, based on size, location, ownership, etc. However, in general, the financial needs of portfolio projects can be divided into small and large project, or <USD 5m and >USD 5m respectively. It is therefore proposed that CEFA be launched in two phases, CEFA I and CEFA II, which responds to the project cycle and size characteristics of the targeted market. As the name of the fund suggests, CEFA will target the agro-industrial sector and will therefore, initially target the tea and sugar industries.

The financing gap addressed by Phase 1 of CEFA (“CEFA I”) is between EUR 500,000 and EUR 5 million per investment, with the target fund size being EUR 20 million (CEFA I will focus on Small Hydro Projects linked to the tea sub-sector and may include small cogeneration projects in the sugar and other agricultural sub-sectors).

The financing gap addressed by Phase 2 of CEFA (“CEFA II”) is over EUR 5 million per investment; the total target fund size is EUR 50 million. This will focus on medium to large co-generation projects in the sugar and other agricultural sub-sectors.

In order to deliver effective investments, it is proposed that CEFA could, in addition to the project preparation assistance under the “Greening the Tea in East Africa” and the separately proposed Cogen for Africa projects, combine its investment funding with Business Development Assistance, under CEFA’s “Project Developer’s Support Facility” or PDSF. PDSF will be a grant facility which project developers and sponsors would be able to access to apply on very specific barrier-removal activities within their projects, including matters related to internal controls and governance. In addition, PDSF will assist viable projects in their documentation and application for carbon finance under the Clean Development Mechanism (CDM) framework. The following diagrams illustrate the organisational structure and the flow of funds in the proposed Fund.

Appendix U: Monitoring and Evaluation Plan

Execution Performance

Execution performance monitoring of the project will assess the effectiveness and efficiency of management activities of the project. Information on the execution of activities each year will be collected and these will be compared with the activities outlined in the annual work plans. Execution performance monitoring will also evaluate the effectiveness of management structures in resolving difficulties that arise during the course of the project. Table 30 lists the indicators and their means of verification for monitoring execution performance and UNEP will be responsible for tracking these indicators.

Table U1: Indicators for Evaluating Project Execution Performance

Indicator	Means of Verification
Biannual and annual progress reports are prepared on time	Report arrival at UNEP
Quarterly financial reports are prepared on time	Report arrival at UNEP
Project objectives and outcomes are achieved as specified in the annual work plans	Biannual and annual progress reports
Deviations from the annual work plans are corrected promptly and deviations from approved budget is submitted on time	Work plans, PSC meeting minutes; arrival of revised budget at UNEP
Difficulties that arise during project implementation are resolved	PSC meeting minutes; biannual and annual progress reports
Disbursements are made on time and procurement is done according to the procurement plan	IMIS system at UNEP and bank account statements of executing agency
Sound financial practices of the project	Audit reports
The PSC is tracking implementation progress and project impact and providing guidance on work plans	Minutes of PSC meetings

Planned Outputs

Project outputs outlined in Table 31 below will be continuously monitored throughout the project in order to determine their timeliness as well as their quality. The PMO will ensure the preparation of these project outputs as planned in the project work plan and mid-term and final evaluations of outputs will be carried out by external monitors contracted by UNEP.

Table U2 Project Outputs

Project Outcome	Outputs (O) and Milestones (M)
1. Investment confidence established in small hydropower sector among investors, project developers and financing institutions	<p>O: Ten feasibility studies including detailed design, demand analysis and energy efficiency for small hydropower demonstration projects completed for at least three EATTA countries</p> <p>O: Five pre-feasibility studies and training completed in remaining EATTA countries</p> <p>M: Training conducted for developers in managing small hydropower risks</p> <p>M: Study tours in South Asia and Africa for prospective investors and developers</p> <p>O: Six small hydropower projects developed with commercial investment from the tea industry</p> <p>O: Financing modality for small hydropower investments developed</p> <p>M: Training on project finance for bankers and insurance companies</p>
2. Technical capacity enhanced in EATTA countries to design and construct small hydropower and manufacture associated equipment	<p>O: Quality standards for small hydropower formulated and proposed to engineering and construction community and concerned authorities</p> <p>M: Training of consulting and construction engineers, system designers and surveyors</p> <p>O: Five Eastern/South African consultancy/engineering firms engaged in small hydropower development</p> <p>M: Training of local equipment and component manufacturers</p>

Project Outcome	Outputs (O) and Milestones (M)
	<p>O: Two Eastern/South African manufacturing firms engaged in producing components for small hydropower</p> <p>O: Assessment of local value added to small hydropower development</p>
3. Models in place for private-public participation in rural electrification through small hydropower	<p>O: Two feasibility studies completed for viable models to demonstrate small hydropower based rural electrification projects electrifying neighbouring communities</p>
4. Regulatory environment conducive to IPP investment in small hydropower and private sector involvement in rural electrification	<p>M: Consultation with authorities and other stakeholders to arrive at supportive regulations</p> <p>M: Study tours in South Asia and within Africa to visit countries with effective regulations</p> <p>O: Formulation of light-handed regulations for licensing of IPPs for small hydropower generation as well as for private sector involvement in rural electrification</p>
5. Establishment of a viable 'standard PPA' in EATTA countries for small hydropower	<p>M: Consultations with authorities and other stakeholders for a 'standard PPA'</p> <p>M: Study tours in South Asia and within Africa for utility officials and regulators to observe impacts of a standard PPA</p> <p>O: Studies on a viable 'standard PPA' for small hydropower in EATTA countries</p> <p>O: Draft standard PPA formulated and proposed to authorities in EATTA countries</p>

Project Impact

The overall impact of the project will be evaluated based on its success in achieving the outcomes outlined in the project logical framework. A set of key indicators will be used to evaluate the success of the project. These indicators are outlined in Table 32 according to project outcome. Project impact will be monitored continuously throughout the project through biannual and annual progress reports, mid-term evaluation and final evaluation.

Table U3: Key Performance Indicators

Objectives and Outcomes	Key Performance Indicators	Method of Data Collection
<p>Development Goal</p> <p>Development of a more sustainable and competitive tea industry through wider use of climate friendly energy options</p>		
<p>Project objective</p> <p>Increased investment in small hydropower to reduce energy costs in the tea industry in Eastern/Southern Africa, improve reliability of supply, increase power supply for rural electrification, and reduce Greenhouse Gas emissions</p>	<ul style="list-style-type: none"> • \$'s invested in feasibility studies and project implementation • MW's produced by SHP • SHP produced MWh's utilized in tea production and rural electrification • Cost of energy available to tea factories • New households electrified under RE • GHG reduced as a result of SHP 	<p>M&E system set up at the PMO to record information collected from:</p> <ul style="list-style-type: none"> • EATTA/ National tea boards/ associations • Investors • Banks • Tea factories • Rural electrification boards • Periodic independent reviews
<p>Outcome 1</p> <p>Investment confidence established in small hydropower sector among investors, project developers and financing institutions</p>	<ul style="list-style-type: none"> • Applications for licenses • Investment of tea factories into feasibility studies • Feasibility studies completed beyond pilot • Growth rates in investment (\$s) and SHP MW's • Small hydropower investment 	<p>M&E system will collect information from:</p> <ul style="list-style-type: none"> • Regulators for licenses applied for and issued • EATTA/ National tea boards/ associations for tea factory licence applications • Tea factory investors

Objectives and Outcomes	Key Performance Indicators	Method of Data Collection
	attractiveness spilling over to non-tea sector	<ul style="list-style-type: none"> Investing banks on credit provided Rural electrification boards on small hydropower investment in rural electrification Independent review
Outcome 2 Technical capacity enhanced in EATTA countries to design and construct small hydropower and fabricate associated equipment	<ul style="list-style-type: none"> Number of competent consultants and engineering firms engaged in designing, construction, and commissioning of small hydropower. Increased local manufacturing content in small hydro installations Increased local value added in SHP investment 	<ul style="list-style-type: none"> Information on the number of participating firms from associations of consultancy and engineering firms Study on local component manufacturing and local value added in SHP sector
Outcome 3 Models in place for private-public participation in rural electrification through small hydropower	<ul style="list-style-type: none"> Private sector incentives for investment in rural electrification proposed to governments New distribution models developed and proposed to authorities 	<ul style="list-style-type: none"> Public announcements/reports from rural electrification boards and regulator
Outcome 4 Regulatory environment conducive to small hydropower IPP investment and rural electrification in EATTA member countries enabled	<ul style="list-style-type: none"> New 'light handed' regulations proposed to relevant authorities outlining a simplified process to acquire water rights and licenses for generation and where appropriate, distribution of power Simple yet effective environmental regulations proposed for small hydropower 	<ul style="list-style-type: none"> Public announcements Government acts and policies
Outcome 5 Stage set for establishment of a viable 'standard PPA' in EATTA countries for small hydropower	<ul style="list-style-type: none"> Number of countries with proposed 'standard PPA' for small hydropower 	<ul style="list-style-type: none"> Utility announcements and reports Electricity regulator announcements
Output 1.1 Ten full feasibility studies, including detailed design, completed for small hydropower demonstration projects in at least three EATTA countries. Output 1.2 Six small hydropower projects developed with commercial investment from the tea industry. Output 1.3 Five additional pre feasibility studies with accompanying training completed in remaining EATTA countries. Output 1.4 Project financing modality facilitated for small hydropower.	<ul style="list-style-type: none"> Licenses received for six small hydropower projects Ten high quality feasibility studies completed PPAs signed with respective utilities Small hydropower financing window established Financial closure achieved Contracts signed for construction and equipment supply Project construction completed Projects commissioned Five additional feasibility studies financed by developers 	<ul style="list-style-type: none"> Announcements and reports of <ul style="list-style-type: none"> regulatory authority utilities financing institutions Interactions with: <ul style="list-style-type: none"> project developers banks contracting and engineering firms

Objectives and Outcomes	Key Performance Indicators	Method of Data Collection
<p>Output 2.1 Five Eastern/Southern African consultancy/engineering and construction firms engaged in small hydropower development</p> <p>Output 2.2 Two Eastern/Southern African manufacturing firms engaged in producing components for small hydropower.</p> <p>Output 2.3 Increased local value added in small hydropower development</p> <p>Output 2.4 Quality standards for small hydropower formulated and proposed to concerned authorities in Bureau of standards, utilities, and Association of Engineers in EATTA countries</p>	<ul style="list-style-type: none"> • Engineering firms receive feasibility study and construction contracts • Manufacturing firms with contracts to supply small hydropower components • Good quality work carried out by Eastern/Southern African firms. • Estimate of local value added in small hydropower development • Quality standards for small hydropower proposed and acknowledgement received from concerned authorities 	<ul style="list-style-type: none"> • Engineering firms records • Interaction with consultancy, engineering , and manufacturing firms • Independent assessment of local content in SHP development. • External assessment of proposed quality control guidelines
<p>Output 3.1 Two feasibility studies for viable models to demonstrate small hydropower-based RE project electrifying neighbouring communities</p>	<ul style="list-style-type: none"> • Feasible studies available to demonstrate the viability of a small hydropower based RE in EATTA countries. • Acknowledgment from potential project developers 	<ul style="list-style-type: none"> • Announcements of project developers • Interaction with project developers and participating communities
<p>Output 4.1 Light-handed regulations on licensing of small hydropower generation by IPPs formulated and proposed for EATTA countries</p> <p>Output 4.2 Light-handed regulations for private sector involvement in small hydro based rural electrification formulated and proposed to authorities in EATTA countries.</p>	<ul style="list-style-type: none"> • Draft regulations available on water rights for small hydropower, licensing, distribution and environmental requirements in EATTA countries. • Acknowledgment from authorities of draft regulations 	<ul style="list-style-type: none"> • Public announcements and reports and official communication
<p>Output 5.1 Policy case made for standard PPA's attractive to investors, utilities, and end users for small hydropower made in all EATTA countries.</p> <p>Output 5.2 Draft standard PPA formulated and proposed to authorities in EATTA countries</p>	<ul style="list-style-type: none"> • Policy studies available demonstrating the viability of a standard PPA for all EATTA member countries • Acknowledgment from authorities of draft standard PPA 	<ul style="list-style-type: none"> • Stakeholder consultations, reports and official communication • Announcements by electricity utilities

As briefly described earlier, each entity of the project will have different roles and responsibilities for monitoring and evaluation. These roles and responsibilities have been outlined in Table U4 below according to each entity:

Table U4: Roles and Responsibilities of Project Entities

UNEP	EATTA	Project Steering Committee (PSC)	Project Management Office (PMO)	National Steering Committee (NSC)
<p>Monitor the outlined M&E Plan</p> <p>Receive quarterly progress and financial reports and annual progress reports and copies of all substantive reports from project activities</p> <p>Representation in Project Steering Committee by attending meetings</p> <p>Conduct site visits for monitoring and evaluation</p> <p>Engage third party consultant to for mid-term and final evaluations</p>	<p>Chair the Project Steering Committee and appoint its members</p> <p>Provide direct linkages with all its members in the tea sector</p> <p>Liaise with government agencies/ministries as well as with utility companies</p> <p>Facilitate national workshops in collaboration with EATTA members/ tea associations</p> <p>Facilitate continued data collection</p>	<p>Receive and review quarterly progress reports and financial reports and annual progress reports as well as all substantive reports</p> <p>Provide guidance to the Project Management Office for resolution of difficulties</p>	<p>Establish reporting guidelines for all experts involved in the project</p> <p>Ensure that reports are submitted on time</p> <p>Prepare progress reports and financial reports and forward them to UNEP</p> <p>Conduct site visits to supervise activities on the ground</p>	<p>Receive national level reports and review them</p> <p>Inform the PMO about difficulties that arise at the national level and recommend solutions</p>

OPTIONS: A number of small sites such as mini-hydro stations with a generation capacity of 25MW each and micro-hydro stations capable of producing 150KW have been identified

Uganda develops rural energy master plan

BY CATHERINE KILUNGU
Special Correspondent

Uganda is developing an energy resources database to prepare the country's energy sector for industrialisation on the north.

The database is expected to set standards for and serve private investment in the underdeveloped sector.

The data base will include information on hydro, solar, wind, geothermal, and other potential, status of development and location. The country is endowed with a variety of renewable energy resources such as the sun, wind, water, and biomass.

In order to facilitate investment in the energy sector, the Ministry of Energy and Mineral Development says a number of small sites such as mini-hydro stations with a generation capacity of 25MW each and micro-hydro stations capable of producing 150KW have been identified.

Installation of large sites has also been accomplished, and a 500MW power plant is planned.

The Ministry of Energy said recently in a statement that rural electrification master plan is being developed that will determine potentially viable distribution networks and what other technological options can be applied to serve the varied settlement patterns and demand across the country.

The objective of the master plan is to provide grants to support rural electrification projects and encourage feasibility studies for solar, wind, and biomass energy.

The master plan will establish the best and optimal for development and maintain the time and expense involved in the development of the country as the country's energy sector.

The Ministry has adopted a private public partnership (PPP) approach to deal with the government policy of private sector participation by establishing a rural electrification fund that provides subsidies to private entities engaged in generating and distributing energy to rural areas.

This will bring down the capital costs involved in rural



The dam dam, currently, Uganda's demand for electricity remains supply, and continues to grow at a rate of about 24000 per year. Picture: Uganda Bureau of Information

electrification and renewable energy projects.

"The major policy goal is to meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner."

Going to the increased electricity demand in the mid-1990s and the government's commitment to the Uganda Electricity Board was restructured to allow private sector participation and give opportunity for investment in small-scale renewable energy and also carry out rural electrification.

The government is therefore providing priority rural electrification projects to private sector entities as well as community-based rural electrification projects or CREEPs to reduce the country's dependence on biomass energy.

The Ministry of Energy is in conjunction with the Rural Electrification Agency (REA) and other Energy for Rural Transformation Programme (ERT) implementing companies has embarked on a path of expanding and

transforming the energy sector from one that is heavily dependent on biomass, to one emphasizing development and utilization of modern energy.

The REA has so far identified five distribution companies, that the private sector can construct as there are Masaka, Rakai and Kalungu for the central-west region, Mbarara and Mpigi for the south-west, Mbale, Iganga and Jinja for the north-east, Kasesa, Kibale, and Kisoro for the north-west, and Kulu, Adir, and Kulu for the south-east region.

The growth of Uganda's economy has created additional demand for various forms of electricity. Currently, the demand for electricity supply, and continues to grow at a rate of about 24000 per year.

Uganda's energy sector is dependent on low-grade forms of energy, especially biomass-based fuels.

The overall goal of the REA's 10-year strategy plan is to achieve the national target of 10 per cent rural electrification by 2012 set by the Rural Electrification Strategy and Plan.

The growth of Uganda's economy has created additional demand for various forms of electricity. Currently, the demand for electricity supply, and continues to grow at a rate of about 24000 per year.

Through ERT, the ministry is expanding the demand will be met in the long run. Since the inception of the ERT programme, electricity access has increased from 1 per cent to 2 per cent. The programme is multi-sectoral, with emphasis on providing strategic energy services to rural Uganda through the provision of electricity for schools, health centres, water processing plants and ICT and other services.

INDEPENDENCE: The factories, expected to be operational in 2007, will ease the pressure on the Kenya Tea Development Agency facilities

Kenya's Nyayo Tea Zones to build two new factories of its own

By CATHERINE KILUNGU
Special Correspondent

The Nyayo Tea Zones Development Corporation will build two tea factories this year.

The factories, one in Nandi and the other in Embu districts, are expected to ease the pressure on Kenya Tea Development Agency (KTDA) factories, which currently process leaf for the corporation.

Nyayo Tea Zones managing director Dr. Anne Kinyua said that the corporation is to begin construction of its first factory, at a cost of \$24.5 million, in February in Nandi district within the area's West Rift Valley belt. The second factory is planned for Embu in the East Rift Valley area.

The corporation's green leaf production has increased from three million kilograms in 1990 to 12 million kg last year, earning an estimated KSh100 million (\$4.8 million) annually.

Dr. Kinyua said the corporation will increase when the corporation starts processing its own tea and marketing value-added products to local and international markets.

The corporation was set up in 1991 to grow tea in 100,000 acres in the West Rift Valley area.

The growth of Uganda's economy has created additional demand for various forms of electricity. Currently, the demand for electricity supply, and continues to grow at a rate of about 24000 per year.

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The growth of Uganda's economy has created additional demand for various forms of electricity. Currently, the demand for electricity supply, and continues to grow at a rate of about 24000 per year.



Nyayo Tea Zones workers transport green leaf to a buying centre in Kericho. Pic: Anthony Kariuki

The National Environment Management Authority has given the Nandi Zone a clean bill of health, paving the way for the plant, which is expected to be fully operational in 2007.

Dr. Kinyua said that construction of the factories will ease congestion at the KTDA facilities, which suffer a glut

during peak periods, leading to loss of green leaf and rising farmers' outflows of vehicles every year.

"This situation will be more critical when the corporation's new 52 the remaining belts with tea bushes in the next five years," Dr. Kinyua said.

She said construction of the

factories will go hand in hand with the planting of trees in the forests bordering the zones.

In the area earmarked for tea zone development, some 2,000 hectares of tea and 2,000 hectares of forest have been planted.

Within the next three years, the corporation is planning to plant another 3,000 hectares of tea, 6,000 hectares of forest and 600 hectares of indigenous trees.

Part of the land from the ADB will be allocated to local communities to grow tea to



Construction of the factories will go hand in hand with the planting of trees in forests bordering the zones

Dr. Anne Kinyua, managing director, Nyayo Tea Zones

factories will go hand in hand with the planting of trees in the forests bordering the zones.

The reforestation will be funded by the African Development Bank at a cost of \$400 million (\$40.3 million) and is scheduled to start this month. Funds for the factories have been advanced by the European Investment Bank.

In the area earmarked for tea zone development, some 2,000 hectares of tea and 2,000 hectares of forest have been planted.

Within the next three years, the corporation is planning to plant another 3,000 hectares of tea, 6,000 hectares of forest and 600 hectares of indigenous trees.

Part of the land from the ADB will be allocated to local communities to grow tea to

lead up to conservation efforts, Dr. Kinyua said. "The trees will be used as fuel when the corporation's factories start operating," she added.

Appendix W: List of Stakeholders Contacted During PDF-B

Name	Position	Institution	Country	Contact Address
Tea Producers				
Gilbert Chirwa	Chief Executive	Tea Association of Malawi	Malawi	01 671182/671355
Elysee Ntiranyibagira	Directeur Generale	Office du The du Burundi	Burundi	2680, Bujumbura Tel: 257 224228/224288 otb@cbinf.com
Zabron Mugo	Group Engineer	Williamson Tea Kenya Limited	Kenya	P.O. Box 42281, 00100 Nairobi Tel: 2710740/1 Fax: 2718 737 zmugo@williamson.co.ke
Ali Abdirizack	Group Development Manager	Kenya Tea Development Agency	Kenya	P.O. Box 30213 GPO 00100 Nairobi Tel: 254 20 221441/2/3/4 ext 7953 Fax: 254 020 211240 aabdirizack@kdateas.com
Z. K. M'Imwere	Manager, Strategic Planning and Development	Kenya Tea Development Agency	Kenya	P.O. Box 30213 00100 Nairobi Tel: 254 20 221441/2/3/4 Fax: 254 020 211240 zm'imwere@kdateas.com
Charles Okombe Akali	Senior Accountant	Kenya Tea Development Agency	Kenya	P.O. Box 30213 00100 Nairobi Tel: 254 20 3227000 ext 7503 Fax : 254 020 211240 cakali@kdateas.com
Samuel Gitimbu	Group Administration Manager	Koisagat Tea Estate	Kenya	P.O. Box 53104 00200 Nairobi Tel: 020 318451 or 242024 Fax: 020 343697
Martin Ogada	Company Electrical Engineer	Unilever Tea Kenya Limited	Kenya	P.O. Box 20 20200 Kericho, Kenya Tel: 254 0 52 20120/1 Fax: 254 0 52 30103 martin.ogada@unilever.com
Benjamin Manji	Senior Accountant	Kenya Tea Development Agency	Kenya	P.O. Box 30213 GPO 00100 Nairobi Tel: 254 20 3227000 ext 7503 Fax: 254 020 211240 bmanji@kdateas.com
Donald Onsongo	Senior Zonal Manager	Kenya Tea Development	Kenya	P.O. Box 221, Kangema Tel: 060 322243 or 0733694119

Name	Position	Institution	Country	Contact Address
Tea Producers				
		Agency - Zone 3		
Francis Wanjohi	General Manager	Koisagat Tea Estate	Kenya	P.O. Box 53104 00200 Nairobi Tel: 020 318451 or 242024 Fax: 020 343697
Chris Ballard	General Manager, Engineering	Eastern Produce of Kenya Limited	Kenya	Tel: 254 643434 c.ballard@nandi.easternproduce.co.ke
John Mbugua	Managing Director	Venus Tea Brokers LTD	Kenya	P.O. Box 99954 80107 Mombasa Tel: 2222196/7 Fax: 2222196/7 info@venustea.com
F. K. Utich Kaptich	General Manager, Technical and Development	Unilever Tea Kenya Ltd	Kenya	P.O. Box 20, Kericho, Kenya Tel: 254 52 30395/31383
Danton Vorster	Regional Marketing Manager	Eastern Produce Kenya Ltd	Kenya	45560, 00100 GPO Nrb Tel: 020 4440399/4440115-9 mail@easternproduce.co.ke
Nicholas Munyi	General Manager	James Finlay (Kenya) Ltd	Kenya	223, Kericho Tel: 052 20155-9/164 teafactories@finlays.co.ke
Charles Kipngok	General Manager	Kaisugu Ltd	Kenya	37-20200, Kericho Tel: 052-30623/20027 0722 208827 kaisugu@africaonline.co.ke
Michael Gakungu	General Manager	Karirana Estates Ltd	Kenya	39, Limuru 00217 Tel: 066 71210/72281/71625 Gakungu@karirana.co.ke
		Kibwari Ltd	Kenya	45560, 00100, GPO Nrb Tel: 020 4440399/440115-9 mail@easternproduce.co.ke
Shashi Menon	General Manager	Kipkebe Ltd	Kenya	Private Bag-20227, Sotik Tel: 052 20780/32080/30250 kipltd@africaonline.co.ke
Peter Muthoka	Managing Director	Sasini Tea & Coffee Ltd	Kenya	30151, 00100 Nairobi Tel: 020 342166/ 342171/2 info@sasini.co.ke

Name	Position	Institution	Country	Contact Address
Tea Producers				
Lawrence Karanja	Director	Koisagat Tea Estate Ltd	Kenya	53104-00200, Nairobi Tel: 020 242024/318451 parkside@wananchi.com
Simon Davies	General Manager	Kakuzi Ltd - Siret Division	Kenya	45560, 00100, GPO Nrb Tel: 020 4440399/440115-9 mail@kakuzi.co.ke
Arthur Rimberia	General Manager, Production	Kenya Tea Development Agency	Kenya	30213, GPO 00100 Nairobi Tel: 020 3227000/221441-4 info@kdateas.com
Samson Birir	Managing Director	Kiptagich Tea Estate Ltd	Kenya	1, Olenguruone/13413 Nakuru Tel: 051 850884 kiptagic@africaonline.co.ke
Francis Githendu	General Manager	Maramba Tea Factory Ltd	Kenya	1412-00217, Limuru Tel: 066 50470/50509 maramba@africaonline.co.ke
Titus Kipyab	General Manager	Nandi Tea Estates Ltd	Kenya	26, Nandi Hills Tel: 053 643008 nanditea@africaonline.co.ke
Anne Kinyua	Managing Director	Nyayo Tea Zones Devt. Corporation	Kenya	48552, Nairobi Tel: 020 219376/216748 info@teazones.co.ke
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