PACEAA

Poverty Alleviation through Cleaner Energy from Agro-industries in Africa

Deliverable 2
Business Models for Rural Electrification from Agro-Industries -The Case of Kenya, Tanzania, Rwanda, and Malawi

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Abbreviations and Acronyms

BOO	Build Own and Operate
BOOT	Build Own Operate and Transfer
BOT	Build Operate and Transfer
ESCO	Energy Service Company
GEF	Global Environmental Facility
GTIEA	Greening the Tea Industry in East Africa
IPP	Independent Power Producer
kW	Kilowatt (1000 Watts of power)
MW	Megawatt (1000 kW of power)
NGO	Non-governmental Organization
O&M	Operations and Maintenance
SHP	Small Hydro Power
SWOT	Strengths Weaknesses Opportunities and Threats
TF	Tea factory
UNEP	United Nations Environment Programme
USD	United States Dollar

Preface

Cleaner energy has great potential to contribute to sustainable agricultural growth, poverty reduction, and rural development. However, in practice, effective integration of energy and agricultural sectors to reduce poverty through cleaner energy systems is constrained by several barriers. PACEAA seeks to contribute to poverty reduction in Africa through improved agro-based cleaner energy planning and implementation. Specific objectives are: (a) to identify policy, commercial and regulatory barriers that are currently restricting the uptake of cogeneration and renewable energy systems from agro- industries in selected countries, and to propose ways of overcoming these barriers; (b) to develop detailed policy and regulatory guidelines and incentives for adoption of cleaner energy from agro-industries into rural electrification programmes as well as incorporate the packages into local rural electrification plans; and (c) to enhance local and regional capacity of public institutions, private sector (financial institutions, agro-industries, rural stakeholders) for the effective utilisation of cogeneration and other cleaner energy systems from agro-industries in the rural electrification process (d) to promote rural electrification packages for financing by rural electrification funds/ agencies and dedicated donors. PACEAA will accelerate the pace of integration of energy and agriculture sectors leading to poverty alleviation in Africa.

The actual potential for generating energy from renewable energy technologies (hydro, biomass) by agro-industries could potentially generate more than the industries' actual energy requirements and the excess energy could be used for Rural Electrification: the demand for power is high in rural areas of the 11 countries (Burundi, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Sudan, Swaziland, Tanzania, Uganda, Zambia) covered by PACEAA, as the average rural electrification rate does not exceed 5% of the total rural population.

The overall goal of the PACEAA project is to encourage and facilitate the involvement of rural African agro-industries in the process of rural electrification, in order to alleviate poverty and contribute to sustainable development. This requires understanding the energy needs and priorities of agro-based industries, the identification of best practice solutions to address these needs and the formulation of packages covering institutional, financial and technical issues ready for implementation and replication. It requires strengthening the capacity of agro-processing industries, local communities, planners and service suppliers to adopt such best practices, so that rural Africa will gain access to an improved choice of affordable, efficient and acceptable

agro-industry-led and -induced energy services. The immediate objectives of the Project are threefold:

To identify policy, commercial and regulatory barriers that are currently restricting the uptake of cogeneration and renewable energy systems from agro-industries in selected countries, and to propose ways of overcoming these barriers;
To develop detailed policy and regulatory guidelines and incentives for adoption of cleaner energy from agro-industries into rural electrification programmes as well as incorporate the packages into local rural electrification plans.
To enhance local and regional capacity of public institutions, private sector (financial institutions, agro-industries, rural stakeholders) for the effective utilisation of clean energy systems and cogeneration from agro-industries in the rural electrification process.

Four projects were selected to develop full regulatory, organisational and financial packages that would facilitate the effective implementation of a rural electrification project in and around interested tea factories in parallel to their respective development of their small hydro projects. For these 4 projects, local rural electrification plans have been developed in association with local stakeholders in the vicinity of selected tea factories and used as case studies to validate the effectiveness of the regulatory, organisational and financial packages.

The output of these activities is being widely disseminated in Africa in order to set the foundation for an effective contribution of agro-industries to rural electrification. Training and capacity building activities have taken place throughout the project duration.

PACEAA cooperates with two large initiatives from the agro-industries in East and South Africa, co-implemented by the United Nations Environment Programme (UNEP) and the African Development Bank (AfDB) through the Global Environmental Facility (GEF): “Greening the Tea Industry in East Africa (GTIEA)” executed by the East Africa Tea Trade Association (EATTA) and “Cogen for Africa” executed by AFREPREN/FWD. Both EATTA and AFREPREN/FWD are key subcontractors to the PACEAA project, with DTU (Denmark, Coordinator), IED (France) and UNEP (France) being the European partners. The project duration is 36 months.

1 Introduction

Taking into account PACEAA's overall goal of poverty reduction facilitated by clean energy deployment, it is important to consider how to appropriately mobilize resources so that social development is prioritized alongside the pursuit of economic growth. In this light, it is deemed that the mobilization should take place around the two key activities of the project, namely power generation on one hand and power distribution on the other; and for both areas of activity businesses should be organized with a strong social focus. In this chapter of the PACEAA project the business models that could deliver the desired pro-poor benefits are analyzed and discussed, and in the end suitable models are recommended. Here, a business model is taken to mean a setup or arrangement of a business organization with the objective of achieving monetary and other gains after committing investments.

The centre of attention in the PACEAA project is power generation by tea factories or companies, and rural electrification involving communities that are target beneficiaries for the generated power. Therefore, the business models that are considered include as key players the tea factories and benefiting communities around the tea factories. At the generation level, the tea factories are expected to generate power or have it generated on their behalf, and the bulk of the electricity would be used by the factories. It is estimated that less than 2% of the power available after meeting the factories' requirements would be taken up by the rural electrification. Thus, the generation business model should be such that it caters for the electrification (social) needs of the communities around the tea factories. Socio-economic gains of the business are also expected to trickle down to the communities through employment of local people and creation of other economic spin-offs from the business.

The electrification or distribution business is expected to receive electric power from the tea factory or designated generator, and through a local distribution network provide supply to community members. Generally, the business could be carried out by any organization or person. However, in view of the strong connection between the electrification and community welfare, it is important to involve the community either as the business owners and operators or as substantial stakeholders. Regardless of the ownership or undertaking, it is worth noting the likelihood of a low or negative financial return on investments. Social returns would, on the other hand, be high although difficult to account for in economic terms. Consequently, the distribution (electrification) business model would normatively have a low probability of attracting profit-making organizations in the business, and more interest from development-oriented institutions.

For the two types of business models, namely generation and distribution models respectively, financing is a critical input. A decision about the right models can therefore be made only after examining available kinds and sources of financing. For example, on

the generation side the commercial element of the business is strong and it should ideally be simple to obtain debt and equity financing from private investors, commercial banks, micro-finance institutions, and other lenders. However, generation of power from renewable energy sources as planned in this project is normally considered a high risk venture, and most commercial lenders would be reluctant to provide finances for such initiatives, or high levels of guarantees would be demanded. What could attract the lenders is the existing credit rating of the project developer, in this case the tea factory or associated power generator. There would also be possibilities for the project to attract development or carbon financing in view of the social development and environmental impacts reduction potential of the project. Therefore, a mixture of commercial and development financing could be available for the project.

For the distribution business the risk of committing financial investments is much higher and as such securing private capital or commercial lending is an enormous task. The most probable sources of financing would be from micro-credit institutions, cooperative savings and credit societies, development funding agencies, and special sources like the Fair Trade System. The funding agencies include bilateral and multi-lateral donor institutions, governments (represented by e.g. rural electrification funding bodies), and charitable organizations. Although development funding would be the substantial source of finance, increasingly commercial co-financing has been demanded as leverage for the soft funding. The co-financing requirement is for ensuring sustainability of the community-based initiatives. Additionally, the benefiting communities would be expected to make significant in-kind contributions as a supplement to any financial inputs they can raise. The contributions would reinforce the communities' commitment to the initiatives and again the sustainability level would be increased.

It should be noted that although both generation and distribution types of business models are discussed, the requirement for the PACEAA project output is the latter. This is as stipulated under Work Package 3 (see Appendix 1) of the project contract sheets. The generation business models are given attention as they relate to the distribution ones, and their design under the GTIEA project is expected to have an impact on the distribution businesses.

This document should be read in conjunction with the project mission reports and Deliverable D1 document that preceded the current one, in the PACEAA series of documents (available on the http://www.paceaa.org website). The facts used in analyzing the business models were mainly gathered during missions and reviews presented in the reports and documents. Information from literature has also been used and a list of references that were consulted is given at the end of the document. Following is a layout of the main sections of this document:

An overview is given in section 2 including all the possible models both on the generation and distribution sides. Details of the characteristics of the models considered follow in section 3.

In section 3 individual country cases are analysed and models that would be suitable are derived. Analyses of the potential models are carried out after screening with general selection criteria applicable separately to generation models and distribution models. The final assessment in each case is a SWOT analysis for the three topmost models, following which suitable models are recommended. Implementation issues are discussed thereafter

In the 4th section, conclusions are drawn from the assessments carried out. Furthermore, a cursory consideration of other countries in the scope of the PACEAA Project is given in the light of the conclusions arrived at.

2 Business Model Characteristics

From the literature (e.g. Barnes and Foley, 2004; World Bank, 2008; Barnes and Floor, 1996), and authors' experiences, there are numerous business models that can potentially fit the requirements of the generation and distribution businesses that are envisaged. The closeness of the fit does, however, vary considerably and after discarding the obviously inapplicable cases the lists that follow have been arrived at.

Potential models

GENERATION BUSINESS	
GM1	Tea factory (BOO) – as builder, owner and operator
GM2	Tea factory and IPP (joint venture) – as builder, owner and operator
GM3	IPP (BOO) - as builder, owner and operator
GM4	IPP (BOT) - to build, operate, and transfer to Tea Factory or other buyer after full establishment
GM5	Concessionaire* - assigned license by regulator to generate and distribute within the area (to supply tea factory and local communities)
GM6	National power utility** - as generator and distributor to tea factory and local communities, and if possible connect to national grid

DISTRIBUTION BUSINESS***	
DM1	Rural Community (Cooperative) - as owner and operator
DM2	Rural Community (non-cooperative and non–profit association) - as owner and operator
DM3	Rural Community (as a for-profit company) - as owner and operator
DM4	Rural Community and Tea Factory -as owner and operator
DM5	ESCO - as owner and operator
DM6	ESCO and Rural Community - as owner and operator
DM7	NGO and Rural Community - start up by NGO and transfer to community
DM8	Concessionaire - may combine generation and distribution
DM9	National power utility - may sell to rural community after local generation and partial distribution

* This model may be applied in case the tea factory is unable to undertake the power generation business

** Similarly this model may be applied in case the tea factory is unable to undertake the power generation business

***The distribution business would be carried out after purchase of power from tea factory power generation or from other generator/distributor

NB: The lists of models are not exhaustive, as those that would be marginally suitable have been excluded.

For a closer understanding of the different business models considered in this document, the descriptions below provide details of the individual models. Firstly, generation models are given generically (section 2.1) and then specifically (sections 2.1.1 to 2.1.6); and secondly the same process is followed for distribution models (sections 2.2 and 2.2.1 to 2.2.7).

2.1 Power generation models

The elements taken into account in all the models within the scope of generation are depicted in Fig.1. Here, the producer is any entity that puts up the generating facility with its own investments or capital secured from third parties, and could be the owner and operator of the facility as well. Possible producers could be private bodies like Independent Power Producers (IPPs), public utilities, power supply concessionaires, the tea factory (TF) that is the principal beneficiary of the power to be generated, the TF in joint venture with an IPP, or other kind of power business enterprise. Although the TF is the primary target of the power generation, it only constitutes part of the potential market for the power. Other market targets would be the rural community or settlements neighbouring the TF, and the public power utility that has a grid network near the power production site.

The inputs to the power business include investment capital, operation and maintenance (O&M) capital, and other resources. The bulk of the investment and O&M capital is in the form of financing which can be obtained from financial institutions such as commercial banks, share contributions, micro-finance institutions, and other sources as indicated in Fig.Ap1. The source or sources of finance that can be available for the business depend upon the business's corporate status, focus (e.g. profit-making, socio-economic development, climate change or environmental impacts mitigation, or other pursuit), scale of operations, perceived credit-worthiness, gender orientation, etc.

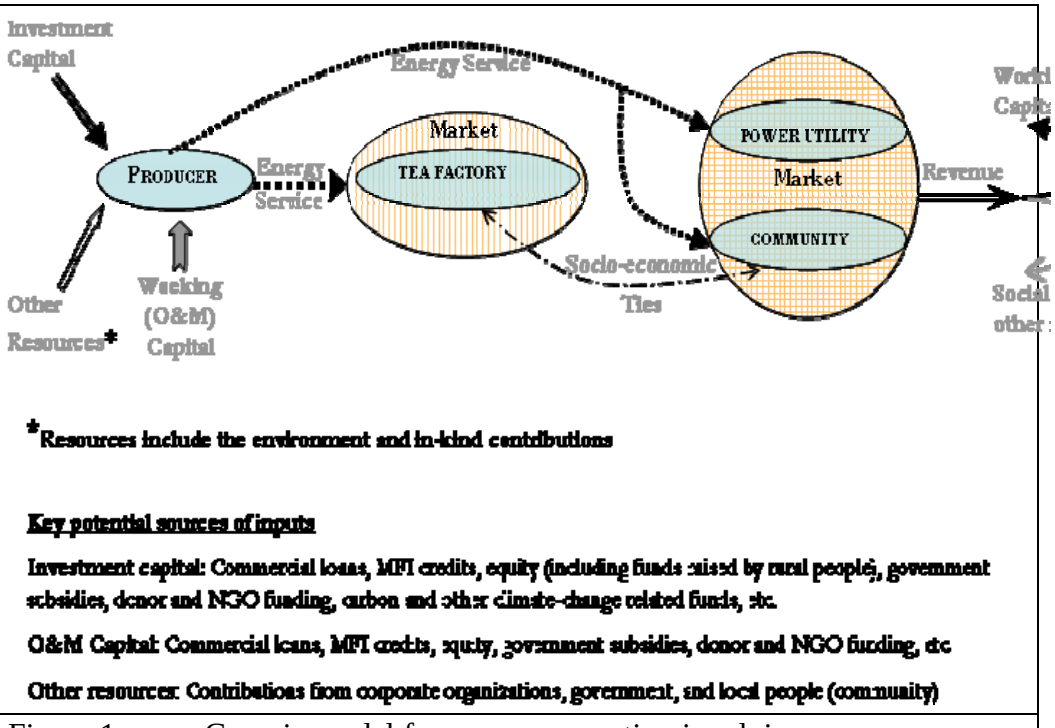


Figure 1: Generic model for power generation involving tea factory and rural community

The other category of inputs is other resources, largely composed of non-financial components such as environmental elements (land, water, air, natural vegetation, etc.), and in-kind contributions such as free labour and assets. The proportion of these inputs increases as the type of business moves from the scale of commercial to non-commercial; or from a private enterprise model as represented by, for example, a commercial firm, to a social organization model as exemplified by a rural community association.

The principal aim of the business is to generate electricity and primarily make the power available to the tea factory (TF). The power production could be carried out by the TF itself; or alternatively, either a separate producer or a combination of the TF and the producer could undertake the generation. The market for the power also consists of the communities around the TF (who are usually without access to electricity), and the nearest public power utility grid (as most TFs are grid connected). The extent of supply to the other players in the market could depend on the availability of power capacity above the TFs requirements and the incentives for serving the additional users. However, the situation would be different if the power utility took the place of the producer, in which case the utility would be expected to accord priority to supplying its own grid. The same argument could apply to the communities if they were able to carry out the generation business. However, although they are quite capable of pico-scale hydropower projects (≤10 kW), they would not be able to take up generation of the size required by a TF (minimum of several hundred Kilowatts) but could in some circumstances become a shareholder of the generation company.

The output from the power business would mainly be revenue that would be fed back into the business as operating capital, and profit. The success of the business would largely depend on the level of revenue earned in relation to the inputs. In addition to the financial earnings from the business, there would be socio-economic benefits that would arise from the business. The benefits would include employment opportunities for the local population (communities), and possibly increased purchases of local products, with consequent improvement of incomes of people in the vicinity of the business. If the tea factory is the power producer or the factory benefits significantly from availability of generated power, increased tea manufacturing could be achieved. The benefits could further be passed to the local community members who supply the factory with tea, and who benefit in other ways from socio-economic ties with the tea company.

2.1.1 **Tea factory as developer, owner, and operator (BOO)**

In this case an illustration of which is given in Fig. 2, the existing business of green leaf tea buying, processing, and marketing is extended to include a power generation component, or a subsidiary company is formed to look after the power generation aspect. This would entail a business expansion, and calls for the tea company to obtain investment capital as well as other resources for the new line of business. Since the core

activity of the company is tea related the highly technical line of power production could present a challenge.

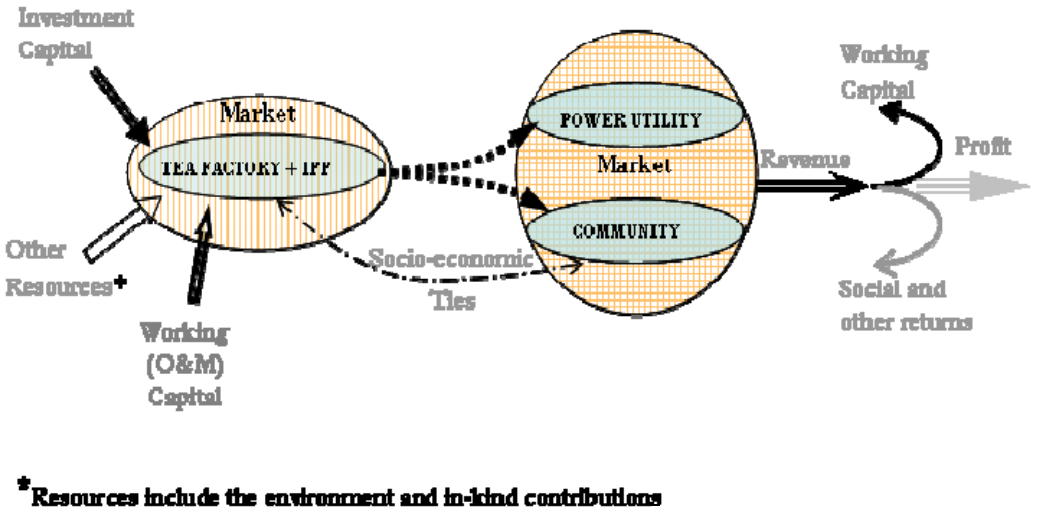


Figure 2: Model for power generation by tea factory as developer, owner, and operator

If the company goes for the first option of integrating the electricity generation into the existing business, it would be necessary to either create an entirely new and permanent technical department to deal with the new electric power activity, or additional resources would need to be provided for the existing technical department. For the first option, it is also imperative that modification to other departments like accounting, stocks, and marketing would require beefing up to cater for the new business. The second option where a subsidiary company would be formed is more straightforward, and dedicated resources for the new company would have to be secured and deployed. However, in both options the marketing function would need specific attention if it is decided that there would be electricity sales over and above production of power for use in tea manufacture.

It is advantageous that the tea factory owners have an ongoing business, and therefore starting power production would only need a diversification from their current trade. The question that arises is whether the tea company should engage in the power business directly, or engage another entity that is more competent in running a similar business, and thus ensure better performance. The direction to be taken would be dictated by a number of factors including: whether the tea company would achieve a higher benefit to cost advantage by engaging an agency for the power business, whether the goal is to generate power solely for own-use or to undertake power sales as well, and whether acquisition of necessary investment finance would be enhanced by use of the agency. The other options open to the tea company are to leave the production of electricity to a

competent producer and become a buyer of the power from the producer, or go into partnership with the producer. The last two options are discussed separately in the sections below where each option is considered as a model on its own.

From the perspective of addressing the power needs of the communities around the tea factory, it would definitely be better to have the tea company as a power producer, or have the company in partnership with a power generating entity. Additionally, the communities could have a stake in the power generation

2.1.2 **Tea factory and IPP (joint venture)**

For sharing of resources, competencies, and risks this is a good option as the strengths of the tea factory and IPP would be harnessed. It would be particularly important to use the electric power business competence of the IPP, and the tea factory would optimize on the demand-side of the business through its tea production knowhow. Taking into account the high risk associated with power production from renewable energy sources, financing of the business would be a major challenge, but with the sharing of risks financiers could soften their terms. The presence of the IPP in the venture would also be an added incentive for commercial financiers to consider lending to the business. Nonetheless, finding a venture partner, agreeing to business terms, and arriving at equitable sharing of proceeds would be a significant hurdle. Therefore, the option, which is illustrated in Fig. 3, would need to be given careful consideration.

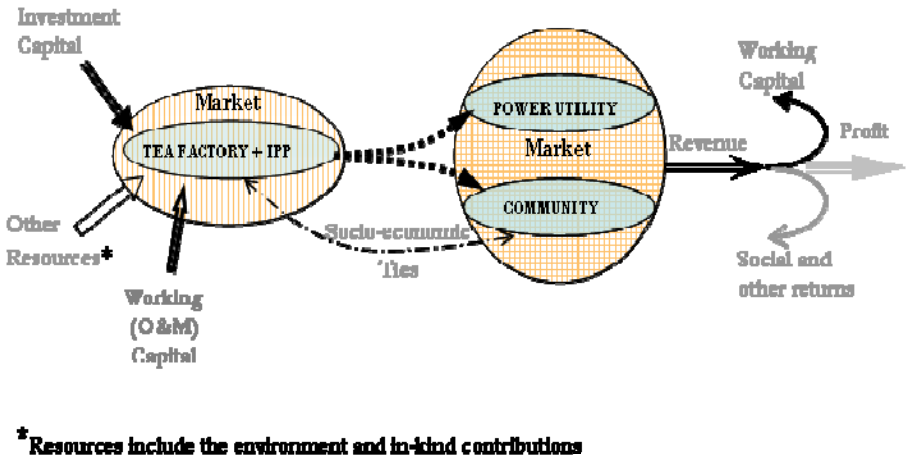


Figure 3: Model for power generation by tea factory and IPP as joint developer, owner, and operator

Since the business partnership would be strongly commercial its main thrust would be ensuring success in the provision of power to the tea factory and the grid (where feasible). The prospects of it being involved in development efforts would be limited, and particularly interest in rural electrification would be confined to the influence of

local people on the tea factory business. If on the board of the tea factory ownership there is good representation of tea farmers and associated communities pressure can be exerted towards supporting rural electrification. Similarly, if donor funding is obtained to facilitate electrification the partnership would accordingly give attention to provision of power to local communities.

2.1.3 **IPP as developer, owner, and operator**

The situation in this case would be similar to the one of the joint venture between a tea factory and IPP, but without participation of the tea factory. It would be expected that the business (shown in Fig. 4) would have as its first priority maximization of financial gain from commercial investments. In addition, the business would have to be sufficiently attractive to keep the IPP in it in the long term; otherwise the IPP might want to transfer the business to the tea factory or other parties as described under section 2.1.4.

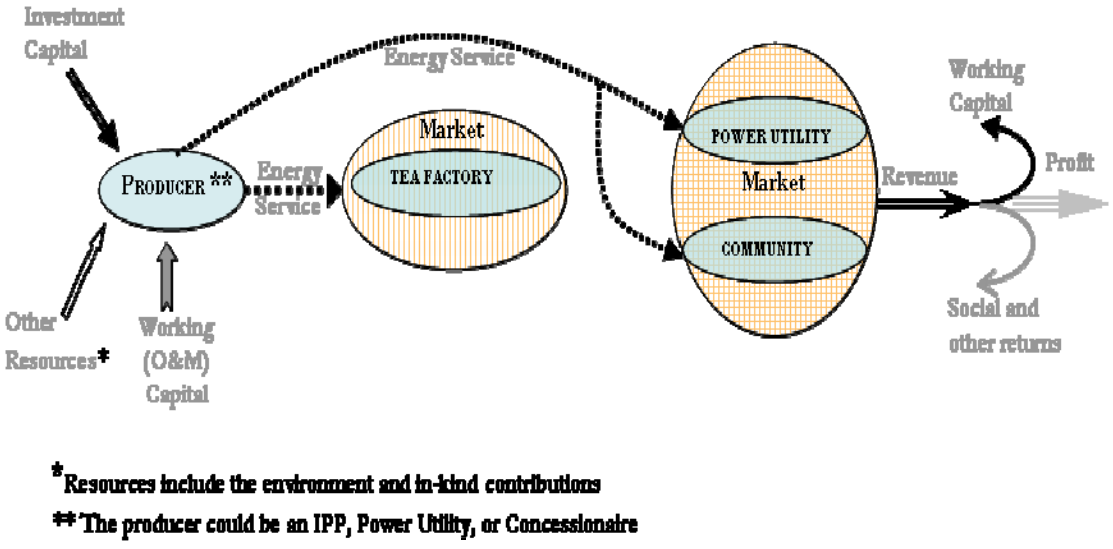


Figure 4: Model for power generation by IPP as developer, owner, and operator

Rural electrification would deserve attention from the IPP if development funding could be obtained to support the electrification. However, relative to the other business models this business option would be least likely to receive such support, e.g. from donors; and therefore rural electrification would be of secondary importance.

2.1.4 **IPP as developer, operator, and temporary owner**

The process of developing the power plant from investment acquisition, to construction, and full operation is quite a challenging task requiring the skills of IPP's or similar

enterprises. It would therefore be cost-effective to have an IPP build the plant, and for a brief period own and operate the plant while resolving start-up problems. After the initiation period the plant could be transferred to the relevant tea factory or other enterprise that would assume ownership and continue the simpler task of operation. In Fig. 5 the BOT arrangement involving the IPP is shown. Once the transfer is done, the IPP gets out of the picture and all assets and business affairs are shifted to the tea factory or an agent of the factory.

From a rural electrification perspective the BOT option is a good one. This is because unlike the IPP the tea factory would have a greater interest in facilitating access to electricity for surrounding communities; and the factory would be able to provide assistance once it takes over ownership of the generation plant.

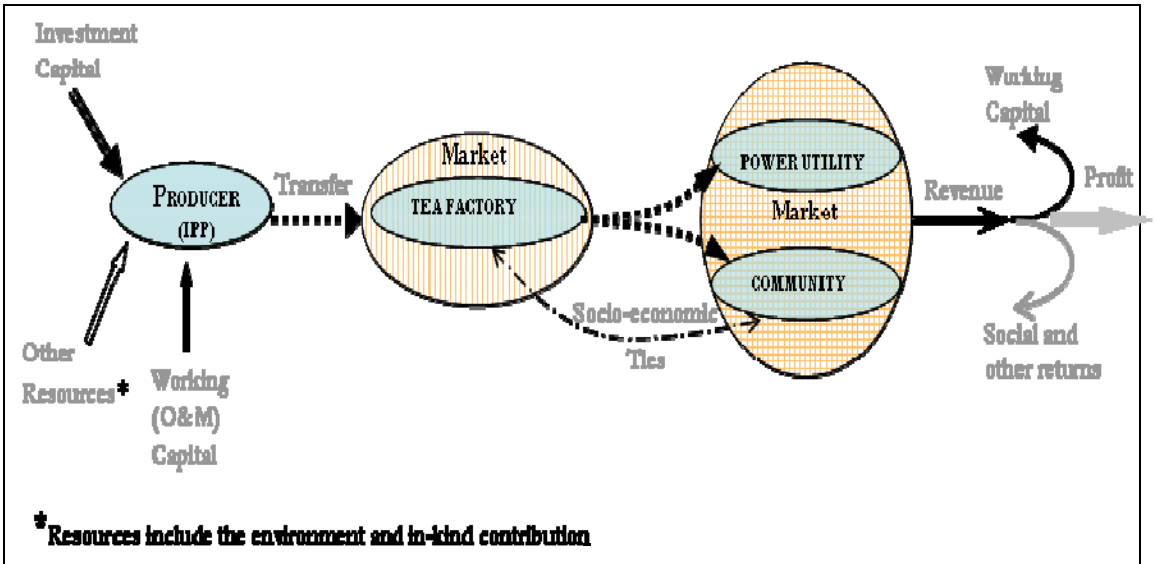


Figure 5: Model for power generation by IPP as developer, and operator, and temporary owner

2.1.5 **Concessionaire arrangement**

This is similar to the IPP BOO model, but is only partially commercial. The concessionaire would be contracted by government or a statutory authority to supply power in a specified area, and could be involved in both power generation and distribution. The aim would be to carry out rural electrification through a combination of government funding and private investment. Government subsidies would be used to cover the portion of investment and O&M costs not obtainable from commercial sources, and for meeting shortfalls between revenue earned and required investment margins.

While the concessionaire model would be good for rural electrification, and for supply of power to the tea factory, there is a problem of finding governments that have policies

accommodating concessionaires. This is especially so because concession arrangements are applicable country-wide and not for specific locations like where there are tea factories. There are therefore limited opportunities for using the concessionaire model.

2.1.6 **National Power Utility Model**

National power utilities are well placed to undertake power generation from small hydropower plants as part of their national portfolio of power projects. This is from the viewpoint of competence and other resources at their disposal. In addition, since many of them are mandated to undertake rural electrification, they would endeavour to use power from the small plants for electrification alongside meeting the power requirements of tea factories.

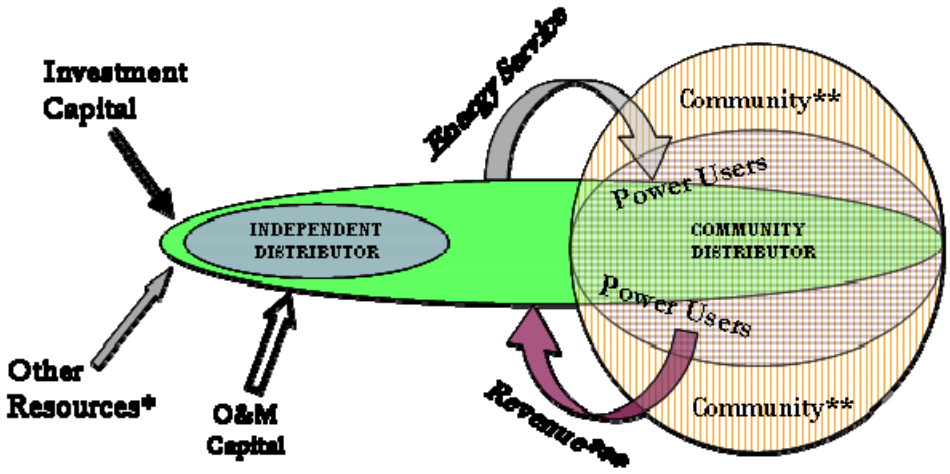
Nevertheless, the utilities are faced with the daunting task of developing and running major power projects such that it does not pay for them to go for the small initiatives. For this reason utilities leave the small-scale projects to IPPs and other enterprises, and direct participation of the utilities in the envisaged power generation around tea factories would be unlikely.

2.2 Power distribution models

In the same way generation models are meant for obtaining power (by a production process) and through a business arrangement making it available to intermediary (usually bulk buyers), the distribution models are meant for getting power from the intermediary and through a business arrangement distributing it to end users. For countrywide power grids, where hundreds of kilometres of lines are involved, the intermediary is a transmission company or agency, with an entire transmission system between the generation points and the distribution take-off points. However, small supply systems like the ones here for rural areas have no transmission lines and therefore power is transferred from the generators to the distributors directly.

Fig. 6 shows a generic model for a distribution business, where members of rural communities around tea factories are the end-users. The illustration indicates that there could be an independent distributor supplying power to the community (or communities), or the community could be a distributor to itself, with a section of the community comprising of power users. The larger community (with both users and non-users) is included to depict the fact that when power is available benefits can be expected for the whole community. Apart from the direct benefits of electricity there would be indirect benefits like employment for distribution system construction, operation, and maintenance; and improved public services (health centres with electricity, drinking water facilities, irrigation and lighting at schools – evening classes etc.) socio-economic activities associated with the presence of electric power (e.g. more and better crops from irrigation, rural industrial production, and night time social events facilitated by electric lighting).

The inputs and outputs for the distribution business are similar to the ones for the generation business as described above, but profits may not have the high significance attached to them as in the generation case. This is due to the complementary role played by social gains that the communities can achieve as a result of having electricity. The gains would be highest when the community members are also the power distributors.



Key potential sources of inputs

Investment capital: Commercial loans, MFI credits, equity, government subsidies, donor and NGO funding, carbon and other climate-change related funds, etc.

O&M Capital: Commercial loans, MFI credits, equity, government subsidies, donor and NGO funding, etc

Other resources: Contributions from corporate organizations, government, and local people (community)

*Other resources include the environment and in-kind contributions
**The community at large would benefit from electric power indirectly
***Includes operating capital and profit

Figure 6: Generic model of distribution business with community or independent distributor

2.2.1 **Rural Community Organization as a Distribution Enterprise**

An ideal situation for electrification that could lead to highest benefits for the community would be where an organization that is self-managed by the community owns and runs the distribution business (see Fig. 7). For instance, the organization could mobilize resources to build a distribution system that closely meets community needs, and beneficiaries of the electrification could contribute substantially towards system

construction, both financially and in-kind. Items like labour, land, and materials could be provided by the members as part of their contributions. Similarly, operation and maintenance could be done using local labour, expenditures could be minimized through use of appropriate technology, and good care of the power system would be ensured due to the community's sense of ownership of the system. Such an arrangement could especially have high poverty reduction benefits and degree of sustainability for both users and non-users of electricity within the community.

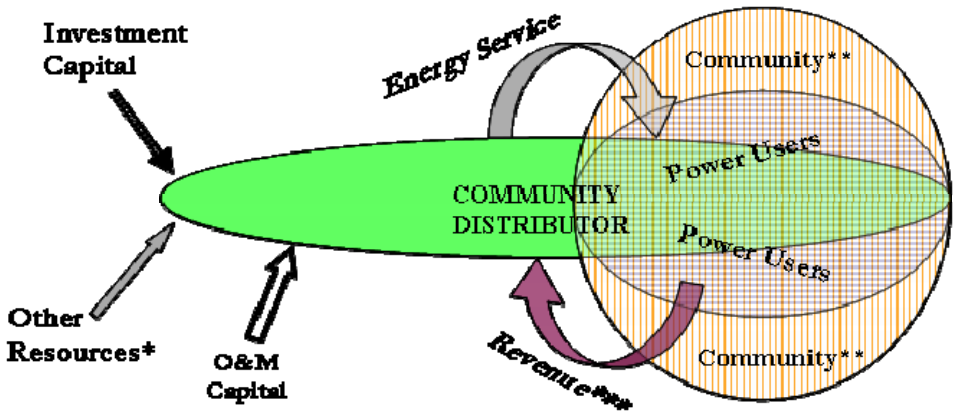


Figure 7: Model of distribution business with the local community as the distributor

If the community organization is a properly constituted cooperative the electrification business could be even more successful. This is due to the empowerment provided by cooperative principles upon which a sound cooperative is founded. The key principles include equity of membership where each member has equal voting rights as any other (one member one vote), well enforced regularity of general meetings, and effective member education. Rural electrification in countries like Bangladesh and the Philippines has in large part flourished due to adoption of the cooperative approach.

Due to the potential for socio-economic development associated with the community-driven business, the electrification initiative would be a good candidate for donor funding. Conversely, since members of the community have in most cases a paucity of business and technical skills and the commercial risks are quite high, the initiative would have a low eligibility rating for commercial financing. In view of this, success of the

electrification could be tremendously improved by building the community's capacity, through for example NGO support facilitated by donors. As the skills improve and performance is enhanced securing of finance from commercial sources would become easier. It would also be possible to gradually reduce any subsidies on running costs as the community's capacity gets better and performance of the business improves, thus paving the way for a more sustainable electrification process.

The community organization undertaking electrification could be in other forms; for example an informal association, many of which are prevalent in poor developing countries; or it could be in the form of a company. However, the informal association is unlikely to have sufficient legal strength to successfully carry out the business, and support would be difficult to get. On the other hand, formation of a company requires financial capital which rural communities would not be in a position to obtain. The cooperative is therefore appropriate for electrification, and the next best alternative would be a formal association that has a national or external backing.

2.2.2 **Rural Community and Tea Factory as a combined distributor**

The tea factory would have built competence as a business organization over time, and could therefore be in a good position to help the community in electrification. Since the profitability level of an electrification business is generally low, participation of the tea factory in the business would not be motivated by commercial considerations. Instead, the factory could be willing to get involved as an exercise of its social responsibility or obligation to the community arising from the economic relationship between it and the local people. The situation that would exist in the joint initiative is depicted in Fig. 8.

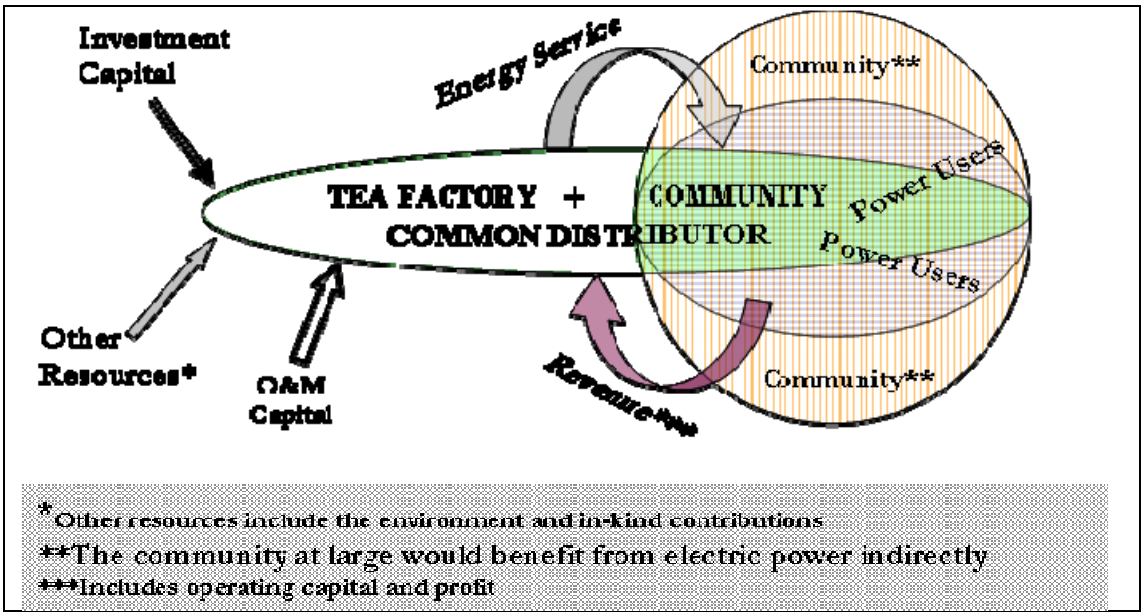


Figure 8: Model of distribution business with the local community tea factory as the distributor

In terms of the business's commercial attractiveness the position would be improved by the inclusion of the tea factory, and thus financing could be obtained more easily from banks and other commercial institutions. The terms of the financing would also be softer on account of the reduced trading risk. Besides, there would be interest in the initiative from donor agencies, which would be willing to provide support for fostering the development dimension of the endeavour. Overall, therefore, the initiative would have good potential for success.

The size of the electrification project could be a determining factor in the tea factory's willingness to participate, as the larger it is the more the commitment that would be required from the factory. Usually, the commitment that would be expected from the point of view of a social responsibility or non-commercial obligation would be small. Therefore, as the project magnitude increases the likelihood of the factory's involvement would decrease.

2.2.3 **ESCO as a Distributor**

The setup where an ESCO (Energy Service Company) would be a distributor on its own, as shown in Fig. 9, would be similar to that of the tea factory without a partner.

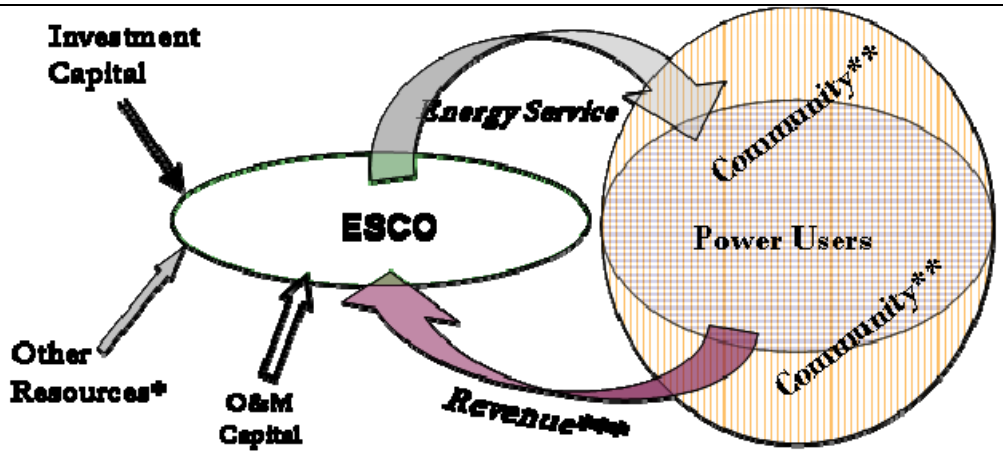


Figure 9: Model of distribution business with an ESCO as the

distributor

The main differences between the ESCO and the tea factory options would be:

- The ESCO would be better in carrying out the electrification business as electricity is at the core of its activities
- The commercial success of the electrification would be greater with the ESCO as it would more easily obtain investment financing due to its expected good performance
- The tea factory would be more willing to accept lower profitability and apply a degree of social responsibility in providing power to the community. This would facilitate acquisition of donor funding, which an ESCO would find difficult to get
- There would be greater support to the tea factory from the community due to tea trading ties that already exist between them

It is worth noting that ESCOs are just beginning to emerge in developing countries and getting one for rural electrification would be challenging.

2.2.4 **Rural Community and ESCO as a Distributor**

This combination could be made for example if an ESCO is tasked with building up the distribution system and train local people to take over management of the distribution business. It is unlikely that an ESCO would wish to engage in the business along with the community without facilitation by a third party, on account of the non-profit nature of the union. ESCOs are generally designed to work as commercial concerns and hence such a union would be unattractive to it. The third party envisaged would be a funding or development aid agency that would help in providing finances for assisting the ESCO to get its required returns.

Since the rural community would be the eventual distributor on its own, the situation is similar to the one described in section 2.2.1. The advantage of this arrangement would be the opportunity for the capacity of community members to be built by the ESCO, with expected better performance of the business.

2.2.5 **Rural Community and NGO as a Distributor**

Again, this partnership would be ideal for start-up of a distribution business and capacity building for the community. The situation would be similar to the one where a community and ESCO come together as described in section 2.2.5, except that the NGO

would be more concerned with the development and not commercial aspect of the business. On the plus side therefore development funding would be easier to secure, and the combination would have a greater impact on sustainability. On the down-side, the fact that the NGO is unlikely to have competence in electricity business may necessitate employment of trainers for the technical aspects of the business.

2.2.6 **Concessionaire as a Distributor**

The concessionaire would have a similar arrangement as an ESCO, with a significant part of investment financing coming from the government or a public body. O&M and some of the capital costs would have to be met by the concessionaire, and the total period of operation of the business would depend upon the concession contract. The period could be 25 years or more. The option of the community taking over after the concession period is possible and even desirable for sustainability purposes. What may influence this option is whether or not capacity building of the community is done before the end of the period.

2.2.7 **Public utility as a Distributor**

A public utility could combine its existing distribution business elsewhere in the country with providing supply to the community. As such, the terms of getting supply for community members would be similar to those of other customers of the utility. There could be a possibility for the utility to put up the distribution system, and while remaining the system owner the utility could lease it to the community. The latter arrangement would allow the community to run a business using the system, and this would help in building capacity of the community both for the power business and socio-economic growth.

3 Analyses and model selection for the case of Kenya Tanzania, Rwanda, and Malawi

3.1 Underlying basis for selection criteria

The criteria below are based on the requirement that the selected model should enable a sustainable uplifting of socio-economic standards for the targeted rural people; where sustainability is determined by among other things a business approach to development, ownership of the development process by the rural people, and care for the environment. The criteria are applicable to all the countries under consideration, and generally to sub-Saharan Africa. Country-specific circumstances are taken into account in the final analyses (Section 3.4).

3.2 Criteria for selection of models

3.2.1 **Generation business**

i. *Competence of organization to start and run a power business (A1)*
Existing capabilities of the organization to run a power business is envisaged here

ii. *Expected level of electricity business performance (A2)*
Based on experience of similar organizations' conduct of power generation businesses, the projected performance of the body under consideration would be gauged

iii. *Commercial financing attractiveness (A3)*
In this aspect, the general trend of inclination of commercial institutions to lend to the type of body being considered would be taken into account. Thus credit-worthiness and lending risk level would be important factors

iv. *Donor financing attractiveness (A4)*
Whether or not donor assistance to the body in question would support development of poor or disadvantaged populations would be an important consideration here

v. *Level of connection to local communities and interest in local development (A5)*
The higher the level of connection between the body doing the electricity business the greater the social benefits that can be expected from the business. The communities would accordingly reciprocate any assistance they get, and the synergy would be highest if some members of the community are carrying out

the business. For example, a tea factory involved in the electricity business and having community members within its directorship would have a strong connection o the communities, and would tailor the electricity business to the needs of the communities

vi. *Level of support expected from local communities [to use their lands, willingness to relocate where necessary, grant of wayleaves consents, etc.] (A6)*
This follows from criterion A5, and the support would be highest if there is a sense of ownership of the electricity development among the communities

vii. *Level of interest in small rural projects and importance that could be attached to them (A7)*
The higher the level of this interest the greater the likelihood of the initial decision to invest in the business, and success of the envisaged business once it is started

viii. *Level of interest in providing power to local communities [as opposed to sale to the national grid] (A8)*
The less the linkage between the communities and the business entrepreneur, and the more commercial the orientation of the entrepreneur the greater the inclination to sell power to the grid

ix. *Freedom from political interests (A9)*
Bearing in mind that political interests have a tendency towards rent seeking behaviour in developing countries this freedom could be desirable

3.2.2 **Distribution business**

The criteria applicable in this regard are the same as for generation business, except for those indicated as A8 above, and B8 below. Explanations for B1 to B7 and B9 below are therefore the same as for A1 to A7 and A9 above.

i. *Competence of organization to start and run a power business (B1)*

ii. *Expected level of electricity business performance (B2)*

iii. *Commercial financing attractiveness (B3)*

iv. *Donor funding attractiveness (B4)*

v. *Level of connection to local communities and interest in local development (B5)*

vi. *Level of support expected from local communities [to use their lands, willingness to relocate where necessary, grant of wayleaves consents, etc.] (B6)*

vii. Level of interest in small rural projects and importance that could be attached to them (B7)

viii. Willingness to build the capacity of rural people (B8)
Building the capacity of local people so that they eventually run the electrification business themselves is important for sustainability and therefore this should be targeted where possible

ix. Freedom from political interests (B9)

3.3 Screening of models

In a bid to rank the models and determine the most suitable ones, screening is done through the following analyses, using a scale of 1 to 3 for the ranking of all the models:

3.3.1 **Generation models**

Analysis results from Table 1 (Appendix 2) indicate that the best three generation business models, with an almost equal ranking, are in hierarchical order the Tea Factory and IPP joint venture, the Tea Factory on its own, and the IPP (BOT) option. The other options follow closely and could still be reverted to in case of problems with the first three.

A sturdiness[1] analysis for Table 1 (Appendix 2) is further carried out to ascertain the robustness of the assessment carried out. This is done by apportioning weights to the criteria according to the importance of each criterion. Based on field experience, the weights assigned are as follows:

[1] Sturdiness is taken as a measure of how a parameter changes with alterations to key variables and is equivalent to sensitivity analysis

CRITERIA	WEIGHT (%)
A1--Organization competence	14
A2--Business performance	10
A3--Financing attractiveness	10
A4--Donor funding pull	12
A5--Affiliation to communities	10
A6--Community support	14
A7--Interest in rural projects	10
A8--Interest in community power	10
A9--Freedom from politics	10

Applying the above weights to the criteria, the modified scores are as in Table 1a (Appendix 2).

From Table 1a Analysis (Appendix 2) it is shown that the weighting of the scores does not change the ranking of the models, and the maximum change in the scores after weighting is approximately 14 %. Therefore, the assessment is substantially robust.

NOTE:
No further analysis of the generation models is carried out in this work, and recommendations on suitable models are made on the basis of the foregoing analyses. More analyses could be carried out by the GTIEA team or those appointed to develop generation implementation plans for the identified pilot sites.

3.3.2 **Distribution models**

Analysis results from Table 2 (Appendix 2) indicate that the first three models in the ranking are: Community and NGO together, Community and Tea Factory together, and Community Association alone; the last two being at the same ranking. The next three options are not substantially different and could be considered if a fall-back is needed.

A sturdiness analysis for Table 2 (Appendix 2) is further carried out to ascertain the robustness of the assessment carried out. This is done by apportioning weights to the criteria according to the importance of each criterion. Based on experience, the weights assigned are as follows:

CRITERIA	WEIGHT (%)
B1--Organization competence	14
B2--Business performance	10
B3--Financing attractiveness	8
B4--Donor funding pull	14
B5--Affiliation to communities	10
B6--Community support	14
B7--Interest in rural projects	10
B8--Capacity building interest	12
B9--Freedom from politics	8

From Table 2a (Appendix 2), it is shown that the weighting causes a very insignificant change in the ranking, and the highest deviation of 13% occurs in the first ranked option, emphasizing that this would be the best option. Overall, therefore, the ranking is robust.

3.4 Final analyses of distribution models

The analyses will focus on four case countries: Kenya, Tanzania, Rwanda and Mali and focus on the suitable models selected using SWOT analyses based on individual country and pilot site conditions. In the final analyses, the first three options (competence of organization to start and run a power business, expected level of electricity business performance, commercial financing attractiveness) are selected from the foregoing screening assessments and their merits are considered in the light of the prevailing national circumstances. The conclusions of the individual cases will compare the ideal models to be pursued and include reflections on the following implementation.
The case of Kenya differs from the other cases, as it is more elaborative, i.e. it includes a section on generation as opposed to the other cases the focuses uniquely on distribution. A number of factors have contributed to this elaboration, namely those of: 1) Better and easier access to information, in particular on energy policies and regulatory conditions 2) The targeted communities for rural electrification are relatively more advanced in terms of business and technical capacity.

3.5 Kenya (Kipchoria) case

In this section the proposed implementation of the business model that has been selected for the Kipchoria electrification project is described. The analysis considers the setup that is envisaged and the process of putting up and running the electrification.

Referring to Table 3 in Appendix 2, the SWOT analysis for the Kipchoria case indicates that engagement of the community that would benefit from the proposed electrification, especially in matters of sustainability and promotion of community welfare. However, there are also considerable weaknesses arising from the lack of community capacity to carry out rural electrification business. These weaknesses are unlikely to be overcome with the community undertaking the electrification process. The community could pursue opportunities by gaining access to electricity, and threats could be overcome by joining up with a capable organization like a tea factory associated with the community, or an NGO that has the necessary resources. In the Kipchoria case, there is an advantage in that the community has an organization of their own as described below. The capability of the community to conduct business is therefore relatively strong. However, technical skills and the high level of business knowhow needed to run a fairly advanced form of business like electrification. Therefore, combining the community organization with a body that could enhance the community's capability for electrification would be imperative.

The tea factory business (referred to as TF) could be a suitable partner and facilitator for the community organization, particularly in view of the economic and social ties between the community and the TF. The community is not only the supplier of green (raw) tea to the TF, it is also the provider of most of the labour. In turn, the TF supports the community in various ways, including development projects. The most effective way that the TF could help in building electrification business by the community would be to be a partner in the business. In such a situation the TF would be motivated to inject enough of its own resources as would make the business viable. However, the level of risk in the electrification business is too high, and expected returns would be minimal or negative. As such, the TF is unlikely to take up the option of partnering with the community. In discussions held with the TF management in the Kipchoria case the reluctance has already been expressed. Alternatively, the TF could support the community in setting up the electrification business using its corporate social responsibility (CSR) medium. The sort of support that could be given is for example technical personnel who could train community artisans and accountants in putting up a power system and maintaining it, and in book-keeping. Nonetheless, the CSR support is bound to be very limited and more substantive capacity building assistance would still be needed.

There is also an option for the community to work with an NGO that has experience in community capacity development, and which could leverage support from development agencies. This option would be the most suitable one and is feasible on account of the presence of such NGOs in Kenya, and the fairly wide support available for such

organizations to promote rural development. Although the NGOs working in the energy sector are not many it is generally possible to get any of them that are familiar with community development to secure necessary energy related skills and resources for use by communities. Therefore, it should be possible for an NGO to be found for facilitation of implementation of the proposed electrification in the Kipchoria case. It would be expected that support for the NGO and community electrification partnership would come from development agencies as well as the government.

Precedents where the Kenya government has rendered support exist, where national policies and regulations have been adjusted, and other forms of encouragement have been provided in an effort to promote this sort of partnership. Through the support, the electrification initiatives overcame teething problems and are performing satisfactorily. Even so, it has to be borne in mind that sustainability of the electrification business could be threatened by over-dependence on assistance. Measures have therefore had to be taken to overcome this weakness, and they include financial and in-kind contributions from community members (sweat equity), where possible incorporating a semi-commercial source of funding for capital investment, and aiming for a positive return on investment.

The supply-side: Tea factory and power generation

Under the GTIEA project, it is proposed to develop a hydropower generation plant on the Kipchoria River to serve tea factories in the Nandi Hills area. For convenience, the whole area occupied by the tea factories and the settlements within is referred to as Kipchoria. There are four owners of the tea factories that could be included in the project, namely: Eastern Produce Kenya Ltd (EPK), George Williamsons, Nandi Estates, and Koisagat Tea Estate. However, EPK has the largest number of factories (seven out of eleven), and is the one that is keen on the power generation. It is envisaged that EPK could invest in the power generation and use the power for its tea factories solely or share with other factory owners that would be interested in contributing to the investment. Therefore, in the following description reference is made to EPK as the power generation developer and its factories simply taken as the tea factory.

EPK is a limited liability company which is part of a multinational group (Camellia PLC of the UK). It is already producing 120 KW of power from a hydropower plant on the Kipchoria River, and transmits this power on its own line to serve one of its production units. A preliminary investigation has shown that it could generate about 1.7 MW from the proposed site, and thus be able to meet more of its power requirements and ensure a stable supply. Currently, most of the power is obtained from the national power utility (KPLC), but this source is not very reliable. A feasibility study is being carried out for the new small hydro power plant by EPK, and it is estimated that the outcome of the study will be finalized by October 2010.

A large portion of the settlements around the tea factories is occupied by workers and growers of tea that serve the factories either by supplying labour or raw tea, and the inhabitants have no electric power. Therefore, it is proposed that some of the power produced from the expanded power generation would be made available to the settlements (Kipchoria community). EPK has shown a willingness to assist the community obtain power on a cost-plus basis, where EPK would charge for electricity supplied at production price plus a small margin to cover for overheads. In addition, EPK could give some assistance to the community to set up a power distribution network and business for power provision to community members.

The demand-side:The community and distribution organization

The settlements that need electrification are in the tea growing area where EPK factories draw their raw tea (green leaf) supplies, and are inhabited by low income farmers and workers – although the level of poverty is not very high by the standards of rural areas in Kenya. There are concentrations of population in trading centres where some commercial activities like corn grinding, water vending, and food preparations (restaurants/bars trading) are carried out. Schools, health clinics, and other public facilities are present in these centres, along with residential quarters. Outside the centres are scattered dwellings. There are close to 200 potential electricity customers in the settlements with single and three phase loads. Quarters are provided for tea factory workers but these are not included in the count of potential customers as tea factory management has separate plans for providing them with electricity along with other facilities.

The tea growers within the community have an association for promoting the interests of the farmers and particularly to improve marketing of their tea, optimize on production costs, and undertake worthwhile investments. The organization, known as the EPK Outgrowers Empowerment Project (EPK-OEP), started as a social grouping but in 2006 was converted into a limited liability company. However, the social characteristics were maintained as directors are elected, and members make financial contributions as for a members' welfare body. Inclusion of EPK in the name is due to the recognition of the supportive role played by the EPK in promoting the organization.

An important source of funds for the organization comes from Fairtrade premiums, which the Fairtrade Labelling Organizations International (FLO) provides in respect of tea grown and marketed according to FLO standards. An amount of USD 0.5 is paid as a premium for every kilo of FLO certified tea sold, and the money earned is expected to be used in economic and social development. Up to this year the EPK-OEP has acquired a total of USD 857,000 from Fairtrade. From this source and members' own contributions, EPK-OEP has been able to raise about 41% capital required towards purchase of a USD 5.5 Million tea factory, thus underscoring the organization's good performance and investment capabilities. In addition, EPK-OEP has within its memorandum and articles of association a provision for investment in electricity

generation; and therefore it has strong elements that could enable it to carry out electricity business.

Due to EPK-OEP's existing capabilities and interest in developing an electricity project, it is considered worthwhile to have the organization developing and running a power distribution business. The business could then provide electrification that is needed for power provision to the community in the Kipchoria area. However, for this ambition to be achieved it would be necessary to develop the capacity of the organization to meet the challenges of a demanding business like the one of power trading. The capabilities to be built are chiefly technical and commercial, so that the organization could mobilize resources within the community, and for sustainability reasons have the community run the power system and management on their own. The other support that the organization would need is securing of start-up capital as internal sources of finance are already heavily committed to purchase of a tea factory. EPK-OEP has indicated that its members could raise between 10% and 30% of the required capital.

Facilitation

In the PACEAA Project, it is already recognized that community-based electrification is best facilitated through community management, and support would be necessary to jump-start the process. To this end, the deliverables of the project include rural electrification plans and business models that could be used by the communities or their agents to undertake the electrification. By the end of the project the plans and models will be ready for passing on to the implementers of the proposed pilot projects, Kipchoria being among them. Besides this, it is planned that the PACEAA Project team will identify potential funding sources for the pilot projects and will link the sources to the implementers. Bilateral, multilateral, and other development agencies, and financial institutions are being approached with a view to getting the necessary support. In the case of the proposed Kipchoria project there is potential for seeking funds and technical assistance from the Rural Electrification Authority, and other sources of assistance are still being sought.

Apart from the intermediation through the PACEAA Project, it would be necessary for facilitation of implementation of the pilot projects. Similarly, capacity building would be required to enable the communities getting electricity or their agents to participate in the implementation and eventually manage the proposed power systems. This is especially with a view to getting the communities to assume ownership of the electrification projects and ensure their sustainability. The facilitator could be an NGO or other body that is experienced in community development, and is capable of marshalling support and carrying out capacity building for implementation of the electrification projects. The body or institution would act as a consultant to the communities, organize for project resources acquisition and execution, and arrange for participatory training for community members. However, although the need for the services of the facilitator has been identified ways and means for procurement of the services have to be found. The PACEAA project team will, as part of its winding up process, seek to identify and hand

over to the facilitator during the remaining period of the PACEAA project – up to 31st August 2010.

Proposal for the business

The expected availability of power from the proposed hydropower generation by EPK provides the community in the area with an opportunity to get a power supply from a renewable energy source. With internalization of social and environmental costs, the power may also be more cost-effective than grid (KPLC) power that is within a few kilometres of the area. However, one of the biggest challenges that would be faced is to tap the new power from the EPK network and economically distribute it to the community. A distribution business would therefore have to be set up.

From the information given above, it is clear that the distribution business would best be carried out by EPK-OEP. This approach would followed the model outlined in figure 7. According to the draft rural electrification plan prepared by the PACEAA team, it has been provisionally estimated that USD 300,000 would be required as capital investment for the distribution project. Since the organization is able to contribute up to 30% from its resources, an amount of about USD 210.000 would have to be sought from donor and soft credit sources. As indicated, the Rural Electrification Authority (REA) is included as one of the donors, but the actual amount that REA could give will be discussed once co-financiers and their contributions have been found.

Since electricity business is already included in the organization's memorandum and articles of association it would not be necessary to form a subsidiary or separate company for the business. However, separate books of accounts would need to be opened. A technical section would also need to be formed to cater for operations and maintenance of the distribution system once it is built. The personnel in the section could be trained as part of the capacity building of the project, or qualified personnel could be recruited.

As indicated above, the EPK intends to charge for the power supplied on a cost-plus basis, where the margin above the cost is for covering overhead charges only. It is recommended that an agreement be drawn between EPK and EPK-OEP that would entail the pricing among other terms and conditions. A model that could serve as a guide for preparation of the agreement is given in Appendix 3 of this document. Furthermore, retail prices chargeable to community members who will be connected to the EPK-OEP network would be worked out after the wholesale prices and other cost elements are known. The latter prices should be set at a level that would enable the distributor to recover full costs.

It is recommended that before the PACEAA Project comes to an end in August 2010, arrangements be made by the managers of the PACEAA and GTIEA projects for a facilitator of the electrification project. The task of organizing for implementation would then be left with the facilitator, who would work with the EPK-OEP and other

stakeholders to have the electrification project executed and handed over to the community (through EPK-OEP). The package of plans and models prepared for the implementation under the PACEAA Project would be taken over by the facilitator for use in the implementation.

3.6 Tanzania (Suma) case

Referring to Table 6 in Appendix 2, the SWOT analysis for the Suma case indicates that a joint initiative of the tea factory (TF) and the community targeted by the proposed rural electrification would be most desirable. This is especially true considering that the community is already represented by a community association that supplies unprocessed tea to the factory. The association is known as Rungwe Small Tea Growers Association (RSTGA), and holds 25% shares in the company under which the TF trades. The company is the Wakulima Tea Company Ltd (WTC), and there is a plan for it to be eventually taken over by RSTGA. This is the same company that would be responsible for development of the SHP at Suma.

With the existing linkage between RSTGA and WTC both the SHP project (supply-side or generation aspect) and rural electrification for community power supply (demand-side or distribution aspect) could be combined in one project. Indeed, it has been suggested by the Rural Energy Agency (REA) of Tanzania that REA would be willing to support the combined project financially and through technical assistance. Alternatively, WTC could handle the SHP project separately as a full commercial venture supplying power to the TF and selling power to the grid (TANESCO); and support RSTGA to carry out rural electrification. However, despite many discussions with WTC, management of the company is unwilling to involve the company in rural electrification, and is keen on proceeding with the SHP project solely. The only support that the management is considering on the rural electrification aspect is providing a small amount of power from the SHP development. After buying power from WTC at cost plus a small margin, the RSTGA or other rural electrification developer would then use it for supply to the community. It is important to note that RSTGA is already running as a business concern trading in unprocessed tea and tourism; and they have Fair Trade funding that could be used for an electrification project

Another desirable model that is derived from the SWOT analysis is the national power utility (TANESCO) model. In this model TANESCO could take up provision of supply to the community using power generated by WTC from the proposed SHP. A key attractive feature of this model would be the use of well established power business resources available at TANESCO. Instead of using entities like RSTGA which have no experience in electricity business and spending considerable time in capacity building, TANESCO would take minimum time in implementing the electrification project. There would also be the possibility of using the nearby TANESCO grid to supply the required power when the SHP supply is low or unavailable. Nonetheless, this model would have little or no involvement of the community, and therefore the level of social benefits from

the electrification would not be as high as in the case where a community organization implemented and operated the electrification. There could of course be some participation of the community in the TANESCO electrification through provision of labour and in-kind inputs, thereby building a sense of ownership by the community. Overall, the biggest barrier to the TANESCO model would be the difficulty of convincing the power utility to include the proposed electrification in their programme. The difficulty can be appreciated from the fact that the community being considered was excluded from the rural electrification process, when the existing rural grid was installed by TANESCO about six kilometres away.

Again from the SWOT analysis, the third model that could be used in rural electrification is where the community association (RSTGA) would join up with an energy NGO to implement the proposed electrification. The key responsibility of the NGO would be to guide and build the community's capacity for developing and running the electrification project, and secure funding and other support for the project. In Tanzania, the NGOs that could take part in the project are such as TaTEDO (Tanzania Traditional Energy Development and Environment Organization). During PACEAA stakeholder discussions TaTEDO was approached and its management expressed a willingness to undertake the project. The most significant challenge to this model is the large amount of funding that would be needed, not only for the extensive capacity building but also for facilitating the NGO's role.

Taking into account all the circumstances surrounding the three top models for Tanzania, the TANESCO model seems to be the most viable. It is proposed to approach TANESCO with a request to implement the proposed electrification project once the SHP project is undertaken. Funding for the electrification would be expected from the Rural Energy Agency and other aid agencies. Failing this, the model combining RSTGA and an NGO would be adopted.

3.7 Rwanda (Giciye) case

A SWOT analysis for this case is made as appears in Table 7. Here the community cooperative model is topmost as social and economic considerations are well taken into account. The cooperative movement in Rwanda is well developed and within the tea sector cooperatives are given good support through OCIRTHE (an umbrella body for tea growers). It is also significant that the community targeted for electrification is represented by two tea growers' cooperatives, namely COTRAGGAGI and COPTHEGA. The two organizations have expressed an interest in development and operation of a rural electrification scheme. However, the financial base for the cooperatives is weak in view of the large loans they are paying. With substantial capacity building and funding aid the cooperatives could engage in rural electrification,

but getting entities that could provide the required support would present significant challenges.

Some of the support to the cooperatives could be obtained from owners of the two associated tea factories, namely Nyabihu and Rubaiya. The owners are Rwanda Mountain Tea Ltd (RMT) who are the developers of the SHP project from which power for rural electrification would be obtained. Subject to sufficiency of capacity in the power systems at the factories RMT would be willing to provide electricity at affordable rates for use in rural electrification adjacent to the factories. Further support may not be possible as RMT is participating in another rural electrification scheme for supplying power to villages near the SHP hydropower site (Giciye) that the company is developing. The participation was requested by the government of Rwanda; and for the same rural electrification project RECO, the national power utility, is expected to be a co-implementer with RMT and take over eventual operations.

From the SWOT analysis, the second option that is considered feasible is the community company model. For the community to use this model a company would need to be formed, and the organization would have characteristics similar to those of the cooperatives. Capacity building and funding support would be key requirements. However, securing of financing for the company would be easier as donor agencies as well as financing institutions in Rwanda prefer this form of organization.

The third option according to the SWOT analysis is the power utility model, where the national power utility (RECO) would be the main player in the electrification. Since RECO is the implementer of the national rural electrification programme, it should be fairly simple for it to undertake the proposed electrification, once it is decided to include the proposed scheme in the national programme. It is important to note that the government of Rwanda has a major national electrification plan principally funded by the World Bank. The plan aims at increasing electricity access in both urban and rural areas, and if the PACEAA initiated electrification scheme is accepted by RECO implementation of the scheme could be done within the scope of the plan. It is intended to enter into dialogue with RECO on inclusion of the scheme in the plan.

Taken together, the three options in the SWOT analysis are all feasible with varying degrees of challenges. In view of the points raised above, the power utility option stands out as the most promising. Pursuit of the utility model will therefore be given priority in the PACEAA implementation plan. As a fall back option the community company model would be pursued, possibly by having the cooperatives forming a subsidiary company.

3.8 Malawi (Ruo) case

This case is different from all the other two described above in view of the fact that the SHP project which would have provided power for rural electrification is unlikely to

proceed. The feasibility study for the project has shown that due to environmental and implementation problems the SHP development cannot take place as originally designed. On the other hand, GTIEA funds that were provided for project study and design have been exhausted and therefore within the GTIEA project an alternative design cannot take place.

In view of the GTIEA project impasse, Lujeri Tea Estates Ltd who are the developers of the SHP project have opted to explore the possibility of an upgrade of one of their existing power plants. They intend to work outside the scope of the GTIEA project, meaning that rural electrification under the PACEAA project would also be excluded from their plans. However, through their CSR, they have agreed to give support to the community targeted for rural electrification by identification of funding sources, procurement of required materials, and technical advice. The scheme that they recommend for the rural electrification is where ESCOM, the national power utility, would be the power supplier and operator as in other national rural electrification projects.

Separately, there is another rural electrification initiative taking place not far from the Ruo site where the PACEAA electrification scheme was expected to get power from. The initiative involves a micro-hydro scheme being developed by MUREA, a local NGO; and is expected to serve part of the Lujeri community targeted by the PACEAA electrification scheme. It would therefore be possible to undertake electrification for a sizeable part of the Lujeri community by expanding the scope of the initiative. With this in mind, discussions have been held among MUREA, Lujeri Tea Estates Ltd, and the community to seek ways of providing power to the community.

The models that are being considered in the electrification plan by the PACEAA team are as given in the SWOT analysis in Table 8. The first model is one entailing the use of a community association. This model is favoured by the fact that there is an existing association for the Lujeri community for whom electrification is being planned. The name of the association is Sukambizi, and is made up of tea growers who sell unprocessed tea to Lujeri Tea Estates. Apart from normal earnings from tea sales, the group gets income for development purposes from Fair Trade funds, which could be used for electrification. With capacity building, the association could engage in the proposed rural electrification. However, as has been explained in the other cases where inexperienced community organizations wish to undertake electrification the biggest hurdle is to get funding and other support for capacity building. This would also apply to the second option indicated in the SWOT analysis, where a community cooperative model is considered. The latter model has a slight advantage over the community association model, taking into account that cooperatives have capacity building mechanisms built into them. It would also be possible to secure some financing for the cooperative from savings and credit societies that are part of the cooperative movement.

The third option in the SWOT analysis is the power utility model. Again as indicated in the other instances where this type of utility has been considered the model has many

advantages. The problem would be to get the proposed electrification scheme in the national programme that is implemented by the utility. Furthermore, getting community participation and resultant social gains from electrification would be minimal once a utility takes over. Nonetheless, the model would be the most suitable where obtaining funding and other support for community organized electrification is a major obstacle.

Taking into account all the pros and cons of the three models for Malawi it is deemed that the power utility model should be given first priority. Already Lujeri Tea Estates have had communication with ESCOM regarding rural electrification for the Lujeri community. If ESCOM is assisted by the tea company in cheaply procuring materials for the electrification, and the MUREA electrification initiative is integrated with ESCOM grid extension, ESCOM could implement the electrification. As far as possible the tea company and MUREA could assist in funding the electrification through resources from development aid agencies, and this would be an added incentive for ESCOM for undertaking the project. It is therefore proposed to pursue the power utility model, and in case this cannot be realized the community association model would be recommended. In the latter model the Sukambizi Association could be facilitated by MUREA with expansion of the ongoing micro-hydro project and use of other hydro power resources in the Lujeri area. The support of Lujeri Estates Ltd would also be enlisted in the community association model.

3.9 Implementation

In section 3.4 the specific business models that are being considered for implementation have been derived. In summary these models are:

Kenya	1st option: Community Association, namely, EPK-OEP
Tanzania	1st option: National Power utility, namely, TANESCO 2nd option: Community Association, namely, RSTGA
Rwanda	1st option: National Power utility, namely, RECO 2nd option: Community cooperatives, namely, KOTRAGGAGI and COPTHEGA
Malawi	1st option: National Power utility, namely, ESCOM 2nd option: Community Association, namely, Sukambizi Association

It is clearly desirable that in the cases of all countries except Kenya the proposed electrification schemes are given to national power utilities to develop and operate. The possibility of implementation by the utilities will however be known once discussions with the utilities are conducted and concluded. If utility implementation is agreed upon

then the PACEAA team would together with the utilities finalize details of project completion at the close of the PACEAA project duration in August 2010, at which point the project team's work will end. The utilities would then commence and proceed on with implementation using plans and resources that the PACEAA team would have passed on. However, in case agreement is not reached with any of the utilities and community organizations have to undertake implementation, it would be necessary to seek facilitators for implementation, necessary funding, and capacity building support. It would be the responsibility of the PACEAA team to do all the preparations for implementation before the team's exit. One of the tasks for the team would be to prepare model contracts for bulk power supply purchase by the community organizations. The sample contracts would be used in negotiating agreements with suppliers of power for the proposed rural electrification, and these are as given in Appendix 3.

4 Other assessments

To further determine the efficacy of the PACEAA RE initiatives the following assessments have been done and details on them are given below:

a) Regulatory options and the likely scenarios for the business models under the different options
b) Financial options and the likely scenarios for the business models under the different options
c) Expected risks and measures for mitigating them

Regulatory options

With reference to delivery D1 of the PACEAA project, relating to *Review of national frameworks for involvement of agro-industries in rural electrification*, the energy sector regulatory frameworks for countries included in the PACEAA project and developing countries generally have been evolving dynamically. It would therefore be pertinent to ensure that the proposed RE initiatives are in conformity with the changing regulatory regimes.

The regulatory frameworks that are emerging in Africa are following the trends of powers sector reforms that have been taking place globally for close to thirty years, and a clear pattern of the frameworks is discernible. The pattern has some or all of the following elements: establishment of an energy or power regulatory authority, unbundling of vertically integrated national power utility, privatization of some of the unbundled units, entry of independent power producers (IPPs) into the national power generation sector, setting of Feed-in tariffs to promote small private sector power production and meet national power demand using renewable sources, formation of a rural electrification agency or authority, and promotion of village-level power production and supply with rural community involvement.

African countries are at different levels of development of the frameworks, but some are emerging as clear leaders, like Uganda, the frameworks of which could be considered as best practice cases. As such, the frameworks of three leading countries have been selected as models for the assessment being carried out here. The countries are Uganda, Kenya, and Tanzania, whose current regulatory regimes are as follows:

UGANDA

- Electricity Regulatory Authority in place
- Unbundling done for generation, transmission, and distribution
- Generation and distribution privatized
- IPPs allowed and Feed-in tariffs for renewable energy in place
- Single tariff model for power distribution consumers
- Light-handed regulation for village level power production and supply
- Rural electrification authority in place

KENYA

- Energy Regulatory Authority in place
- Power generation separated from transmission & distribution
- One public generation company and IPPs with single buyer
- Feed-in tariffs for renewable energy in place
- Single tariff model for power distribution consumers
- Light-handed regulation for village level power production and supply
- Rural electrification authority in place

TANZANIA

- Energy Regulatory Authority (including water services) in place
- Vertically integrated national power company continues
- IPPs with national power utility as single buyer
- Feed-in tariffs for renewable energy in place
- Single tariff model for power distribution consumers
- Light-handed regulation for village level power production and supply
- Rural energy authority in place

The three models are used as options for testing the compatibility of the business models selected in the previous chapters with different regulatory regimes that are practised by countries in the Africa region. From this perspective, assessments are done in Appendix 4(a) and Appendix 4(b), with regard to community association and national power utility business models. The results of the assessment show that the business models being proposed are well supported by the regulatory options that exist in the four core PACEAA countries, namely Kenya, Malawi, Rwanda, and Tanzania. If regulatory options like the one in Uganda are put in place then a problem of compatibility with the models could arise. In such cases it would be necessary for the RE project developers to negotiate with the relevant regulatory authorities for special regulatory provisions allowing for PACEAA RE plans to be implemented. The special regulatory provisions would also be required in cases where special circumstances arise, for example where power wheeling agreements are needed to facilitate delivery of power to target RE consumers.

Expected risks and their mitigation

The risks that are expected and proposed measures for mitigating them are given below. With actions that are being taken to implement the measures it should be possible to contain the main risks of the PACEAA project.

MAIN RISKS	MITIGATION MEASURES
1. Hydropower developer is unable to undertake power generation project	An alternative source of power will be sought by the community group or facilitator for RE project implementation; e.g. a grid power source
2. No power is available for sale to the grid and for RE	-Ditto-
3. Hydropower developer sells all power unused in their tea factory to the grid	Letters of interest in providing power for RE will be sought from hydropower developers before the end of the PACEAA project
4. No community organization is available for RE business	The national power utility will be requested to take up the RE project
5. National power utility or electrification authority uninterested in the RE project	An NGO or project facilitator will be sought to undertake the formation and capacity building of a community organization for the RE project
6. No funding is available from potential sponsors of the RE project	Seek prioritized inclusion of the RE project in the national electrification plans as an example of RE based on power generated by a rural industry
7. The hydropower project takes unduly long to implement leading to RE sponsors' and facilitators' loss of interest	Alternative sources of supply to be sought in case hydropower development takes too long
8. Low demand and inability to pay for power consumed leads to poor cost recovery in the RE business	Assistance of enterprise development groups or programmes like GVEP will be requested to promote productive uses among consumers benefiting from the project

Financial issues

It was originally contemplated that in the PACEAA Project financial issues relating to different business models would be investigated. However, referring to the rural electrification plans (see http://www.paceaa.org) that have been prepared as another deliverable of the project (deliverable D3), it has been found that the issues are independent of business models. Consequently, no further work on financial issues has been carried out apart from what has been done in preparation of the plans.

5 A general perspective of other PACEAA countries

The full scope of the PACEAA Project encompasses 11 countries, which are Burundi, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Sudan, Swaziland, Tanzania, Uganda, and Zambia. Out of these Kenya, Malawi Rwanda, and Tanzania were selected as the core ones, where detailed studies were carried out and demonstration projects are expected to be implemented. All the 11 countries have many similarities politically and economically, but there are significant differences especially between the ones that have undergone major conflicts, e.g. Sudan, Rwanda, and Burundi on one hand and the rest of the countries on the other side of the divide. The post-conflict countries are lagging the others in development, but Rwanda has made the quickest recovery such that it has almost caught up with the ones that have remained stable.

On reforms and general development of the energy sectors all the 11 countries are undergoing changes to improve the sectors, in tandem with their economic developments. As noted in earlier sections of this report, the four core countries have made reforms such that the national frameworks are conducive for PACEAA type of rural electrification. Specifically, the national energy policies and regulations have undergone necessary changes to allow private sector and non-state participation in power generation and rural electrification. Use of renewable energy is also being promoted by the national governments through measures like tariff signals and tax incentives. However, some of the barriers to PACEAA type of electrification still require addressing, and the general status is as follows:

Barriers' Table (1 of 2)

BARRIER	STATUS
1. Policies and regulations	
a) Slow rate of energy sector reforms	Improved significantly in Rwanda and Kenya
b)Power utility monopoly in electricity generation	Eliminated in Kenya, Rwanda, and Tanzania
c)Power utility monopoly in electricity distribution	Still applies to grid power in all the four countries, but off-grid private distribution allowed
d) Electricity tariffs not cost-reflective	Substantially overcome in Rwanda and Kenya
e) Rural electrification not separated from commercial power utilities	Separation achieved in all four countries
f) Renewable and efficient technologies not supported	Support of the technologies given in all the four countries
g) Feed-in tariffs not available or insufficient	The tariffs are established in Kenya and Tanzania, but in Kenya prices are not satisfactory yet
2. Financing	
a)Reluctance to invest in new technologies and power supply systems	Most financial institutions are still not getting involved in all the countries; but efforts to introduce carbon credits are improving the situation. Development financing bodies are the best sources of finance
b) High interest rates for loans to small power suppliers	Debt financing to the small suppliers is still being provided at high rates in all the countries (> 15% p.a.)
c) Gradual move away from provision of grants and subsidies	Development aid to energy sectors is tending towards provision of soft loans and credits in all countries
d) Rural people's inability to pay for electricity connections and bills	Power for productive uses being targeted to reduce inability to pay in all countries
e) Agro-industries' unwillingness to invest in rural electrification	This will continue until the financial viability of rural electrification is improved in all countries

Barriers' Table (2 of 2)

3. Technologies		
	a) Identification of potential power generation resources in agro-industries not being done	There is no systematic way being used in the identification in all the countries
	b) Resources in 3(a) above that have been identified not well documented	Information about resources that have been identified is scarce in all the countries
	c) Technologies not available or cannot be made locally in the countries	Technologies have ha d to be imported at high cost, but a few exceptional cases exist in Tanzania and Kenya
3. Organizational aspects		
	a) Agro-industries need joint ventures or outsourcing to carry out power generation	Since agro-industries want to focus on core businesses joint ventures with or outsourcing to firms that could undertake electricity generation and operation is the trend
	b) Power utilities and firms not interested in rural electrification	Lack of financial viability and commercial financing for rural electrification deters power utilities and firms
	c) Community organizations willing to carry out rural electrification but incapable	The organizations are usually not well organized to undertake complex businesses like power supply. With few exceptions substantial capacity building would be needed.
4. Technical capacities		
	a) Skills for undertaking power generation capital works not available locally	Experts would need to be fetched from far or imported to carry out generation plant construction
	b) Skills for operating rural electrification systems not available in rural areas	Same as in 4(a) above labour would be difficult to get locally where electrification is needed
5. Information dissemination		
	a) Awareness about opportunities for power generation and electrification from agro-industry sources is scant	Creation of the necessary awareness has been done to a small extent through the PACEAA and GTIEA projects. A great deal still needs to be done in all the countries
	b) Rural electrification is considered to be a task for the government	Many rural areas have remained without electricity due to this perception, and efforts are beginning to make people aware of non-government electrification possibilities

From the barriers assessment it is evident that some steps have been taken to address the impediments to rural electrification that could be provided from power generation by agro-industries. The steps indicate the direction that could be taken in meeting the challenge of tackling the impediments not only for the four core PACEAA countries but

for all the 11 countries in the full scope of the project. The people that should take the lead in facing the challenge include energy sector advisors and executives in governments and regulatory organs; development partners that include international aid agencies and non-governmental organizations; consultants in energy, economic, and financial matters; and political leaders. The required awareness and motivation for action could be stepped up substantially by having many more demonstration projects in the 11 countries, with development partners being key drivers.

6 Conclusion

Rural electrification using electricity from hydropower generated by a tea industry could be approached in many ways. The business models used on the supply-side (power generation) and the demand-side (power distribution) largely determine the approaches, and the models could be optimized for achievement of maximum socio-economic benefits particularly poverty reduction. In the analyses carried out it was deduced that for the four countries that were selected for piloting (Kenya, Tanzania, Rwanda and Malawi), distribution models that have rural communities at the core of the electrification businesses are most ideal. This is especially because members of the communities are the ones targeted for poverty reduction efforts through electrification. Getting the members to own the electrification process and businesses would maximize the benefits to the communities and ensure sustainability of the initiatives. It was noted that the community based electrification businesses would be well supported by energy sector policies and regulations that already exist or are in the process of formation. In addition, key institutions like international development agencies, governments through national rural electrification bodies, NGOs, and micro-finance bodies are willing to support the businesses.

However, community organizations would find it very difficult to start and run electrification projects on their own, chiefly because of lack of adequate technical and business capacities. It was therefore found necessary to have community electrification businesses developed in conjunction with the tea industries or with NGOs. The latter option is more feasible due to the reluctance of the tea industries to involve themselves substantially in risky businesses like rural electrification. The industries would be willing to provide limited support through their CSR programmes.

In Kenya, the pilot electrification project could be carried out by the EPK-OEP community organization in the Kipchoria area. The organization is already running as a company and has a financial base that could be used for an electrification business. However, a large part of the business financing would need to come from external sources in the form of development assistance and soft credit. It is recommended that this organization be supported through a facilitator to implement the Kipchoria electrification project. The facilitator could be a body or institution experienced in

community development work and has the capability of leveraging required support and implementation of the project. The PACEAA Project team would then hand over to the facilitator the implementation package developed by the team, for the facilitator to proceed to project execution and finalization.

Considering Tanzania, Rwanda and Malawi together, a wide range of business models could be used for rural electrification with poverty alleviation benefits for the targeted rural communities. The centre of attention has been on electrification from hydropower expected to be generated by tea industries. However, the arguments advanced could apply to power from other renewable energy sources and agro-industries. The degree of the poverty alleviation benefits varies broadly with the highest coming from models that involve community members in the development and operation of the proposed power supply businesses. Conversely, in models where benefiting communities have little or no participation, and businesses are driven by few private entrepreneurs aiming for maximum returns on investments, the benefits are lowest. The models that have therefore stood out prominently in the search for appropriate options have been those that have some form of community involvement, like community associations, cooperatives, and companies.

On the other hand, although community organizations have been found ideal as means towards achieving poverty alleviation benefits from rural electrification, a major weakness in using models driven by the organizations is project implementation challenges. A key challenge is that all the organizations that were encountered have no experience and existing capacity for carrying out rural electrification business. Resources have therefore to be sought for empowering the organizations to do the electrification business, and it would take considerably longer to implement the proposed electrification projects due to the steep learning curve involved. In some cases the resources could be obtained, and where this is possible it is recommended that the models centred on community organizations be given priority.

In some cases it has been found possible to use a model where national power utilities would be the providers of the proposed rural electrification. If this model is employed implementation of the electrification is greatly simplified in view of the utilities' capacity for electric power business. A significant obstacle when the model is applied is that communities are unlikely to be involved in the electrification and therefore poverty alleviation benefits would not be fully realized. This is due to the top-down approaches adopted by most of the utilities, and the lack of community or power user ownership in the electrification projects. Nonetheless, it has been deemed necessary to pursue the model as a first line of action towards implementation of the proposed electrification. This measure is on account of the difficulties of securing resources for empowering communities to do rural electrification.

As the PACEAA project comes to an end in August 2010, preparations are being made for implementation of the proposed electrification using plans made by the PACEAA project team. Discussions will be held with national power utilities to find out whether

they would carry out the implementation and operate the power supply systems. If the discussions succeed the PACEAA team would handover to the utilities plans and resources prepared for the implementation. Alternatively, facilitators and resources for empowering the relevant communities would be sought by the project team and implementation would be left to the facilitators and community organizations. In case the communities are involved in the implementation it would also be expected that they would eventually run the electrification systems.

At this point, it is pertinent to consider the possibility of PACEAA type of rural electrification in the remaining seven countries within the scope of the PACEAA Project; namely: Burundi, Ethiopia, Mozambique, Sudan, Swaziland, Uganda, and Zambia. In about half of these countries commercial scale tea growing is carried out and hydropower could be generated, with resultant opportunities for rural electrification. In the countries where tea growing is not sufficiently developed, agro-industries such as sugar, wood, and sisal factories could be used as sources of electricity through energy cogeneration, and the power obtained applied in electrification. For each case where electricity is generated and supplied to neighbouring communities there are possibilities for involving the potential electrification beneficiaries in providing themselves with required power. Where benefiting communities are not in a position to participate in electrification national power utilities and concerned government organs could undertake the electrification. It is generally noted that energy sector reforms are ongoing in most of these countries. Possibilities therefore exist for creation or operationalization of policy and regulatory frameworks that would enable agro-industries to generate electricity and for rural electrification to take place using the power generated

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Appendix 1: Work Package 3 description

N° of work package: WP3	Name of the work package: Elaboration of business models for rural electrification from agro-industries
Duration in months: 14	Leader of the work package: DTU
Total person-hours of work: 2 756	costs in EUR: 190 131

Scope:

This activity will build on the assessment of the legal and regulatory framework and the requirements of potential donors provided in WP 2, and design a business model that would be applicable for rural electrification from agro-industries, specifically, for tea factories.

Activities

Sub-task 3.1. Selection of most mature 4 projects

Given the specific implementation schedule of the COGEN, project will be only selected from the UNEP/GEF funded "Greening the Tea Industry in East Africa" . Projects will be pooled together and assessed in terms of the: (i) interest of the owner to develop and invest in the project in the short to medium term; (ii) economic attractiveness of the project, (iii) interest in exploring the rural electrification component (iv) availability of site specific information (at least Pre-FS should be available). A set of criteria will be developed for the selection of the four most mature projects for rural electrification projects, catalysed by Tea-industries, in at least two different countries. The criteria will be mutually agreed with EATTA and the remaining project partners and will cover aspects pertaining to the maturity of the institutional framework, potential for replication in other countries, and the interest expressed by the Tea-industries in the development of the Small Hydro Power Plant. If possible, at least one of the projects will be "isolated", i.e. without PPA to the National Utility grid.

Sub-task 3.2. Elaboration of business models and addressing financing and regulatory issues

Once the 4 case studies are selected, detailed assessments and descriptions of the business models for rural electrification in the various tea and sugar factories will be carried out. This will start with the detailed analysis of the regulatory framework built on the WP2 and will include following: definition of the roles of various organs/offices; mode of operation and management of the rural electrification programme; interaction with other institutions and stakeholders involved in rural electrification (national electricity utilities, rural electrification agencies/funds, rural end-user associations, etc); drafting model contracts/agreements between the various parties involved; investigation of regulatory and financing issues including risk assessment; testing business models under different financial and regulatory conditions. In the elaboration of business models, emphasis will be given to the most "easy to implement approaches". For example, the following business models will be analysed: (i) The Tea factory as a direct investor in SHP + local grid and responsible for distribution in the Estate area (only to tea growers); with or without sale of excess power to the national grid; with or without the establishment of an ESCO ; (ii) same with distribution to rural customers (not only tea growers); (iii) Tea factory as a direct investor in SHP + excess power sold to the national grid and special agreement with the Rural Electrification Fund / Agency to extension the grid to rural customers; (iv) The Tea factory as a direct investor in SHP + sale power to a local utility (to be established with local stakeholders) ; with or without sale of excess power to the national grid. The business models will also be prepared in line with requirements of potential donors identified in WP2.

Outcomes

Selection criteria; Business models; Selection of four project in four countries; Recommendations for removal of barriers for remaining 7 countries

Deliverable(s) of this work package:

D2: Four (4) Business Models for Rural Electrification from Agro-Industries (in at least 2 different countries)

Role / contribution of each partner in this work package:

DTU will lead sub-task 3.2; develop the matrix for selection of projects and the first draft of business model	Hours Budget	577 78 432€
IED will contribute on the financial aspects and on the risk management (3.2), and on the technical criteria for 3.1	Hours Budget	440 50 139€
UNEP will be responsible for sub-task 3.1 and will review/comment D2	Hours Budget	23 1 353€
Role / contribution of each subcontractor in this work package:		
AFREPREN/FWD will only comment D2 before finalisation.	Hours Budget	394 7 930
EATTA will associate its members to validate the choice of projects involving tea factories, will disseminate the draft D2 and will comment on D2.	Hours Budget	1 323 52 278 €

Appendix 2: Details of model selection

MODEL	CRITERIA SCORE (Scale of 1 to 3)									
	A1--Organization competence	A2--Business performance	A3--Financing attractiveness	A4--Donor funding pull	A5--Affiliation to communities	A6--Community support	A7--Interest in rural projects	A8-Interest in community power	A9-Freedom from politics	Total
(GM1)Tea factory	2	2	2	2	3	3	2	2	1	19
(GM2) Tea factory & IPP	3	3	3	1	2	2	2	2	2	20
(GM3) IPP (BOO)	3	3	2	1	1	1	2	1	3	17
(GM4) IPP (BOT)	3	3	2	2	1	1	2	2	2	18
(GM5) Concessionaire	3	2	2	2	1	1	2	2	2	17
(GM6) National power utility	3	2	2	2	1	1	1	1	1	14
	A1	A2	A3	A4	A5	A6	A7	A8	A9	
	Maximum attainable score = 27									

Table 1: Assessed scoring of the generation business models according to each criterion

MODEL	CRITERIA SCORE (weighted from Table 1)										
	A1--Organization competence	A2--Business performance	A3--Financing attractiveness	A4--Donor funding pull	A5--Affiliation to communities	A6--Community support	A7--Interest in rural projects	A8-Interest in community power	A9-Freedom from politics	Total (new scale)	Total (original scale)
(GM1)Tea factory	0.28	0.2	0.2	0.24	0.3	0.42	0.2	0.2	0.1	2.14	21.4
(GM2) Tea factory & IPP	0.42	0.3	0.3	0.12	0.2	0.28	0.2	0.2	0.2	2.22	22.2
(GM3) IPP (BOO)	0.42	0.3	0.2	0.12	0.1	0.14	0.2	0.1	0.3	1.88	18.8
(GM4) IPP (BOT)	0.42	0.3	0.2	0.24	0.1	0.14	0.2	0.2	0.2	2	20
(GM5) Concessionaire	0.42	0.2	0.2	0.24	0.1	0.14	0.2	0.2	0.2	1.9	19
(GM6) National power utility	0.42	0.2	0.2	0.24	0.1	0.14	0.1	0.1	0.1	1.6	16
	A1	A2	A3	A4	A5	A6	A7	A8	A9		

Table 1a: Weighted scoring of the generation business models according to each criterion

MODEL	CRITERIA SCORE (Scale of 1 to 3)									
	B1--Business competence	B2-- Business performance	B3-- Financing attractiveness	B4-- Donor funding pull	B5-- Affiliation to communities	B6-- Community support	B7-- Interest in rural projects	B8 -- Interest in capacity building	B9—Freedom from politics	Total
(DM1) C.B.* Coop	1	1	1	2	3	2	3	3	1	17
(DM2) C.B. Association	1	1	1	3	3	3	3	3	2	20
(DM3) C.B. Company	1	1	1	3	3	2	3	2	2	18
(DM4) Comm + TF	2	2	2	3	2	2	3	2	2	20
(DM5) ESCO	3	3	3	1	1	1	1	2	3	18
(DM6) Comm + ESCO	2	2	2	2	2	2	3	2	2	19
(DM7) Comm + NGO	2	1	1	3	3	3	3	3	2	21
(DM8) Concessionaire	3	2	2	2	1	1	3	1	2	17
(DM9) Power Utility	3	2	2	2	1	1	1	1	1	14
	B1	B2	B3	B4	B5	B6	B7	B8	B9	
	Maximum attainable score = 27									

Table 2: Assessed scoring of the distribution business models according to each criterion

MODEL	CRITERIA SCORE (Weighted from Table 2)										
	B1--Business competence	B2-- Business performance	B3-- Financing attractiveness	B4-- Donor funding pull	B5-- Affiliation to communities	B6-- Community support	B7-- Interest in rural projects	B8 -- Interest in capacity building	B9—Freedom from politics	Total (new scale)	Total (original scale)
(DM1) C.B.* Coop	0.14	0.1	0.08	0.28	0.3	0.28	0.3	0.36	0.08	1.92	19.2
(DM2) C.B. Association	0.14	0.1	0.08	0.42	0.3	0.42	0.3	0.36	0.16	2.28	22.8
(DM3) C.B. Company	0.14	0.1	0.08	0.42	0.3	0.28	0.3	0.24	0.16	2.02	20.2
(DM4) Comm + TF	0.28	0.2	0.16	0.42	0.2	0.28	0.3	0.24	0.16	2.24	22.4
(DM5) ESCO	0.42	0.3	0.24	0.14	0.1	0.14	0.1	0.24	0.24	1.92	19.2
(DM6) Comm + ESCO	0.28	0.2	0.16	0.28	0.2	0.28	0.3	0.24	0.16	2.1	21
(DM7) Comm + NGO	0.28	0.1	0.08	0.42	0.3	0.42	0.3	0.36	0.16	2.42	24.2
(DM8) Concessionaire	0.42	0.2	0.16	0.28	0.1	0.14	0.3	0.12	0.16	1.88	18.8
(DM9) Power Utility	0.42	0.2	0.16	0.28	0.1	0.14	0.1	0.12	0.08	1.6	16
	B1	B2	B3	B4	B5	B6	B7	B8	B9		

TABLE 2a: Weighted scoring of the distribution business models according to each criterion

* C.B. means Community Based

	Community plus NGO	Community plus Tea Factory	Community Association
Strengths	1) A community organization that could be used is existing 2) NGOs experience with communities would be helpful 3) Community mobilization potential 4) External support to NGOs and communities 5) Community labour and other inputs 6) Community cohesion could be enhanced by NGO 7) The community has some experience in business management 8) Policy and legal frameworks are conducive	1) A community organization that could be used is existing 2) Existing ties between community and TF 3)TF business experience and credit worthiness 4) Community labour and other inputs 5) Community cohesion 6) The existing business management skills could be enhanced through TF help 7) Policy and legal frameworks are conducive	1) A community organization that could be used is existing 2)This organization is easy to form 3)Possible support from NGOs and donors (developmental sources) 4) Community labour and other inputs 5) Community cohesion exists 6) Assistance to the association could be used in building existing business skills 7) Policy and legal frameworks are conducive
Weaknesses	1) A great deal of capacity building for electrification business is needed 2) Relatively low income levels 3) Micro-credit is difficult to find 4) Strong dependence on external support 5) Some policy and regulatory guidelines are lacking 6) NGO's covering energy developments are few	1) The TF management may be reluctant to engage fully in electrification business 2) A great deal of capacity building for electrification business is needed 3) Relatively low income levels 4) Tea business under- performance could affect electrification 5)Some policy and regulatory guidelines are lacking	1) A great deal of capacity building for electrification business is needed 2) Relatively low income levels 3) Organization may vulnerable to leadership or political manipulation 4) Required external support would be difficult to find 5) Some policy and regulatory guidelines are lacking
Opportunities	1) NGOs are very active in rural areas 2) Sustainability can be stimulated 3) ERC and REA support to communities 4) Demand for electricity in schools and businesses 5) Productive land usable for income generation 6) Fair trade system can be used for funding	1) Corporate efficiency in TF could be imparted into community business 2) Fair trade system can be used for funding 3) Corporate social responsibility 4) ERC and REA support to communities 5) Demand for electricity in schools and businesses 6) Productive land usable for income generation	1) Once business established, the degree of development sustainability is high 2) Independence from external forces could foster performance 3) ERC and REA support to communities 4) Demand for electricity in schools and businesses 5) Productive land usable for income generation
Threats	1) Lack of adequate education and equity awareness within community 2) Community leadership without sound development agenda 3) NGOs without electrification priority 4) Expectation of service from national power utilities	1) Fear of TF in taking up risky (social) business of electrification 2) Lack of adequate education and equity awareness 3) Community leadership without sound development agenda 4) Expectation of service from national power utilities 5) Low prioritization of electrification	1) Exposure to negative political agendas 2) Lack of adequate education and equity awareness 3) Community leadership without sound development agenda 4) Expectation of service from national power utilities 5) Low prioritization of electrification

Table 3: SWOT analysis for distribution business model in Kenya (Kipchoria Site)

MODEL	CRITERIA SCORE (Scale of 1 to 3)										
		A1--Organization competence	A2--Business performance	A3--Financing attractiveness	A4--Donor funding pull	A5--Affiliation to communities	A6--Community support	A7--Interest in rural projects	A8-Interest in community power	A9-Freedom from politics	Total
(GM1)Tea factory	Tanzania	2	2	2	1	2	2	2	1	1	15
	Rwanda	2	2	2	2	2	2	2	2	2	18
	Malawi	2	2	1	1	2	2	1	1	1	13
(GM2) Tea factory & IPP	Tanzania	3	2	2	1	2	2	1	1	2	16
	Rwanda	3	3	3	2	2	2	1	1	3	20
	Malawi	2	1	1	1	1	1	1	1	1	10
(GM3) IPP (BOO)	Tanzania	3	2	2	1	1	1	1	1	3	15
	Rwanda	3	3	3	2	1	1	1	1	3	18
	Malawi	2	1	1	1	1	1	1	1	2	11
(GM4) IPP (BOT)	Tanzania	3	2	2	2	2	2	2	2	2	19
	Rwanda	3	2	2	2	2	2	2	2	3	20
	Malawi	2	1	1	1	1	1	1	1	1	10
(GM5) Concessionaire	Tanzania	2	1	1	1	1	1	2	2	1	12
	Rwanda	2	2	2	2	1	1	2	2	2	16
	Malawi	1	1	1	1	1	1	1	1	1	9
(GM6) National power utility	Tanzania	3	2	2	2	1	1	1	1	1	14
	Rwanda	3	2	2	3	1	1	2	2	2	18
	Malawi	2	1	1	1	1	1	1	1	1	10
		A1	A2	A3	A4	A5	A6	A7	A8	A9	
	Maximum attainable score = 27										

TABLE 4: Assessed scoring of the generation business models according to each criterion

MODEL	CRITERIA SCORE (weighted from Table 1)											
		A1--Organization competence	A2--Business performance	A3--Financing attractiveness	A4--Donor funding pull	A5--Affiliation to communities	A6--Community support	A7--Interest in rural projects	A8-Interest in community power	A9-Freedom from politics	Total (on new scale)	Total (on original scale)
(GM1)Tea factory	Tanzania	0.28	0.2	0.2	0.12	0.2	0.28	0.2	0.1	0.1	1.68	16.8
	Rwanda	0.28	0.2	0.2	0.24	0.2	0.28	0.2	0.2	0.2	2	20
	Malawi	0.28	0.2	0.1	0.12	0.2	0.28	0.1	0.1	0.1	1.48	14.8
(GM2) Tea factory & IPP	Tanzania	0.42	0.2	0.2	0.12	0.2	0.28	0.1	0.1	0.2	1.82	18.2
	Rwanda	0.42	0.3	0.3	0.24	0.2	0.28	0.1	0.1	0.3	2.24	22.4
	Malawi	0.28	0.1	0.1	0.12	0.1	0.14	0.1	0.1	0.1	1.14	11.4
(GM3) IPP (BOO)	Tanzania	0.42	0.2	0.2	0.12	0.1	0.14	0.1	0.1	0.3	1.68	16.8
	Rwanda	0.42	0.3	0.3	0.24	0.1	0.14	0.1	0.1	0.3	2	20
	Malawi	0.28	0.1	0.1	0.12	0.1	0.14	0.1	0.1	0.2	1.24	12.4
(GM4) IPP (BOT)	Tanzania	0.42	0.2	0.2	0.24	0.2	0.28	0.2	0.2	0.2	2.14	21.4
	Rwanda	0.42	0.2	0.2	0.24	0.2	0.28	0.2	0.2	0.3	2.24	22.4
	Malawi	0.28	0.1	0.1	0.12	0.1	0.14	0.1	0.1	0.1	1.14	11.4
(GM5) Concessionaire	Tanzania	0.28	0.1	0.1	0.12	0.1	0.14	0.2	0.2	0.1	1.34	13.4
	Rwanda	0.28	0.2	0.2	0.24	0.1	0.14	0.2	0.2	0.2	1.76	17.6
	Malawi	0.14	0.1	0.1	0.12	0.1	0.14	0.1	0.1	0.1	1	10
(GM6) National power utility	Tanzania	0.42	0.2	0.2	0.24	0.1	0.14	0.1	0.1	0.1	1.6	16
	Rwanda	0.42	0.2	0.2	0.36	0.1	0.14	0.2	0.2	0.2	2.02	20.2
	Malawi	0.28	0.1	0.1	0.12	0.1	0.14	0.1	0.1	0.1	1.14	11.4
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A1		
	Maximum attainable score = 27											

Table 4a : Weighted scoring of the generation business models according to each criterion

MODEL	CRITERIA SCORE (On a scale of 1 to 3)										
		B1--Business competence	B2-- Business performance	B3-- Financing attractiveness	B4-- Donor funding pull	B5-- Affiliation to communities	B6-- Community support	B7-- Interest in rural projects	B8 -- Interest in capacity building	B9—Freedom from politics	Total
(DM1) C.B.* Coop	Tanzania	1	1	1	1	2	2	2	2	1	13
	Rwanda	2	2	2	2	3	3	3	3	2	22
	Malawi	1	1	1	1	2	2	2	2	1	13
(DM2) C.B. Association	Tanzania	1	1	1	2	3	3	2	2	1	16
	Rwanda	1	1	1	1	2	2	2	2	1	13
	Malawi	1	1	1	2	2	2	2	2	1	14
(DM3) C.B. Company	Tanzania	2	2	2	2	1	1	2	1	2	15
	Rwanda	3	3	3	2	2	2	2	2	2	21
	Malawi	1	1	1	2	1	1	2	1	1	11
(DM4) Comm + TF	Tanzania	2	2	2	2	2	2	2	2	2	18
	Rwanda	2	2	3	2	2	2	2	2	2	19
	Malawi	1	1	1	1	1	1	1	1	2	10
(DM5) ESCO	Tanzania	3	2	2	1	1	1	1	1	3	15
	Rwanda	3	2	2	2	1	1	1	1	3	16
	Malawi	1	1	1	1	1	1	1	1	2	10
(DM6) Comm + ESCO	Tanzania	2	2	2	1	2	2	2	1	2	16
	Rwanda	3	2	2	2	2	2	2	1	2	18
	Malawi	1	1	1	1	1	1	1	1	1	9
(DM7) Comm + NGO	Tanzania	2	2	1	2	2	2	2	2	1	16
	Rwanda	1	1	1	2	2	2	2	2	1	14
	Malawi	1	1	1	1	1	1	1	1	1	9
(DM8) Concessionaire	Tanzania	2	2	2	1	1	1	2	1	2	14
	Rwanda	1	1	1	1	1	1	1	1	2	10
	Malawi	1	1	1	1	1	1	1	1	1	9
(DM9) Power Utility	Tanzania	3	2	1	2	2	2	2	1	1	16
	Rwanda	3	2	1	3	2	2	2	2	2	19
	Malawi	2	1	1	1	2	2	1	1	1	12
		B1	B2	B3	B4	B5	B6	B7	B8	B9	
	Maximum attainable score = 27										

Table 5: Assessed scoring of the distribution business models according to each criterion

*CB means community based

MODEL	CRITERIA SCORE (weighted from Table 2)											
		B1--Business competence	B2-- Business performance	B3-- Financing attractiveness	B4-- Donor funding pull	B5-- Affiliation to communities	B6-- Community support	B7-- Interest in rural projects	B8 -- Interest in capacity building	B9—Freedom from politics	Total (on new scale)	Total (original scale)
(DM1) C.B.* Coop	Tanzania	0.14	0.1	0.08	0.14	0.2	0.28	0.2	0.24	0.08	1.46	14.6
	Rwanda	0.28	0.2	0.16	0.28	0.3	0.42	0.3	0.36	0.16	2.46	24.6
	Malawi	0.14	0.1	0.08	0.14	0.2	0.28	0.2	0.24	0.08	1.46	14.6
(DM2) C.B. Association	Tanzania	0.14	0.1	0.08	0.28	0.3	0.42	0.2	0.24	0.08	1.84	18.4
	Rwanda	0.14	0.1	0.08	0.14	0.2	0.28	0.2	0.24	0.08	1.46	14.6
	Malawi	0.14	0.1	0.08	0.28	0.2	0.28	0.2	0.24	0.08	1.6	16
(DM3) C.B. Company	Tanzania	0.28	0.2	0.16	0.28	0.1	0.14	0.2	0.12	0.16	1.64	16.4
	Rwanda	0.42	0.3	0.24	0.28	0.2	0.28	0.2	0.24	0.16	2.32	23.2
	Malawi	0.14	0.1	0.08	0.28	0.1	0.14	0.2	0.12	0.08	1.24	12.4
(DM4) Comm + TF	Tanzania	0.28	0.2	0.16	0.28	0.2	0.28	0.2	0.24	0.16	2	20
	Rwanda	0.28	0.2	0.24	0.28	0.2	0.28	0.2	0.24	0.16	2.08	20.8
	Malawi	0.14	0.1	0.08	0.14	0.1	0.14	0.1	0.12	0.16	1.08	10.8
(DM5) ESCO	Tanzania	0.42	0.2	0.16	0.14	0.1	0.14	0.1	0.12	0.24	1.62	16.2
	Rwanda	0.42	0.2	0.16	0.28	0.1	0.14	0.1	0.12	0.24	1.76	17.6
	Malawi	0.14	0.1	0.08	0.14	0.1	0.14	0.1	0.12	0.16	1.08	10.8
(DM6) Comm + ESCO	Tanzania	0.28	0.2	0.16	0.14	0.2	0.28	0.2	0.12	0.16	1.74	17.4
	Rwanda	0.42	0.2	0.16	0.28	0.2	0.28	0.2	0.12	0.16	2.02	20.2
	Malawi	0.14	0.1	0.08	0.14	0.1	0.14	0.1	0.12	0.08	1	10
(DM7) Comm + NGO	Tanzania	0.28	0.2	0.08	0.28	0.2	0.28	0.2	0.24	0.08	1.84	18.4
	Rwanda	0.14	0.1	0.08	0.28	0.2	0.28	0.2	0.24	0.08	1.6	16
	Malawi	0.14	0.1	0.08	0.14	0.1	0.14	0.1	0.12	0.08	1	10
(DM8) Concessionaire	Tanzania	0.28	0.2	0.16	0.14	0.1	0.14	0.2	0.12	0.16	1.5	15
	Rwanda	0.14	0.1	0.08	0.14	0.1	0.14	0.1	0.12	0.16	1.08	10.8
	Malawi	0.14	0.1	0.08	0.14	0.1	0.14	0.1	0.12	0.08	1	10
(DM9) Power Utility	Tanzania	0.42	0.2	0.08	0.28	0.2	0.28	0.2	0.12	0.08	1.86	18.6
	Rwanda	0.42	0.2	0.08	0.42	0.2	0.28	0.2	0.24	0.16	2.2	22
	Malawi	0.28	0.1	0.08	0.14	0.2	0.28	0.1	0.12	0.08	1.38	13.8
		B1	B2	B3	B4	B5	B6	B7	B8	B9		
	Maximum attainable score = 27											

Table 5a: Weighted scoring of the distribution business models according to each criterion

*CB means community based

	Community plus Tea Factory	Power Utility (TANESCO)	Community plus NGO
Strengths	1) A community organization that could be used is existing 2) Existing ties between community and TF 3)TF business experience and credit worthiness 4) Community labour and other inputs 5) Community cohesion 6) The existing business management skills could be enhanced through TF help 7) Policy and legal frameworks are conducive	1) Competence in power business is well established 2) Technical and other necessary skills are already available 3) Same low tariffs as for other TANESCO customers can be applied 4) Start-up challenges would be minimal 5) Community labour and other inputs could reinforce utility resources 6) Generally community participation could be facilitated and serve as an example for community based electrification	1) A community organization that could be used is existing 2) NGOs experience with communities would be helpful 3) Community mobilization potential 4) External support to NGOs and communities 5) Community labour and other inputs 6) Community cohesion could be enhanced by NGO 7) The community has some experience in business management 8) Policy and legal frameworks are conducive
Weaknesses	1) The TF management is reluctant to engage in rural electrification business 2) A great deal of capacity building for electrification business is needed 3) Relatively low income levels 4) Tea business under- performance could affect electrification 5)Some policy and regulatory guidelines are lacking	1) Securing commitment of TANESCO to undertake electrification in this area that is not in their plan would be a challenge 2) The utility would not be obliged to take power from the proposed SHP resource and therefore the envisaged sustainable energy benefits may not be gained in the rural electrification 3) Poverty alleviation objectives would not be fully realized as community involvement would be low	1) A great deal of capacity building for electrification business is needed 2) Relatively low income levels 3) Micro-credit is difficult to find 4) Strong dependence on external support 5) Some policy and regulatory guidelines are lacking 6) NGO's covering energy developments are few 7) Large funding would be required for capacity building and NGO facilitation
Opportunities	1) Corporate efficiency in TF could be imparted into community business 2) Fair trade system can be used for funding 3) Corporate social responsibility 4) ERC and REA support to communities 5) Demand for electricity in schools and businesses 6) Productive land usable for income generation	1) Well established resources of the utility would be available 2) Economies of scale can be realized by pooling resources from other projects 3) Immediate implementation of project would be possible 4) Quality of power system to be put up would be relatively high and O&M costs would be low 5) Support available for national rural elect6rification projects would be available for the proposed project	1) NGOs are very active in rural areas 2) Sustainability can be stimulated 3) ERC and REA support to communities 4) Demand for electricity in schools and businesses 5) Productive land usable for income generation 6) Fair trade system can be used for funding
Threats	1) Fear of TF in taking up risky (social) business of electrification 2) Lack of adequate education and equity awareness 3) Community leadership without sound development agenda 4) Expectation of service from national power utilities 5) Low prioritization of electrification	1) Like in many TANESCO rural electrification projects power could be made available and very few connections made 2) Poverty alleviation would not be a target and only provision of power would be prioritized 3) The community to be served with electricity would not take ownership of the proposed project	1) Lack of adequate education and equity awareness within community 2) Community leadership without sound development agenda 3) NGOs without electrification priority 4) Expectation of service from national power utilities

Table 6: SWOT analysis for distribution business model in Tanzania (Suma Site)

	Community Cooperative	Community-based Company	Power Utility (RECO)
Strengths	1) Cooperatives that could be used for electrification exist 2) There is good support for the cooperatives from their members and there is little reliance on top-down governance 3) The tea sector in Rwanda has a well organized cooperatives' structure 6) The existing business management skills could be enhanced 7) Policy and legal frameworks are conducive	1) In general commercial enterprises are being promoted in the power sub-sector 2) The motivation for generation of positive returns on investments would create an environment for business success 3) With community shareholders in the company community interests would be taken into account in the business 4) Community labour and other inputs could reduce costs 5) Policy and legal frameworks are conducive	1) Competence in power business is well established 2) Technical and other necessary skills are already available 3) Same tariffs as for other RECO customers can be applied 4) Start-up challenges would be minimal 5) Community labour and other inputs could reinforce utility resources 6) Generally community participation could be facilitated and serve as an example for community based electrification
Weaknesses	1) The cooperatives have no skills for a power business 2) A great deal of capacity building is needed 3) Relatively low income levels among community members 4) Tea business under- performance could affect electrification 5) The cooperatives are burdened by loans	1) A significant amount of training would be needed to create a commercial enterprise run by community members 2) Social equity could be compromised in pursuit of a profit motive 3) The company might not receive enough commercial support as it would be viewed as a social organization 4) It would take a long time to start earning a profit due to a steep learning curve for the company	1) Securing commitment of RECO to undertake electrification in this area that is not in their plan would be a challenge 2) The utility would not be obliged to take power from the proposed SHP resource and therefore the envisaged sustainable energy benefits may not be gained in the rural electrification 3) Poverty alleviation objectives would not be fully realized as community involvement would be low
Opportunities	1) Community members could have a say in the provision of electricity and influence better utilization of the power 2) The existing business relations between the cooperatives and the TF could be used in securing better prices for power from the TF 3) Resources provided for cooperatives could be used in electrification business 4) Involvement in electrification could serve as a good example for the many cooperative societies in the country	1) The aim for a commercially mode of operation could enable the company to run professionally 2) Support for the business is likely to come from commercial and non-commercial sources 3) Skills acquired in running the company as a commercial enterprise could be applied to related businesses such as tea growing, with overall business success 4) Political capture is unlikely to occur when the organization is legally constituted as a company	1) Well established resources of the utility would be available 2) Economies of scale can be realized by pooling resources from other projects Immediate implementation of project would be possible 3) Quality of power system to be put up would be relatively high and O&M costs would be low 4) Support available for national rural elect6rification projects would be available for the proposed project
Threats	1) Lack of adequate education and equity awareness within community 2) Failure of past cooperative projects could deter promotion of cooperatives as organizations for electrification 3) Expectation of power supply by RECO under the national rural electrification programme could discourage community-based electrification	1) Limitation of resources within the communities could discourage use of community companies for electrification 2) Strict legal requirements for formation of companies could make it difficult to start a company for electrification 3) Expectation of power supply by RECO under the national rural electrification programme could discourage community-based electrification	1) Like in many RECO rural electrification projects power could be made available and very few connections made 2) Poverty alleviation would not be a target and only provision of power would be prioritized 3) The community to be served with electricity would not take ownership of the proposed project

Table 7: SWOT analysis for distribution business model in Rwanda (Giciye Site)

	Community Association	Community Cooperative	Power Utility (ESCOM)
Strengths	1) A community organization that could be used is existing 2)This organization is easy to form 3)Possible support from NGOs and donors 4) Community labour and other inputs 5) Community cohesion exists 6) Assistance to the association could be used in building existing business skills 7) Policy and legal frameworks are conducive	1) The cooperative movement in Malawi has a long history 2) The existing community association could be converted to a cooperative 3) For the proposed electrification project members could borrow funds from the savings and credit arm of the cooperative movement 4) Membership to a cooperative could be localized making enabling members to promote local community welfare 5) Community cohesion exists	1) Competence in power business is well established 2) Technical and other necessary skills are already available 3) Same low tariffs as for other ESCOM customers can be applied 4) Start-up challenges would be minimal 5) Community labour and other inputs could reinforce utility resources 6) Generally community participation could be facilitated and serve as an example for community based electrification
Weaknesses	1) A great deal of capacity building for electrification business would be needed 2) Relatively low income levels would cause affordability problems 3) Organization may be vulnerable to leadership or political manipulation 4) Most of the required project development funding would have to be secured as aid or soft credit	1) A cooperative would have to be formed and substantial capacity building would be needed to do electricity business 2) Relatively low income levels would cause affordability problems 3) Most of the required project development funding would have to be secured as aid or soft credit 4) Organization may be vulnerable to leadership or political manipulation	1) Securing commitment of ESCOM to undertake electrification in this area that is not in their plan would be a challenge 2) ESCOM is facing many challenges of meeting national power demand and would be unable to provide sustainable power supply 3) ESCOM applies top-down approaches to power supply 4) Poverty alleviation objectives would not be fully realized as community involvement would be low
Opportunities	1) Fair trade funds being received by the existing community association could be applied towards the proposed electricity project 2) The community would get significant social gains through ownership of the proposed power project 3) An NGO is developing an SHP project for electrification of part of the community 4) The TF is seeking assistance for community electrification	1) Cooperatives are well supported by the cooperative societies law in the country 2) Some of the required capacity building could be provided through the country's cooperative movement 3) The community would get significant social gains through ownership of the proposed power project 4) An NGO is developing an SHP project for electrification of part of the community 5) The TF is seeking assistance for community electrification	1) Well established resources of the utility would be available 2) Economies of scale can be realized by pooling resources from other projects 3) Immediate implementation of project would be possible 4) Quality of power system to be put up would be relatively high and O&M costs would be low 5) Support available for national rural elect6rification projects would be available for the proposed project (possibly including assistance that could be obtained through Lujeri tea estate and MUREA)
Threats	1) High costs of development of the proposed power project may make the project unaffordable for the association 2) Lack of adequate education and equity awareness within community. 3) Community leadership without sound development agenda. 4) Lack of national experience in formation and running of community electricity businesses	1) High costs of development of the proposed power project may make the project unaffordable for the proposed cooperative 2) Lack of adequate education and equity awareness within community 3) Community leadership without sound development agenda 4) Lack of national experience in formation and running of community electricity businesses	1) Like in many ESCOM rural electrification projects power could be made available and very few connections made 2) Poverty alleviation would not be a target and only provision of power would be prioritized 3) The community to be served with electricity would not take ownership of the proposed project

Table 8: SWOT analysis for distribution business model in Malawi (Ruo Site)

Appendix 3: Bulk power supply agreement (sample)

BULK POWER SUPPLY AGREEMENT [*sample*]

This Bulk Power Supply Agreement is made and entered into as of [day] [month] [year] at [name of city], [name of country], dated [day] [month] [year]

BETWEEN

1) [name of Distribution Enterprise], a body established under the laws of [name of country], with its principal office at [address] and its successors and assigns of the one part, hereinafter called "Power purchaser".

AND

2) [name of Bulk Supplier], a body incorporated under the laws of [name of country], with its principal office at [address], and its permitted successors and permitted assigns of the other part, hereinafter called "Company".

Both the Power Purchaser and the Company shall hereinafter also be referred to individually as "the Party" and collectively as "the Parties".

WHEREAS the Company will sell and the Power Purchaser will purchase from the Company electrical energy on the terms and conditions set here-in-forth, pursuant to Generation or Bulk Supply Licence issued by [name of regulator].

NOW THEREFORE, in consideration of the mutual benefits to be derived and the representations, warranties, conditions and premises herein contained, and intending to be legally bound, the Company and the Power Purchaser hereby agree as follows:-

Wherever the following capitalized terms appear in this Agreement, they shall have the meanings stated below:

"Back-Up Metering System" – All meters and metering devices to be procured, installed and tested by the Power Purchaser. The accuracy class of meters shall be 0.5.

"Billing Cycle" – The period starting from [ ] hours of [ ] day of each month up to [ ] hours of [ ] day of each month .

"Company" [name of Bulk Supplier], a body incorporated under the laws of [name of country], with its principal office at [address] and its permitted successors and permitted assigns.

"Fixed Cost Component" – The tariff component payable @ US Cents [ ] per kWh delivered, by the Company which includes but not limited to O&M cost, tax on income of the Company, insurance cost, return on investment, duties, etc. This component will remain at par with Fixed Cost

Sample Bulk Power Supply Agreement

Component allowable to other Bulk Supplier (s), already supplying power to distribution companies through bilateral contracts.

"Fuel Cost Component" – The tariff component payable @ US Cents [ ] per kWh delivered by the Company based on the Reference Oil Price and as adjusted from time to time for Oil price movements only.

"FCC" – Stands for Fuel Cost Component.

"GP" – Means the price of pipeline quality Oil notified by

"Bulk Supplier" – Means the bulk supplier or part thereof, located on site having installed capacity up to [ ] MW and earmarked to deliver electrical energy to the Power Purchaser under this Contract.

"Bulk Licence" or "Generation Licence" – The permission granted by [name of regulator]to the Company for bulk supply or generation and supply of electricity to [name of Distribution Enterprise].

"Interconnection Point" – The physical point(s) where the Bulk Supplier system and the distribution system of the Power Purchaser are connected;

a) Independent radial feeder(s) isolated from any other system of the Bulk Supplier;

Or

b) Synchronization of the system of the Bulk Supplier with the system of the [name of distribution enterprise], but isolated from any other system of the Bulk Supplier;

"Metering Point" – The outgoing breaker panel/metering panel installed in the control room of the Bulk Supplier.

"Metering System" – All existing meters and metering devices available at the Metering Point of the Bulk Supplier shall be used for recording of electrical energy to be supplied to Power Purchaser. The accuracy class of meters shall be 0.5. The Power Purchaser may check/recalibrate the Metering System at appropriate intervals, at its own cost.

"The Regulator" – The national body responsible for regulating electric power according to the law governing the national electricity sector, and any successor or substitute regulatory agency with authority and jurisdiction over the national electricity sector

"Power Purchaser" – [name of distribution enterprise], a body established under the national laws, with its principal office at [address] and its successors and assigns.

"Prudent Electrical Practices" – The use of equipment, practices or methods, as required to comply with applicable industry codes, standards, and regulations in the country (i) to protect the Power

Purchaser's distribution system, employees, agents, and customers from mal-functions occurring at the system (s) of the Bulk Supplier, and (ii) to protect the Bulk Supplier system (s) and the Company's employees and agents at the Bulk Supply System from mal-functions occurring on the distribution system of the Power Purchaser. Prudent Electrical Practices are not limited to optimum practices, methods or acts to the exclusion of all other, but rather are a spectrum of possible practices, methods and acts which could have been expected to accomplish the desired result at reasonable cost consistent with reliability and safety.

The Parties further agree that:

a) The term of this agreement is [ ] years, from the signing of the agreement which can be extended by mutual consent of the Parties.

b) The Bulk Supplier shall not supply electrical energy, produced on fuel other than that agreed between the Parties.

c) The Company shall sell and the Power Purchaser shall purchase the electrical energy at a price agreed upon by the parties.

d) The Company shall provide up to [ ] MW of power at a voltage of [ ]kV and at 50 Hz frequency with a tolerance of ± 5% in nominal voltage and ± 1% in nominal frequency. The quality of electrical energy shall be ensured by the Company through installation of necessary equipment required as per Prudent Electrical Practices and Prudent Utility Practices.

e) The cost of connectivity on any of the distribution or transmission voltages will be borne by the Power Purchaser.

f) The Company shall provide access and facilitate the authorized representative(s) of the Power Purchaser to the control room of the Bulk Supplier's system or power plant to monitor the Metering System and Interconnection Point relating to power dispatch.

g) The meter reading will be recorded by Power Purchaser's authorized persons in the presence of the Company's representative as per Billing Cycle and the Company will submit its energy invoice accordingly.

h) The Company will submit one (1) original invoice with three (3) copies to Power Purchaser. The Power Purchaser will make payment against each invoice submitted by the Company on or before the 7th day from the date of receipt of the invoice by the Power Purchaser. If the Power Purchaser fails to make the payment by the due date then the Power Purchaser will pay to the Company late payment surcharge @ 1% (one percent), per month. In the event of non-payment by Power Purchaser for two (2) consecutive Billing Cycles, the Company reserves the right to discontinue the power supply.

i) (a) All notices and other communications required or permitted to be given by a Party shall be in writing and either delivered personally or by courier or sent by facsimile to the address or number of the other Party specified below:

i) **If to the Power Purchaser:**

Attention: Chief Executive Officer, [name of Distribution Enterprise]

Facsimile:

With a copy to:

Attention: Chief Engineer / Technical Director, [name of Distribution Enterprise]

Facsimile:

ii) **If to the Bulk Supplier:**

Attention: Chief Executive Officer, [name of Company]

Facsimile:

With a copy to:

Attention: Chief Engineer / Technical Director, [name of Company]

Facsimile:

provided that a Party may change the address to which notices are to be sent to it by giving not less than thirty (30) days' prior written notice to the other Party.

(b) No notice or other communication shall be effective until received or deemed received. Notices or other communications shall be deemed to have been received by the receiving Party:

(i) When delivered if personally delivered;

(ii) One (1) business day after sending, if sent by courier; or

(iii) Upon sending if sent by facsimile, subject to confirmation of an uninterrupted transmission report and provided that a hard copy is dispatched not later than the following business day to the recipient by courier or personal delivery.

j) The Power Purchaser may install the Back-Up Metering System with meters of 0.5 accuracy class in the metering room at Company's premises. Parties agree that, in case of doubt by any Party about the accuracy of Metering System, the recordings of the Back-Up Metering System or any other mutually agreed arrangement may be adopted. In the event of complete or partial damage to the Metering System the same shall be replaced. Such replacement shall be at the sole option of the Power Purchaser and at its expense. On the initial or any subsequent replacement (s) of the Metering System the Power Purchaser shall have the right to affix seals on the tested and calibrated meters but in the presence of Company's authorized representative.

k) If either of the Metering System(s) differ from the other by an amount greater than one-half of one percent (0.5%), the Power Purchaser shall test the accuracy of the Metering System and recalibrate the Metering System. If the Metering System is found to be in order, the Company shall be bound to test and calibrate the Back-Up Metering System to the satisfaction of the Power Purchaser. Either Party shall give prior notice, not less than forty-eight (48) hours to conduct such tests.

l) The Company will provide its maintenance schedule to the Power Purchaser so as to ensure stable and reliable supply to Power Purchaser's network.

m) Company will serve at least a 48 hour notice to the Power Purchaser regarding any planned shut down. The Company has right to immediately disconnect the power supply to the Power Purchaser in the event of any electric load shedding of its affiliates, maintenance of engine of affiliate mills, break down of machineries in the Generation Facility and will intimate to Power Purchaser.

n) In case of a permanent fault on any feeder, the Company will inform the Power Purchaser immediately and the Company will switch on the feeder, only after obtaining the clearance certificate from an authorized person nominated by Power Purchaser.

o) The Company will immediately inform Power Purchaser about power supply failure due to defect/mal-operation of the Generation Facility.

p) Either Party shall be responsible to adopt all safety measures according to the Prudent Electrical Practices on respective sides of the Interconnection Point.

q) In the event that a dispute arises, the Parties shall attempt in good faith to settle such dispute through their Chief Executive Officers (CEOs) by mutual discussion(s) within thirty (30) days after the date that the disputing Party delivers written notice of the dispute to the other Party.

r) The Party reporting the existence of a dispute shall give to the other Party written notice setting out the material particulars of the dispute in the written notice. Chief Executive Officer (CEOs) of each Party shall meet to attempt in good faith to resolve the dispute.

s) In case the dispute is not resolved within thirty (30) days after the date of receipt of notice described in section (q) by the relevant Party (or within such longer period of time as the Parties may agree), any Party may initiate arbitration proceedings under the national law of arbitration currently in force

t) Either Party can terminate this agreement by giving a three-month advance notice. There will be no liability on any Party except the payments due to either Party prior to termination of the Agreement.

u) Except as specifically provided elsewhere in this Agreement, the Power Purchaser shall indemnify and defend the Company, for itself and as trustee for its officers, directors and employees against, and hold the Company, its officers, directors and employees harmless from, at all times after the date hereof, any and all losses incurred, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon, the Company.

v) Except as specifically provided elsewhere in this agreement, the Company shall indemnify and defend the Power Purchaser, for itself and as trustee for its officers, directors and employees against, and hold the Power Purchaser, its officers, directors and employees harmless from, at all times after the date hereof, any and all loss, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon, the Power Purchaser.

w) All permissions, consents required by the Company from different agencies such as the regulator etc. will be arranged through joint efforts of the Company and Power Purchaser. The cost incurred in this regard will be borne by the Company.

IN WITNESS whereof the Parties hereto have signed this Agreement on the day and year first above written.

ON BEHALF OF [name of distribution enterprise]	ON BEHALF OF [name of Company]]
(name) Chief Executive Officer	(name) Chief Executive Officer
WITNESS	WITNESS
(name)	(name)

Appendix 4(a)

Business model under consideration: National power utility as RE distributor (**Y** means regulatory element is favourable, the reverse is denoted by **N,** and not applicable is denoted by --**)**					
REGULATORY MODEL 1 (Applied in Uganda)		REGULATORY MODEL 2 (Applied in Kenya)		REGULATORY MODEL 3 (Applied in Tanzania)	
1.Electricity Regulatory Authority in place	Y	1.Energy Regulatory Authority in place	Y	1.Energy Regulatory Authority (including water services) in place	Y
2.Unbundling done for generation, transmission, and distribution	Y	2.Power generation separated from transmission & distribution (the latter two combined)	Y	2.Vertically integrated national power company continues	Y[1]
3.Generation and distribution privatized	N[1]	3.One public generation company and IPPs with single buyer	Y	3.IPPs with national power utility as single buyer	Y
4.IPPs allowed and Feed-in tariffs for renewable energy in place	Y	4.Feed-in tariffs for renewable energy in place	Y	4.Feed-in tariffs for renewable energy in place	Y
5.Single tariff model for power distribution consumers	N[2]	5.Single tariff model for power distribution consumers	N[1]	5.Single tariff model for power distribution consumers	N[2]
6.Light-handed regulation for village level power production and supply	Y	6.Light-handed regulation for village level power production and supply	Y	6.Light-handed regulation for village level power production and supply	Y
7.Rural electrification authority in place	Y	7.Rural electrification authority in place	Y	7.Rural energy authority in place	Y
Overall position	N[3]	Overall position	Y[2]	Overall position	Y[3]
Notes 1. Privatized utility would not be inclined to take community-based electrification 2. No flexibility for changing tariffs to suit local supply conditions, even when power costs are very high 3. The unfavourable elements are very strong and make this regulatory option unsuitable		**Notes** 1. No flexibility for changing tariffs to suit local supply conditions, even when power costs are very high 2. The unfavourable element is manageable		**Notes** 1. Marginally this element is favourable otherwise the monolithic nature of the vertically integrated utility would be a barrier for take-up of small distribution systems 2. No flexibility for changing tariffs to suit local supply conditions, even when power costs are very high 3. The unfavourable element is manageable	

Appendix 4(b)

Business model under consideration: Community Association as RE distributor (**Y** means regulatory element is favourable, the reverse is denoted by **N,** and not applicable is denoted by --**)**					
REGULATORY MODEL 1 (Applied in Uganda)		REGULATORY MODEL 2 (Applied in Kenya)		REGULATORY MODEL 3 (Applied in Tanzania)	
1. Electricity Regulatory Authority in place	Y	1. Energy Regulatory Authority in place	Y	1. Energy Regulatory Authority (including water services) in place	Y
2. Unbundling done for generation, transmission, and distribution	Y	2. Power generation separated from transmission & distribution (the latter two combined)	Y	2. Vertically integrated national power company continues	Y[1]
3. Generation and distribution privatized	Y	3. One public generation company and IPPs with single buyer	Y[1]	3. IPPs with national power utility as single buyer	Y
4. IPPs allowed and Feed-in tariffs for renewable energy in place	Y	4. Feed-in tariffs for renewable energy in place	Y	4. Feed-in tariffs for renewable energy in place	Y
5. Single tariff model for power distribution consumers	N[1]	5. Single tariff model for power distribution consumers	N[2]	5. Single tariff model for power distribution consumers	N[2]
6. Light-handed regulation for village level power production and supply	Y	6. Light-handed regulation for village level power production and supply	Y[3]	6. Light-handed regulation for village level power production and supply	Y[3]
7. Rural electrification authority in place	Y	7. Rural electrification authority in place	Y	7. Rural energy authority in place	Y
Overall position	N[2]	Overall position	Y[4]	Overall position	Y[4]
Notes 1. No flexibility for changing tariffs to suit local supply conditions, even when power costs are very high 2. The unfavourable element is manageable		**Notes** 1. This element may be unfavourable if IPPs can only sell power to the national power utility 2. No flexibility for changing tariffs to suit local supply conditions, even when power costs are very high 3. Due to this element the regulation on sale of power by IPPs could be made flexible to allow the community association to buy power from IPPs 4. The unfavourable element is manageable		**Notes** 1. This could be a barrier if the national power utility is the only allowed power distributor in the country 2. No flexibility for changing tariffs to suit local supply conditions, even when power costs are very high 3. Due to this element the regulation that could allow the national utility to be the sole distributor would not bar the community association from being a distributor 4. The unfavourable element is manageable	