

UGANDA

Household Energy Status Report (Annexes)

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**REDC with the Uganda Ministry of Energy and Mineral
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ANNEXES

ANNEX 1: UGANDA POWER SECTOR RESTRUCTURING AND PRIVATISATION

NEW STRATEGIC PLAN & IMPLEMENTATION PLAN

1. Introduction

In 1997 the government of Uganda formulated and the cabinet accepted a comprehensive and detailed strategic plan for transforming the Ugandan power sector (UPS) into a financially viable electricity industry capable of providing the people of Uganda with a reasonably priced and reliable power service while maximising inter-regional export opportunities. In this way the power sector would be able to make its full contribution to the further economic and social development of Uganda

The recent history of Uganda's power sector had been characterised by consistent power supply deficits, massive load shedding, resource constraints, government involvement in finance and management and inadequate accountability in the sector. This situation could not be allowed to continue.

The 1997 Strategic Plan set out proposals to address these deficiencies and developed implementation plans for the near, medium and long term. The Plan was intended to be updated as the UPS evolved and more information became available on the experience of power sector reform around the world and of private sector participation. The government has now fundamentally revised the plan to take into account the up-to-date evidence and information, and developments in the Uganda Electricity Board (UEB) since 1997. This New Strategic Plan sets out the government's mission statement for the sector and its proposals to make the UPS efficient, financially viable and able to meet consumers' growing demands for electricity.

Adoption of the New Strategic Plan by the government expresses the government's unambiguous support for private sector participation (PSP) in the UPS. It also allows all participants, whether private or state, to have confidence in the Strategic Plan. This confidence will strengthen the prospects of achieving the fundamental objectives.

In developing the New Strategic Plan, the government has reviewed international experience in the reform of power sectors and the introduction of the private sector in order to identify the key lessons which can be used in Uganda and identify the best way forward. It also undertook a survey of potential investors in the UPS to provide a firm underpinning for the proposals, which will involve the private sector. In developing the proposals the government has also taken into account the likely impact of privatisation and sectoral restructuring options on tariffs. Further, throughout

it has considered the risks associated with different options for reforming the sector and enhancing the role of the private sector.

In preparing the New Strategic Plan, the government has benefited from extensive stakeholder consultation, including a number of conferences and workshops which have been held in Uganda on the reform of the power sector, and from advice received through a number of consultancies.

2. Mission Statement

The mission of the New Power Sector Strategic Plan is to strengthen and enlarge the power sector to make it efficient and financially viable, to enable it to provide adequate and reliable energy to assist in the sustainable social and economic development of Uganda and to take advantage of the opportunities to export electricity to other countries.

3. Background

3.1 Introduction

The existing power sector and key problems are described briefly in this section, and Uganda's energy resource endowment is reviewed.

3.2 Existing Power Sector

The existing power sector is a publicly owned and vertically integrated power utility, the UEB. The supply system is dominated (over 98%) by the hydro plant at Owen Falls, with a current capacity of 180 MW. Transmission is principally through the 132kV network, although both 66kV and 33kV lines are also used for transmission.

Currently, only 5% of Uganda's population of about 18 million is supplied with grid electricity. Around 20% of the urban population is connected to the grid, but less than 1% of the rural population. Official records show that there are over 148,000 grid electricity users. The average per capita energy consumption in the Kampala-Entebbe district is 170kWh, compared with less than 10kWh in most outlying districts.

Most of Uganda's electricity is consumed by residential or service sector users. Industrial users account for only a small proportion of the total. The main categories of consumers by energy sold are residential (55%), commercial and general (25%) and industrial (20%). The bulk of electricity (72%) is consumed by the 12% of the population that lives in the Kampala metropolitan area, and in the nearby cities of Entebbe and Jinja.

Recent studies conducted by the Ministry of Energy and Mineral Development (MEMD) and the ESMAP/World Bank team have shown that self or private electrification using diesel generation or car batteries is reasonably common in outlying areas. It is estimated that there is around 80 MW of privately installed captive electricity generation capacity, of which at least 50 MW is in Kampala – Entebbe – Jinja area. Studies have also shown that there are over 200,000 households using car batteries, electricity from which is very expensive – in the order of US cents 250.0/kWh compared to US cents 7/kWh for UEB power.

Issues

The sector has been suffering from a number of fundamental problems which have led the government to develop plans for fundamental reform. The key problems are as follows:

- Very poor supply reliability, characterised by extensive and increasing load shedding and reductions in voltage;
- Inadequate investment in all parts of the sector during the 1990s and an inability to finance future required investments, particularly in distribution;
- Very poor commercial performance by the UEB, characterised by collections being received for less than 50% of the electricity generated;
- High technical and non-technical losses, exceeding 30%;
- High accounts receivable, which in early 1999 were equivalent to about nine months' billings, but with around 50% being due for more than one year;
- Low productivity, despite the recent retrenchment of around 30% of UEB's employees; and
- Poor rate of connection of new customers.

In addition to the above problems, which relate directly to the UEB, there has been a further problem of the support required by the UEB from the government's budget. Such support reduces the ability of the government to finance needed social and other expenditures. Therefore, the level of government support to the UEB must be reduced or eliminated.

The UEB has been failing to provide the quality of service demanded by consumers, and more broadly to respond adequately to consumer requirements. Power outages are frequent, as are brown outs and voltage fluctuations. The outages, caused by both system breakdowns and planned load shedding, impose severe costs on consumers and the economy. The frequent voltage fluctuations shorten the life of light bulbs and damage motors and appliances. This situation cannot be allowed to continue and hence this New Strategic Plan has been developed, building on the 1997 Strategic Plan, to address the foregoing problems.

3.3 Resource potential

Uganda is well endowed with considerable hydropower resources. The potential capacity on the White Nile in Uganda is estimated to be in excess of 2,000 MW, of which only 180 MW at Owen Falls had been developed by the end of 1998. There is therefore, considerable potential for further development of the resource for local and export consumption. Apart from the Owen Falls, five other major sites have been identified; Bugali, Kalagala, Kamdini (Karuma), Ayago North and Ayago South.

There is also the potential for small hydropower development, especially along the tributaries of the Nile. Twenty-two mini hydro sites in the capacity range 0.5 –5 MW have been identified. There are also numerous micro hydro sites, especially in the mountainous parts of Western and Eastern Uganda.

A number of non-conventional resources also exist and can be developed to supply electricity as either decentralised or grid connected systems. In particular, solar energy is capable of supplying electricity to many small isolated loads like households since the generators are in small, modular, portable units. Uganda receives relatively high insolation levels averaging about 5kWh/m²/day. However, at the current level of development of solar photovoltaic technology, the supply of

electricity from solar energy is only competitive in small modular units. This mode of electrification is already being promoted by the MEMD in rural areas.

Geothermal resources are estimated at about 450 MW in the Western Rift Valley. Apart from basic studies on the physicochemical characteristics of the hot springs that have been carried out by the Department of Geological Survey and Mines, no programme for power development has been put in place. The successful exploitation of this resource in Kenya indicates its potential for Uganda.

Biomass can provide substantial amounts of electricity, especially by co-generation, where it is the energy source for process heat. The government believes that Uganda's sugar industry should be encouraged to invest in co-generation. The three sugar factories at Kakira (2.5 MW – with a total installed capacity of 4.5 MW), Lugazi (1.5 MW) and Kinyara (1.2MW) produce electricity for their own consumption. If modern co-generation technology was installed, power production would be enhanced and could be sold to the grid. The New Strategic Plan sets out proposals for the sale of own generation onto the grid.

Wind has good characteristics in certain parts of Uganda, like Karamoja and Kalangala, and hill-top in many parts of the country. Wind turbine technology is already mature, is in application in many countries, and the costs of generation have been reducing quickly. Potential for investment in wind power generation in Uganda exists both at power production and competent/system manufacturing levels.

4. Objectives and actions

The Government has set a number of objectives for the power sector, which were articulated in the 1997 Strategic Plan. They include:

- Making the power sector financially viable and able to perform without subsidies from the government budget;
- Increasing the sector's efficiency;
- Improving the sector's commercial performance;
- Meeting the growing demands for electricity and increasing area coverage;
- Improving the reliability and quality of electricity supply;
- Attracting private capital and entrepreneurs; and
 - Taking advantage of export opportunities.

Proposed reforms should be practicable and implementable in Uganda, and be politically/socially acceptable.

In Uganda the key to making the sector financially viable is to increase the proportion of electricity generated which is billed, to substantially increase revenue collection and to significantly reduce technical losses.

This would assist in freeing the sector from the need for subsidies and make it financially viable in its operations. It would also assist fundamentally in developing an environment which would attract private capital entrepreneurs. The combination of making the sector financially viable and, therefore, able to self-finance higher levels of investment programmes, along with attracting private

capital, will assist the sector in meeting the growing demands for electricity and increasing area coverage.

In addition, the government sees enhancing efficiency to be of key importance for the future of Uganda's power sector. Efficiency has three main dimensions, and all are important. They are:

- Operating the existing system to minimise costs;
- Expanding the system at minimum cost; and
- Pricing electricity to reflect the marginal costs of supply.

The government's plans for the reform of the UPS are aimed at achieving all three dimensions of efficiency.

The government sees competition and the private sector as playing key roles in enhancing the power sector's efficiency and in minimising required tariff levels. The proposals for the restructuring of the UPS and development of new market relationships which are set out in this New Strategic Plan are aimed at maximising the role of competition and using it as a driver to enhance efficiency. The government has reviewed the different options for the introduction of competition into the different parts of the UPS. These include full fledged competition at the generation level through a power pool, competition for the provision of new capacity (such as IPPs), competition for the provision of certain services such as billing and collection based on the letting of short term franchises, and full competition at the retail supply level. For the foreseeable future the government considers that the main ways to introduce competition will be through competition for the market and contracting for specified services.

Private sector participation is also seen as being of key importance in improving the sector's efficiency. The private sector faces different incentives than the public sector to improve efficiency.

A pre-condition for PSP is the ability of the distribution entities in Uganda to collect revenues for all kWh sold to final consumers. This is required to remunerate assets under private sector operation or ownership. Action must be taken to address the issues of high system losses, both technical and non-technical, and to improve revenue collection. Unless this is done, Government guarantees to generators will be called and a fundamental objective of reform will not be met. The risk of this is unacceptable to the Government.

Reform of the distribution system, in order to make it financially viable and improve its commercial performance, will be the key to the success of the whole reform programme. The government will therefore initially focus its major reforms on the distribution sector in order to provide strong incentives to collect revenues and minimise losses. To this end of the existing UEB distribution business, and let to the private sector under long term concessions.

Under the government's proposals, the private sector will play the major role in improving reliability of supply and meeting the growing demands for electricity.

4.1 Conflicts between objectives

The government also recognises that not all of the objectives set out above may be realised simultaneously. The objective of ensuring financial viability may conflict with increasing area coverage, particularly in rural areas. Consequently, the government recognises that a policy for

explicit subsidies may be required in these areas. However, government will ensure that where subsidies are justified, they are efficient and sustainable, and applied within a market based framework for electrification.

The government recognises that increasing the efficiency of the UEB may conflict with the political and social acceptability of the reform programme. For example, increasing efficiency is likely to require further staff retrenchment at the UEB, and will also require the fundamental restructuring of the UEB. The government will ensure that these actions are implemented carefully to make them acceptable and minimise disruption.

4.2 Performance against objectives

In preparing the New Strategic Plan, the government has reviewed the past and present performance of the power sector against the objectives.

UEB's financial position both has been and is poor. Its cash flow is inadequate to provide a reasonable rate of return and to service its debts. Therefore, it is unable to contribute significantly to the financing of needed investments, with a resulting burden on the government budget.

UEB's commercial performance also has been and is very poor. In 1997 it only received revenue for 58% of the power generated, and in 1998 for around 50%. Technical and non-technical losses exceeded 30% in both years, and accounts receivable exceeded nine months billings in 1998. This meant that in 1997 the UEB lost over Ushs 13 billion of potential revenue. This situation is not sustainable and hence the distribution and other functions must be reformed urgently.

Area coverage in Uganda is poor. At present only around 5% of the population have access to electricity from the grid. The government has set, as a high priority, increasing the number of consumers and extending access to electricity supply in both urban and rural areas. In the latter the initial focus will be on the development of isolated supply systems.

5. Overview of proposed reform programme

In developing its proposals to reform the UPS, the government has reviewed international experience in the reform of power sectors around the world. Through this it has identified the benefits which have been delivered through the reform programmes and the costs associated with their implementation. It has taken great care to ensure that the proposals presented in this Plan are appropriate for the specific circumstances of the Ugandan power sector.

Many different models have been used to reform power sectors. They cover power systems both large and small, systems dominated by hydro capacity. Many reform programmes have been based on the introduction of competitive power markets, either at generation or at the level of retail supply of electricity to final consumers, or at both. A key feature of these markets, whether or not a pool is established at the generation level, is the ability of distribution companies and large consumers to determine their resource needs and contract directly with generation for power supply. This has been the basis of the reforms in Argentina, Australia, Spain, USA, Great Britain, Norway, Sweden, Bolivia, Dominican Republic and elsewhere. A variation of this model is operating in South Africa with ESKOM's internal market.

Although the power sectors in some developing countries are now moving towards the adoption of this model, the dominant model adopted by developing countries to date has been the Single Buyer Model under which new generating capacity, particularly from independent power projects (IPPs), is contracted competitively to the Single Buyer on behalf of the distribution companies and large consumers. Variants of this model have been widely adopted in Asia, for example, in Pakistan, Thailand and the Philippines and it is also used in Northern Ireland. A number of countries in Africa are presently considering the use of variants of this model. Its main attraction is the facilitation of new investment at least cost by the private sector, with periodic pressures to provide new capacity on a competitive basis.

Government has also noted that, more recently, countries facing similar problems to those in Uganda, have begun to place more emphasis on the reform of the distribution sector. They see this as a necessary requirement to underpin the success of the whole reform programme. The Government is convinced that this is the appropriate way forward in Uganda.

International experience has demonstrated conclusively that the fundamental reform of power sectors to introduce new incentive systems and the private sector can assist in meeting the fundamental objectives which the government has set for the UPS. In particular, the experience has shown that:

- The private sector can meet required investments;
- The commercial performance of utilities can be dramatically improved, particularly by reducing losses and improving collections;
- Efficiency can be raised substantially, whether it is measured in terms of productivity per employee or capital employed;
- The quality and reliability of supply can be improved very quickly; and
- The number of service connections can be increased rapidly.

The government has reviewed numerous alternative models for the organisation of the power industry in Uganda and for the structure of the power market. Based on this review, the government proposes that the industry should be reformed with a number of separate generating companies, a single transmission entity, and as many distribution companies as feasible. Supply in rural areas will be facilitated through a market-based framework for electrification (see section 5.5 below). The role of the private sector will be greatly enhanced in generation, transmission and distribution.

The separation of generation from transmission and retail supply will require the establishment of a structure for the bulk generation market. The government considered the options of introducing some form of competitive wholesale market for electricity (a power pool), distribution companies contracting directly with the generation companies, a single buyer for electricity from the generators, and a single buyer model associated with limited competition at the retail supply level by allowing large consumers to contract directly with generators. The government rejected the competitive model of a power pool since this was unsuitable for Uganda given the dominance of Owen Falls and, in the future, a small number of other major hydro plants. The model of distribution companies contracting directly with the generators was not considered appropriate in the near to medium term because it is thought to impede the development of new generating capacity, particularly large scale hydro capacity.

The government has therefore decided that the preferred option is the single buyer model, with limited retail competition to be introduced at a later date.

The government, proposes to actively encourage competition in the electricity industry. Under its proposals new generating capacity will be provided competitively by the private sector through a process organised by the Transmission Company and monitored by the new regulatory authority (see Section 6). To enhance competition the government's proposals for reform of the UPS include allowing co-generators to sell surplus energy and capacity to the grid. Again in the interest of maximising competition in the generation market, in the longer-term government intends to introduce a structure for the generation market whereby distribution companies and large consumers will contract for generation capacity directly with generators (with appropriate regulatory oversight). This market structure will require the transmission network to be operated on an open access basis . Government will require the advisers recruited to implement the privatisation transaction to recommend the appropriate timing for the introduction of this market structure.

In furtherance of its objective to promote competition, the government also considered carefully the possible introduction of some degree of competition into the final retail markets, which was proposed in the 1997 Strategic Plan. The government continues to support this limited form of competition, however, government's priority is to successfully let the distribution concessions by the end of the year 2000, which will be assisted by assuring revenue flows from large consumers. Hence the introduction of limited retail competition will be delayed to the medium term.

The following sections of this New Strategic Plan provide more details on the proposals for generation, transmission and distribution.

5.1 Generation

The government is committed to increasing the scope of competition in the provision of new generating capacity and the running of existing generation assets. The use of competitive bidding procedures for new generating capacity and the operation of existing facilities by the private sector should increase efficiency and minimise costs. This in turn should minimise the prices that consumers must pay, and assist in promoting the economic and social development of Uganda. Under this revised New Strategic Plan.

1. New generating capacity will be provided competitively by the private sector through IPPs. Government will award concessions for the development of new hydro IPP's on competitive basis.
2. Separate Power Purchase Agreements will be developed for Owen Falls Power Station and the Owen Falls Extension. Both the existing power station at Owen Falls and the soon to be commissioned Extension will continue to be owned by the public sector but let to the private sector through concessions. The privatisation transaction advisers will determine whether it is feasible to let separate concessions for the existing power station and the Extension respectively, or whether it is optimal to have both facilities operated and maintained under a single concession.
3. The development of new capacity, including co-generation capacity, by major industrial plants will be encouraged and a tariff will be developed to encourage

sales of energy and capacity from existing and new plant to the Transmission Company.

5.2 Transmission

The existing transmission network is a simple one and extends only to the more developed parts of the country, and an extensive transmission network is unlikely for some time. As with generation, the government has considered various options for the restructuring and ownership of transmission. A key consideration in the evaluation of the options against the objectives was recognition of the natural monopoly characteristic of high voltage (HV) transmission, and that the key problems in the sector do not lie with the transmission function. Based on its review and assessment of the present operational efficiency of the HV (132kV and above) transmission system the government has decided that through the interim period responsibility for transmission would remain with the UEB, and would be operated as an independent and profit making business unit. As soon as practical the operation of the transmission system will be let to the private sector under a long-term concession, while ownership of the existing assets will remain in the public sector. The transmission concessionaire will not be allowed to operate either generation or distribution businesses.

The principal functions of the Transmission Company will be as follows:

- operation and maintenance of the existing HV system in a safe and efficient manner;
- planning the expansion of the system in conjunction with generation and distribution companies; and
- system dispatch.

As far as feasible new transmission capacity will be developed, financed, constructed, operated and owned by the private sector, in particular this may be appropriate for dedicated export lines.

The proposed contracts or pricing system for the use of the transmission system will be subject to the approval of the regulator.

Bulk Purchase and Supply

The Transmission Company will also purchase generating capacity from competing providers under long term contracts (power purchase agreements – PPAs). The function of bulk purchase and supply of electricity will be undertaken by a ring-fenced entity within UEB's transmission business, with separate accounts and its own personnel. It will be the sole purchaser of generation output, and hence hold the first PPAs. In addition, it will manage invoicing and settlement. Robust and reliable settlement procedures will be put in place to ensure that monies are collected from distributors and paid promptly to generators (and later customers) who default on their settlement invoices. This will build the confidence in the reformed power system that is necessary to encourage active private sector participation.

In order to carry out this role the role of bulk purchase and supply the Transmission Company will:

- assess potential generating projects against a least cost expansion plan which takes into account the costs of associated transmission developments.
- suggest to potential generators the location and magnitude of likely generating shortfalls;
- consider both solicited and un-solicited proposals to construct new generating capacity;

- carry out demand forecasting and publish the results;
- arrange for least cost dispatch against the energy call off price in each of the contracts;
- be responsible for cash flow and settlement; and
- arrange for revenue to be collected on an equitable basis to pay for generation and transmission capacity.

The Transmission Company will be regulated by a new independent regulatory authority. Among other things, the regulator will be required to review and approve the bulk supply tariff and contracts for generation and transmission. The proposals for the regulation of the Transmission Company are set out in more detail in Section 6 below.

Third party access

Various studies have identified the presence of relatively large quantities of won generating capacity in Uganda. In order to encourage competition and ensure that electricity demand is met at least cost, the government has decided to permit third party access to the grid. A cost reflective and non-discriminative tariff will be developed to encourage auto generators and others to sell excess energy to the Transmission Company. The tariff will be subject to review and approval by the regulator. Later direct sales to large consumers will also be permitted. The required legislative changes to permit this will be introduced.

5.3 Distribution

As previously noted, reform of the distribution system in order to make it financially viable and improve its commercial performance will be the key to the success of the whole reform programme. The Government has considered carefully retaining distribution as a single entity in the public sector, transferring that entity to the private sector, introducing a number of privately operated distribution entities each with a well defined service area, and other options. For the reasons mentioned earlier, the government is convinced that the private sector must play a major role in distributing and selling electricity if the objectives set for the new power industry are to be met. This will promote efficiency, improve commercial performance and financial viability.

Although the distribution function in Uganda serves a relatively small number of consumers the government believes that it is important to have multiple distribution companies. The government considered a number of options. The final choice was determined by an appropriate balance between a number of objectives, some of which conflict with each other:

- creating business units that are large enough to attract credible and experienced private operators;
- achieving the early and successful private sector participation in a significant part of the power sector in Uganda;
- ensuring substantial and reliable revenue flows to allow developers to finance new generation projects with the minimum of underwriting by the government;
- creating sufficient business units to allow regulation by comparison; and
- separating the treatment of urban areas and rural areas to encourage the development of local initiatives in rural areas.

The maximum number of financially viable distribution companies will be created out of the existing UEB distribution business, and every effort will be made to assign existing UEB customers to the

new distribution companies. The privatisation transaction advisers will advise government with regard to the number and scope of the new distribution companies.

Although having relatively small distribution companies may lose some potential economies of scale and require longer concession periods, the government believes that this will be outweighed by the benefits to be derived from benchmark competition in the new regulatory framework.

The distribution companies will contract with the Transmission Company for bulk supply. The distribution companies will then sell to final consumers under retail tariffs that will be subject to approval by the regulatory authority. The regulator will be required to satisfy itself that tariffs are structured to include efficiency and to recover costs. In the medium term government intends to expose the distribution companies to competition in the market by permitting limited retail competition (see section 5.4 below).

5.4 Market Structure

Generation Market

Initially the Transmission Company will hold Power Purchase Agreement (PPA's) for OFPS, OFE, and the IPP's under development. This market structure has been chosen as the most appropriate to promote (i) the development of new generating capacity by the private sector, in particular large hydroelectric IPP's and (ii) least cost expansion of generating capacity.

However, in the longer-term government intends to enhance competition in the generation market by introducing a market structure whereby distribution companies and large consumers will contract for generation capacity directly with generators (with appropriate regulatory oversight). Generators and distribution companies will therefore determine the size and timing of new capacity needs. Under this arrangement the market risk would be borne by generators when they build new capacity speculatively, and by distribution companies where they contract generators to supply a given amount of capacity. The transmission network would then be operated on a non-discriminatory and open access basis.

Government will require the privatisation transaction advisers to recommend the appropriate timing for the introduction of a market structure where distributors and large consumers contract directly with generators.

Retail Market

In furtherance of its objective to promote competition, government has also considered carefully the possible introduction of some degree of competition into the final retail markets, in particular permitting large consumers to contract directly with the Transmission Company for bulk supply. In the medium term the government continues to support this limited form of competition. However, governments priority is to successfully let concessions by the of the year 2000, which will be assisted by assuring revenue flows from large consumers. Hence the introduction of limited retail competition will be delayed to the medium term. Government will require the privatisation transaction advisers to recommend the appropriate timing for the introduction of limited retail competition.

5.5 Rural electrification

A key objective of the government is to improve access to commercial electricity supplies by the population in peri-urban and rural areas. At present only around 1% of the rural population which has access to electricity does so through such sources as car batteries, with very high implicit prices per kWh (see section 3.2). This is evidence of the potential demand for electricity by the rural population to meet their basic needs, and of some consumers having a high willingness to pay for small quantities of electricity per month.

The government's proposals for the reform of the UPS focus on promoting private sector participation as a means of delivering an efficient and growing electricity industry to meet consumers' demands. The main proposals set out in this New Strategic Plan concern the reform of the UPS and PSP in grid electricity. The government also proposes to promote PSP in the development of electricity in decentralised power systems and in rural electrification. It will lay the legal basis through the 1999 Electricity Bill. It will also promote it through the implementation of relatively simple contracting/licensing procedures, the removal of bureaucratic obstacles to private investment, and allowing tariffs to be set to ensure financial viability for each decentralised system. Evidence from around the world indicates that such tariffs will be at substantially lower levels than the costs of electricity from the batteries currently being used by most households.

The government has reviewed experience in rural electrification in other countries. It has noted the success of the programmes in Bangladesh, Philippines and Bolivia, and the emerging programme in Mozambique, which have developed responsibility for electricity distribution and sales to the local area.

The government's long term aim is that rural communities should have access to continuous and reliable supplies of electricity, either from the interconnected system or from isolated systems, whichever is least cost in local circumstances. The government's strategy for rural electrification is based on:

- development of markets in services, equipment and credit for electrification;
- a simple and non-bureaucratic licensing framework in order to encourage small independent enterprises to develop;
- retail tariffs will be set at the levels required to ensure financial viability of the local electricity enterprises;
- ensuring that rural electrification schemes are appropriately engineered and costs are minimised;
- lower technical standards in the early days of a distribution system's life are probably acceptable, and save money.

The strategy for rural electrification is based on minimising costs and hence tariffs. In many parts of Uganda this will be done through the development of isolated local generation and distribution system rather than extending the grid. This is because:

- lightly loaded lines over long distances are expensive;
- modern small scale generation is relatively cheap, efficient and easy to maintain;
- networks can grow more closely in line with customer demand; and
- lower technical standards in the early days of a distribution system's life are probably acceptable, and save money

In the longer term, it might be desirable to seek the interconnection of these isolated systems to each other and eventually to the main grid. This is likely to happen through the natural evolution of the network.

The 1999 Electricity Bill will provide the legal basis for the development of generation and distribution at the local level. The government in association with the African Rural and Renewable Energy Initiative (AFFREI) of the World Bank is presently preparing a detailed policy and institutional framework for electrification. The electrification framework will be premised upon a demand driven approach which encourages the development of local initiatives for rural electrification. This framework for electrification will be the subject of a separate policy paper which will be finalised and approved in the near future.

6 Regulation

A key component of the reforms being put in place by the government will be a new regulatory system for the UPS. Although the role of competition will be greatly enhanced in the industry a new system of economic regulation will be required. This will give confidence to both the private sector participants and to consumers that the new UPS will function under an agreed and transparent set of rules and procedures.

The government has reviewed international experience in regulation and is determined to put in place a regulatory system which is consistent with the proposed industry and market structures which are outlined in this New Strategic Plan, and to seek to ensure that from the beginning the regulatory system is appropriate for the new UPS and Uganda.

Institutions

The economic regulation of the electricity industry will be undertaken by an authority to be established in 1999 under legislation that ensures its independence from political influence. The objectives of the regulation will be to:

- protect consumers;
- ensure the financial viability of companies;
- promote competition; and
- collect and disseminate information.

The regulatory authority's broad responsibilities in the power sector will be set out in the new Electricity Bill. The system of regulation will be initially through the various contracts to be entered into for distribution and generation. The key responsibilities of the regulator will be monitoring compliance with the various contracts and establishing the guidelines for and undertaking periodic price reviews. The government will ensure that the regulator has the professional staff required to undertake these functions, but allows for the possibility that in the early years the regulator may need to contract out some of the required services.

The new Electricity Bill will set out the procedures to be used to settle any disputes arising from the application of the new regulatory system. This will include a provision for international dispute resolution, again with the aim of building confidence in the private sector for the new UPS. The government recognises the importance of consumers and intends to empower them through the

creation of appropriate consumer representation bodies, which will be given legal enforcement through the appropriate legislation.

The electricity industry regulator will have an important responsibility of co-ordination with other entities which are responsible for the non-economic regulation of the UPS, including regulation of technical standards and environmental standards. When developing the details of the proposed regulatory system the Government will ensure that the roles and responsibilities of the different entities concerned with regulation are clearly defined and do not overlap.

Functions of the regulator

A key function of the regulator will be the development of incentive based systems which will ensure that the contracts which underpin the proposed reform of the UPS will assist in meeting the government's basic objectives for the power system. The regulator will be responsible for reviewing and approving all contracts, ranging from short term management contracts through to long term concession contracts and PPAs. Reviews and approvals will be in accordance with procedures that assure transparency, timeliness and effectiveness, as defined in the sector legislation and corresponding regulations. It will also be responsible for the development of a process for letting contracts. Further, it will be responsible for monitoring compliance with the contract terms, and enforcing any bonus or penalty payments, as appropriate.

The regulator will undertake the periodic review of the prices which are set in the contracts for transmission and distribution/retail supply in accordance with the principles and parameter values which are agreed in the contracts at the time of signature.

The regulator will also have the following responsibilities, in accordance with general procedures defined in the sector legislation and the corresponding regulations:

- establish its rules of practice and procedure in conformity with the governing legislation
- oversee demand and supply conditions to ensure adequate generation and transmission and capacity is being contracted and constructed;
- grant and revoke licences
- periodically evaluate transmission and distribution performance
- monitor and mediate the domestic contracting process between bulk suppliers and purchasers in situations where contracting parties fail to agree, or when public complaints occur which warrant regulatory oversight
- establish and monitor adherence to rules on reservoir regulation and discharge of water from hydro facilities.

Role of government

Government's key roles in the reformed power sector will be principally to:

- Prepare and obtain necessary approvals for legislation;
- prepare and approve regulations;
- prepare the national energy strategy
- develop GoU electricity policy; and
- prepare indicative generation plans

7 Implementation Plan

The government would draw attention to a number of points about the programme, particularly:

- the programme comprises a number of integrated dated actions, and the failure to meet any of the major actions by the due date would inevitably introduce significant slippages into the whole programme; and
- a number of consultancies must be procured to support the programme-work must commence immediately on agreeing the terms of reference and mobilising finance for the consultancies
- from the outset an interactive process with the market will be pursued, permitting flexibility to package the various transactions to reflect market feedback
- a consortium of advisers led by a management consultants will be appointed by September 1999 to advise government with regard to the implementation of the full set of power sector privatisation transactions.
- the reform of distribution and the letting of the concessions for the areas that account for the majority of the sectors revenues will be the key to the whole reform programme;
- building on the work to be undertaken for the asset valuation study, the government aims to establish the new distribution entities by December 1999;
- an investor conference for the distribution concessions will be held in January 2000;
- the government will issue requests for concessionaires in February 2000;
- final bids for distribution concessions should be received by July 1st 2000; and negotiations with preferred bidders should be concluded, and contracts awarded in October 2000.

ANNEX 2: FURTHER HYDROPOWER NOTES

Twenty-two sites, each with potential of over 500 kW, have been identified since the early-1980s. Another 71 "micro" and "mini" hydropower sites have been identified elsewhere. The following sources of information have been developed over the past ten years:

- X **UNTC:** UN Technical Cooperation Department carried out a study of small hydropower options in north-western and south-western Uganda. The study recommended that small hydro power, where the potential is available, can play a significant role for electrification of areas remote from the national grid. They went further to prioritise the following sites for implementation in respective order: Paidha in the Northwest, Ishasha and Nyamabuye in the Southwest (2 - 5MW). Twenty-two sites with between 0.5 and 5 MW capacity were visited and evaluated.
- X **World Bank & UNDP:** Reviewed the potential to rehabilitate the Kikigati mini-hydropower plant on the Kagera River in late-1980s. Funding was not available to carry out rehabilitation.
- X **Rehabilitate Existing Power Plants:** The Governments of Sweden (SIDA), China, Federal Republic of Germany (KFW) financed a study to rehabilitate and develop small power stations to improve system reliability and to improve the distribution of power in the country at Maziba Power Station (for Kabale), for which rehabilitation is complete, and the development of electrification project in Ssesse Islands, for which funding has not been secured.
- X **Paidha-Nebbi District:** US Trade Development Agency and UN studied small hydropower options.
- X **Paidha- Nyagak River:** Preliminary studies were carried out by the Koreans (PDRK) and Uganda on developing two sites (1 MW and 2 MW) on the River Nyagak. Preliminary engineering design for two sites (1 MW and 2 MW) undertaken and financing proposal developed for the 1 MW site.
- X **Ishasha:** An Austrian team carried out a detailed feasibility study of developing the Ishasha small hydropower plant in Rukungiri District, south-western Uganda.
- X **Paidha-Nebbi, Muzizi-Kibale & Nyamabuye-Kisoro:** Norconsult International, ABB Energy A.S., and Kvaerner Hydropower A.S. carried out pre-investment studies for hydropower development at Paidha in Nebbi district (North Uganda), Muzizi in Kabale District (Western Uganda) and Nyamabuye in Kisoro District (south-western Uganda). Potential at these sites ranged between 3 and 80 MW.
- X **Sipi, Mitano and Siti:** The government of India carried out initial studies of small hydropower sites in eastern and south-western Uganda. They recommended that Sipu (2 MW) in eastern Uganda, Mitano (9 MW) in south-western Uganda, and Siti (1 MW) in eastern Uganda should be implemented, with the highest priority on Sipu.
- X **Biseruka and Nyamabuye:** The Government of Uganda has requested assistance from the Japanese Government to determine the financial, economic and technical; feasibility of hydropower development at Biseruka (10 MW) and Nyamabuye (3-5 MW).

ANNEX 3: CASE STUDY OF CHARCOAL STOVES IN KAMPALA, JINJA AND ENTEBBE (EC Funded Uganda Woody Biomass Study- 1995)

Ten charcoal stoves (sigiri) were purchased from the market to test for charcoal efficiency. Additionally, a new prototype multi-fuel stove, developed for refugees in Northern Uganda, was tested. Three ceramic stoves from USIKA Ltd. were purchased in Kampala, while two "improved" ceramic stoves of unknown make were also purchased in Kampala markets. Three traditional round metal "sigiri" charcoal stoves were purchased in Kampala stove markets, as were two "heavy metal" stoves (which are advertised by their producers as "improved" stoves) from the same markets. The latter are being touted by producers as "improved" stoves. High and low power tests were conducted for these stoves.

A stove market survey was carried out in Kampala, Jinja and Entebbe. Numerous markets were visited, and many producers were interviewed to determine their costs of production, sources of supply, outlets, prices, constraints, among others. Additionally, volume of sales and employment were noted to make a determination of the importance of stove production in urban Uganda.

It should be noted that the HEPP carried out far more extensive market surveys of stoves during 1989 than could be carried out during the current Study. They also carried out stove testing on more stoves than was conducted during the present Study. The present Study was designed primarily to update earlier information, to verify earlier results, and to note any major changes in the market place. This forms the basis for recommendations regarding stoves.

A: Market Surveys

Given the size of Kampala and Jinja, a complete census of producers was not possible during the course of the Study. However, all producers were covered in Entebbe. Kampala and Jinja interviews cover a representative sample of stove producers of all types of stoves in these three urban areas. One very disturbing note was found in Kampala; a so-called "improved" all-metal stove has recently appeared in the market place. It is made of heavy-gauge metal and has heavy bars. The stove's "improvement" is based on the fact that it potentially lasts twice as long or longer as the traditional sigiri, while only costing 40-50% more.

In point of fact, the stove is one of the most energy inefficient stoves tested by the Team. The fact that it is selling very well (according to artisans and people interviewed in the market place) further demonstrates that, while the nominal price of charcoal has gone up (and perceptions are strong that charcoal prices are "high"), in reality, the real or relative price of charcoal to many households has declined to the point where efficiency plays very little role in decision making when selecting a stove. That is, many consumers' perceptions of an "improved" stove rest more with their views of how long the stove lasts (its durability), how the stove looks (its aesthetic appeal) and other features, at least as much as whether or not the stove is more energy efficient. This should not be surprising. The success of improved stoves throughout the world (both developing and developed) rests more with marketing and promotion than with actual efficiency improvements. The fact that people are willing to purchase a stove which consumes considerably more charcoal illustrates both their perceptions of the stove's appeal, as well as their perceptions of the relative value of charcoal.

Kampala Stove Survey

Ten market producers and producer groups were visited in Kampala. Additionally, the Usika Ltd. improved stove works was also visited. The ten employ some 66 artisans on a full-time basis. Their production is on the order of just over 40,000 stoves per annum. Almost all stoves are produced from scrap metal, although the "improved" metal-ceramic stoves use a higher quality metal, and are assembled with a fired clay liner.

Given the estimated number of Kampala households, this production represents approximately 15% of Kampala's annual charcoal household stove demand (assuming a life span for a traditional charcoal stove of about one year). The Study Team's interviews suggest that there are more than 440 artisans employed in charcoal stove production in Kampala. They generate nearly US\$ 1 billion (approximately US\$ 1 million) in revenue per annum from the production of metal charcoal stoves in

Kampala. This demonstrates the importance of the charcoal stove business in Kampala, and corresponds well to other African cities with comparable population sizes and levels of development.

Unfortunately, no reliable figures on "improved" ceramic-metal stove production are available in Kampala. In addition to Usika Ltd., there are at least three other ceramic-metal "improved" stove producers in Kampala who produce at least on an occasional basis. None of these producers were able to estimate their production for the Study Team. Previous work under the HEPP and the ESMAP February 1994 study puts household penetration of ceramic-metal stoves in Kampala at around 15% (see Section 4, above, and Annex 5).

If these stoves have a lifetime of two years (which is contested by many households who maintain that the stoves last no more than one year), this would imply that there are now on the order of 40,000 of these stoves in Kampala alone. In turn, this would indicate production of these stoves on the order of 20,000 per year. This latter figure seems realistic, given the Study's survey, and given previous work.

Jinja Stove Survey

Four stove markets were surveyed in Jinja township. These employ some 21 artisans. The stove smiths produce approximately 8,250 stoves per annum, with a total value of US\$ 16.6 million (approximately US\$ 18,000). Given the fact that there are an estimated 22,000 households in Jinja, the surveyed producers produce over one third of all stoves sold in 1994 in Jinja.

Entebbe Stove Survey

Four markets were surveyed in Entebbe. These producers employ some 22 artisans on a full-time basis. They produce approximately 17,500 stoves with a value of over US\$ 60 million (US\$ 65,000) per annum. Given the fact that Entebbe has approximately 14,000 households, these producers appear to "export" as much as a quarter of their production to other areas around Entebbe and probably to Kampala.

B: Stove Tests 2

Eleven stoves were tested during the course of the Study. These included five "improved" metal-ceramic stoves, five all-metal sigiris (including two of the heavy metal "improved" stoves available on the Kampala market) and the all-metal, multi-purpose, multi-fuel "Refugee" stove developed for refugee camps in Uganda. This funnel stove is made of light-weight materials and has been developed by a gentleman for refugees in Uganda. The Woody Biomass Survey Team requested the stove be included in the Study's stove tests. This stove should be tested on its own merits as it has considerable potential, and it is much more versatile stove than those currently in use for charcoal in Uganda. Simple water boiling tests (WBT) were performed on these stoves. The methodology is set out in more detail in Annex 6 (Household Stove Tests). Eleven standard-sized moulded metal pots ("sufurias" in the vernacular) were used for the tests. These were rotated amongst the different stoves over four test series in order that the variable for different quality pots was minimised amongst the different stoves. The same quantity of charcoal was measured for each stove (500g), as was the same quantity of water (1 litre) at the same ambient temperature.

Both high and low power tests were conducted. The charcoal charges were lit, times were recorded when fires were lit, when water was boiled and when water either stopped boiling or entirely evaporated. Water and fuel were weighed on digital scales when the water came to a boil. They were then placed back in the stoves for the low power test. The low power test continued until either all water evaporated or until all water was boiled off.

C: Comparison of Results

As should have been expected, the five ceramic-metal stoves performed better overall than the five metal stoves available on the market place. One ceramic-metal stove (non-Usika) performed best of all the stoves, both during the high and low power tests. The two heavy-metal stoves fared worse of all. They failed to boil water on two of the four tests. Their charcoal consumption was highest of all, and, therefore, their efficiency was lowest for both the high and low power tests. The three Usika Ltd. stoves did well on the low-power tests, while the three traditional all-metal sigiris performed well on the high power tests, but performed very poorly on the low power test.

Table AA: Comparison of Stove Results for Eleven Stoves Tested: May 1995

Activity	Ceramic-Metal Stoves			All Metal Stoves			
	Usika	Other	Avg Metal-Ceram	Trade Sigiri	New Heavy Metal	Average Metal	"Refugee"
Total time:							
* Ignition to cooking	0.2	0:15	0:18	0:09	0:10	0:90	0:04
* To Boil	00:25	0.18	0:22	0:18	np	0:18	0:07
Weight of:							
* Boiling Water (g)	896	914	903	902	np	902	944
* Hot fuel (g)	275	281	277	282	np	282	na
Total Time end of:							
* fire on stove	na	Na	na	1:52	2:07	2:00	0:44
* water in sufuria	1:10	1:07	1:09	na	na	na	na
Weight of remaining:							
* water in sufuria (g)	0	0	0	165	318	242	562
* charcoal (g)	93	82	88	0	0	0	0

Note: Three tests were run on the "Refugee" stove using grass and two with papyrus. The abbreviation "np" means the stove did not perform, while "na" means not applicable.

The "Refugee" stove, brought water to a boil faster than any of the other stoves, but, given the quantity and type of fuel (grass and papyrus), its power performance on the low power test was low due to the limited charge of fuel. There was no fuel left at the end of each of the five firings (i.e., combustion of the grass and papyrus was complete). Were a denser fuel used on the "Refugee" stove, or were lighter fuels mixed with denser fuels, then it would surely have had a better performance on the low power test.

These results basically support similar tests carried out during the HEPP, and those carried out on "traditional" all-metal stoves and the Kenya Ceramic Jiko (KCJ) metal and ceramic varieties such as the "usika". The metal-ceramic stoves reduce fuel consumption through good insulation. However, the quality of these stoves available on the Kampala market varies widely. The performance of the metal-ceramic stove depends upon a number of factors, including the ceramic quality and the number of holes in the ceramic liner.

There appears to be no standard for the metal-ceramic stoves. Stove vendors in Kampala, Entebbe and Jinja complained of frequent ceramic cracking and customer complaints. They also complained about the quality of craftsmanship (e.g., ceramic liners not securely fitted within the metal cladding). As noted in Section 4, this doubtless accounts for the poor market penetration of these stoves. The HEPP tests and the stove tests conducted during this Study both point to the fact that very little can say about how much fuel is being saved by the "improved" stoves found in 15% of the households by the HEPP and the ESMAP 1994 studies.

**ANNEX 4: ADDRESSES OF CURRENT ACTIVE PROMOTERS OF IMPROVED STOVES
IN UGANDA**

Full Name : Fred Rwashana
 Job Title : Managing Director
 Company : Rwashana and Associates Co. Ltd
 Business Address : Rwashana and Associates Company Ltd
 P.O. Box 5183
 Kampala Uganda
 Business : 256-41-235628

Makes institutional Stoves price from 150,000/= to 1,000,000/= depending on size; Commercial stoves price 200,000/= to 500,000/=; Selina domestic stoves for 30,000/=; Baking Ovens for 400,000/=; Incinerators for 1m/= to 10m/=.

Full Name : Albino Oteka
 Job Title : Senior Instructor
 Company : Nakawa Vocational Institute
 Business Address : P.O. Box 20121
 Nakawa
 Kampala, Uganda
 Business : 256-41-220935

Full Name : Youssef Arfaoui
 Job Title : Energy Advisor
 Department : Health Technology Development Centre
 Company : Ministry of Health
 Business Address : HTDC
 P.O. Box 20014 Wabigalo
 Kampala, Uganda
 Business : 256-41341611
 Business Fax : 256-41-346714

End of 7th Street, Industrial Area, Wabigalo
 Energy Saving Stoves, Rain Water Harvesting, Solar System Installation, biogas, micro hydropower, water filtration and pasteurization.

Full Name : Eva Kiwanuka
 Job Title : Director
 Company : JEEP
 Business Address : P.O. Box 4264
 Kampala, Uganda
 Business : 256-41267303

Offices at Kansanga – just after junction to Muyenga on the right side of the road

Household energy experts

- improved stoves, sustainable agriculture

Full Name : George Kyazze (RIP)
Job Title : Managing Director
Company : Black Power Ltd
Business Address : Black Power Ltd
P.O. Box 19018
13 km Gayaza Road
Kasangati, Mpigi
Uganda

Business : 256-41-567892/567911 ext. 28

Stove producer – charcoal, firewood and briquette stoves, Institutional stoves
Charcoal briquetting from coffee husks

Involved in the DFID funded rural energy project as a stove producer. Institutional Stoves used at Station Restaurant, Jinja Rd; Eagen House, Kampala Rd; New Mulago Hospital; Mengo Senior Sec. Sch.; Sanyu Babies Home; Karamoja Maternity Hospital; Mityana Hospital; Taibah High School; Katalamwa Chesshire Home Bundibugyo Hospital etc. Household stoves sold at Swan D.C. Ltd Plot 22A Namirembe Rd; Bwakeddempulira, Kissekka Market; Nakasero Market Shop 36 facing car park.

Full Name :
Job Title : Director
Company : Bahesi Company
Business Address : Baheesi Company
P.O. Box 815, Masaka, Uganda

Make charcoal briquettes, Improved stoves for charcoal and firewood (120,000/=). Institutional stoves.

Full Name : John Munyansanga
Job Title : Managing Director
Company : Appropriate Technology School For Environment
Business Address : Appropriate Technology School for Environment
P.O. Box 804
Kampala, Uganda

Business : 256-41-221063

Makes institutional stoves

Full Name :
Job Title : Principal
Company : Ministry of Education and Sports
Business Address : Busitema Agricultural College
P.O. Box 236
Kampala, Uganda

Business : 256-41-50818

Business 2: 256-77-412805

PLANS TO START MAKING INSTITUTIONAL STOVES

ANNEX 5: UGANDA PHOTOVOLTAIC PILOT PROJECT FOR RURAL ELECTRIFICATION

(UPPPRE)

PROJECT SUMMARY

The UPPPRE is a three year pilot project to demonstrate and establish the financial and institutional mechanisms to provide solar photovoltaic (PV) – based electrical services on a commercial basis to households, businesses and communities in rural and peri urban areas of the country which are not projected to have access to grid-based electricity in the foreseeable future and which have both the ability and willingness to pay the unsubsidised cost of the systems.

In support of the UPPPRE, the UNDP/Global Environment Facility (GEF) has provided US \$1.8 million for the provision of technical assistance, training, information collection and dissemination. The Government of Uganda is providing \$200,000 to cover certain local costs. In addition, a PV credit fund (PCF) is being established to provide loans to communities, businesses and households for the purchase of solar systems. UNDP/Uganda has provided an additional \$1 million to initially capitalise the fund which, it is anticipated, will operate both during and after the project. Additional donor contributions to the PV credit fund are being sought to increase the scale of solar lending under the project and introduce equipment suppliers from Asia, America, Europe and elsewhere in Africa to the markets in Uganda.

It is expected that the UPPPRE will lead to a large-scale national program to promote PV-based rural electrification involving additional capital from local financial institutions, development agencies, and/or private investors.

In keeping with the Government of Uganda's policies of fostering market-driven, private sector-oriented, economic development as well as environmental conservation, the specific goals of the UPPPRE are to:

Confirm the demand for the increased use of PV technologies to provide electricity in rural areas of the country through the expanded involvement of the private sector to provide energy services;

Develop strategies to overcome the policy, technical, financial, social and institutional constraints to the expansion of markets for PV systems on a demand-driven, full cost-recovery basis;

Strengthen the capacity of the private sector to design, install, service and, eventually, manufacture PV systems on a commercial basis and of the public sector to promote, monitor and provide the policy framework for the expanded use of PV systems;

Provide electricity to at least 2,000 households and 4 communities in areas not presently served by the grid;

Subscribe to global efforts to combat the build-up of CO₂ in the atmosphere and contribute to the curbing of greenhouse gas emissions from the use of kerosene and diesel generators;

Develop mechanisms to market smaller PV systems (i.e. solar lanterns) for low income households, larger systems for high income households and custom-designed systems for economically productive applications which generate employment.

Prepare an investment plan and identify the financial resources to provide PV-based rural electrification services on a national scale using one or more proven implementation strategies.

The project will achieve the above promoting and strengthening linkages between local industry, banking and training institutions, government agencies, end-users and communities. It will be demand-driven and PV systems will be purchased on a commercial

basis through the establishment of credit mechanisms involving local financial institutions. Existing community-based organisations, NGOs, and local authorities will be asked to participate as appropriate.

Activities to be carried out under the project will focus on local capacity building and will include:

1. Assisting the Ministry of Energy and Mineral Development in formulating renewable energy policies which promote private sector-based rural electrification services, overcome policy-related constraints and safeguard Uganda's environment.
2. Assisting the government and private sector in establishing ongoing public awareness campaigns to inform people in both rural and urban areas about the availability, cost, advantages and limitations of PV systems,.
3. Enabling the private sector and local financial institutions to design, test and expand the operation of financing mechanisms to increase the scale of PV lending throughout the country to enable a significant portion of the population to gain access to private sector-based electrification services at the lowest possible cost.
4. Providing training, both in Uganda and overseas, for Ministry and private sector personnel to enable them to plan and carry out expanded PV commercialisation activities.
5. providing information and technical assistance to Uganda's two battery manufactures to enable them to produce and market deep-cycle batteries for use in conjunction with PV systems in Uganda and in the region. Support will also be provided to evaluate if the procedures followed by Ugandan battery manufacturers for battery recycling/disposal can be made more environmentally sound.
6. Strengthening the capacity of the recently-established Uganda Renewable Energy Association (UREA).
7. Assisting the Uganda National Bureau of Standards in establishing and enforcing PV equipment standards and codes of professional practice including the establishment of a basic PV component test facility.
8. Assessing the need to strengthen the data collection and analysis capabilities of the Department of Meteorology of the Ministry of Energy and Mineral Development.
9. Assisting the Ministry of Energy and Mineral Development in monitoring the rate of expansion of PV-based rural electrification services through the establishment of a data base of renewable energy installations in Uganda using a geographic information system.

For further information about the project contact UPRRE Project Manager Godfrey Turyahkayo or Chief Technical Advisor Steve Hirsch, tel. 256-41-257863 or 235889 or e-mail: upppre@inforcom.co.ug.

Federal Ministry for Economics
Cooperation and Development
-Division 214, East Africa –

TECHNICAL CO-OPERATION WITH UGANDA

Brief description of the project “Energy Policy Consultancy”

Now that the Ugandan Government has deregulated the energy sub-sectors electricity and liquid fuels. It sees its further role in the energy sector to be in elaborating and implementing energy policy and energy development strategies, as well as in creating general conditions for improved energy supply. The competent Energy Department in the Ministry of Energy and Minerals is not, however, equipped with sufficient human resources and sector-specific capacities to be able to perform this role efficiently. Management consultancy in structural and regulatory policy areas of central importance, such as energy policy, is a focal area of the German-Uganda Development co-operation.

The objective of the project, for which the government of the Federal Republic of Germany has provided DM 2 million for a first phases, is to support Energy Department personnel through consultancy, upgrading and organisational development in such a manner that they can effectively perform their policy-development, planning, co-ordination and supervision tasks in the energy sector. For this purpose it is planned to second an international long-term expert, to assign international, regional and local short-term experts, to finance upgrading measures and to equip the Energy Department with electronic data processing and office equipment, as well as a vehicle.

Within the energy sector, the World Bank and UNDP are promoting rehabilitation and consolidation of the electricity supply in the electricity sub-sector. The government of Norway is supporting the elaboration of new electricity legislation. The Dutch government is supporting improved use of biomass in domestic households and industry. UNDP (Global Environmental Facility) is preparing to promote a project for small-scale solar energy units. The provision of systematic consultancy to the overall energy sector at macro level has not yet been promoted by any donor. The project is to make a significant contribution here and make use of the global experience of German Technical Co-operation in the fields of energy policy consultancy, renewable energies and energy efficiency.

The success of the project stand and falls with the human resources of the Energy Department. The Government of the Federal Republic of Germany therefore expects of the Ugandan Government that it will guarantee staffing levels at the Energy Department. The success of the project also depends essentially on the Ugandan Government consistently continuing the reform of the legal and regulatory framework conditions for participation of private investors in the energy sector.

GTZ - ENERGY ADVISORY PROJECT

COUNTERPART ORGANISATION: Ministry of Energy & Minerals (MEM): Energy Department.

STATUS QUO: Energy Sector

- Few people have access to modern energy supplies and the country has one of the lowest per capital consumption levels of modern energy in sub-Saharan Africa.
- Energy demand is growing
- Biomass represents 95% of the national energy balance which tends to reduce the country's forest stock.
- Uganda is richly endowed with renewable energy sources (Solar, Biomass, Small-scale Hydropower), but they are not yet very much disseminated.
- Energy strategies don't yet exist and population revenues are very low.

PROJECT PURPOSE

- The Energy Department efficiently and effectively fulfils its policy development, planning, co-ordination, information and monitoring & evaluation functions.

TARGET GROUPS

- Private (Households) and industrial (industries, artisans) energy consumers

COMPONENT: MAIN PLANNED ACTIVITIES

1. Energy policy, sub-sector strategies, appropriate legislation

- Draft energy policy prepared through a consultative process
- Development of sub-sector strategies for Renewable Energies (RE) and Energy Efficiency (EE).
 - Preparation of a legislative framework for RE and EE
 - Review Petroleum Act and amend or repeal.

2. Energy system analysis, monitoring and information methods.

- Assessment and introduction of energy system analysis methods, Monitoring and Information systems.
 - Data collection and update
- Evaluation and publication of Energy information (Energy balance, statistics).

3. Identification of measures for improved rural energy supply

- Evaluation of RE projects taking into consideration economic, environmental, social and gender relevant aspects.
- Identification of incentives for commercial dissemination of RE.
 - Enhancement of co-operation between institutions active in the area of RE and EE.

4. Identification of measures for energy efficiency improvement

- Analysis of the energy conservation potential in various sub-sectors
- Development of standards for energy technologies
- Design energy efficiency measures.

5. Energy sector organisation and co-ordination

- Capacity building of the ED to fulfil 1st functions effectively
 - Improvement of the co-ordination in the energy sector
 - Support of the Sector Planning Department of MPED and the Planning Unit in MEM in appraisal of energy projects.
 - Strengthening of the Co-operation between central and local authorities.

6. Counterpart training

- Review staff development programme and assess training needs
 - Design and organisation of advanced training.
 - Identification of the needs for complementary staff.

ANNEX 7: THE DEPARTMENT FOR INTERNATIONAL DEVELOPMENT (DFID)

The DFID has Uganda as its 4th largest programme world-wide. At the moment DFID is addressing the renewables and rural energy the issues through knowledge and research (KAR) grants administered through the KAR Engineering section. DFID hopes to support the energy sector by integrating energy components in their other projects i.e. education/health, agriculture and fisheries etc.

Policy Markers for DFID supported projects:

1. Protection and better management of the natural and physical environment

- National strategies for sustainable development
- Integrated management of water resources
- Efficient use of productive capacity
- Protection of the global environment
- Urban development
- Energy efficiency
- Sustainable forest management
- Bio-diversity
- Sustainable agriculture
- Sustainable agriculture
- Desertification, land degradation and drought mitigation

2. Better education, health and opportunities for poor people

- Lower child mortality
- Lower maternal mortality
- Essential health care
- Reproductive health service
- Effective universal primary education
- Literacy, access to information and life skills
- Safe drinking water and adequate sanitation
- Food security
- Emergency and humanitarian needs
- HIV/Aids
- Post primary education

3. Policies and actions which promote sustainable livelihoods

- Sound social and economic policies
- Direct assistance to the private sector
- Access of poor people to land, resources and markets
- Good governance
- Human Right
- The prevention and resolution of conflicts
- The removal of gender discrimination
- Business partnership

A selection of DFID –KAR Projects

1. Improving efficient woody biomass energy production and utilisation being implemented in Uganda and Zimbabwe. The project purpose being to demonstrate to key stakeholders the important contribution commercial woody biomass energy makes towards rural poverty alleviation and to the national economy.
Status: Ongoing.

2. Poverty Alleviation Aspects of successful improved household stoves programmes being implemented in Kenya, Ethiopia and Uganda. The purpose being to determine the poverty alleviation aspects of successful commercial stoves programmes on producers, consumers and others associated with the household fuel and stove supply and end-use business.
Status: Ongoing.
3. Community Microhydro in LDC's: Adoption, Management and Poverty impacts. Being implemented in Ethiopia, Uganda Nepal and Sri-Lanka. The purpose being to develop methodologies and action plans through consultation, by which community based Microhydro can be implemented in African countries through the study of successful adoption of Microhydro in Nepal and Sri-Lanka.
Status: Complete
4. Deployment of Improved Institutional Stoves Implemented in Kenya, Uganda, Tanzania and Ethiopia. The purpose being to encourage commercial and institutional makers and users respectively of improved stoves.
Status: Complete.
5. Accelerated Rural Electrification through East African SME Co-operation – implemented in Ethiopia, Kenya and Uganda. The project purpose being to increase off-grid electrification by improving the business, commercial, financial and technical, skills of Uganda, Kenyan and Ethiopian Small and Medium Enterprises (SME's)
Status: Complete

*ANNEX 8: DUTCH FUNDED - SUSTAINABLE ENERGY USE IN HOUSEHOLDS AND
INDUSTRY (SEUHI) PROJECT*

Through Interventions by Ministry of Energy & Mineral Development & NGOs.

The major intervention is on demand – side management, involving the dissemination of improved efficiency stoves both for charcoal and wood.

Under Dutch funding the Sustainable Energy use in households and industry (SEUHI) is carrying out Training of Trainers programmes in the design and construction of improved efficiency, mud stoves (Lorena) in the districts of Kabale, Tororo, Soroti and Adjumani.

So far 2,500 households have installed stoves under the programme. It has a multiplier effect in that those who acquire the skills pass them on to others.

Under the same programme, improved efficiency lime And training of lime producer is going on in the districts of Tororo, Kasese and Kisoro. The present kilns produce one kg of lime using a kg of fuel wood whereas improved ones can produce 5 kg, using a kg of wood.

Charcoal production is also targeted, with the dissemination of improved portable kiln in the districts of Luwero, Masindi and Nakasongola.

Charcoal stoves especially the ceramic ones in Kabale are also disseminated.

It is noteworthy that there are also various NGOs involved in stove dissemination both for households and institutions. Others are involved in Tree planting.

SUMMARY

Sustainable Energy Use in Households and Industry (SEUHI) Project carried out the following output on the course of the reporting period 1st quarter; July to September 1999;

Output 1: Cookstoves dissemination in the districts of Kabale, Tororo and Soroti.

Output 2: Afforestation activities in Adjumani and Tororo districts.

Output 3: Charcoal Production Improvement and Marketing in Luwero, Masindi and Nakasongola district

Output 4: Lime Production Improvement in Tororo district.

Output 5: Awareness Campaigns on energy conservation in households and industry

Output 6: Monitoring and Evaluation of Project activities.

The project progress, (Technical) based on outputs and earlier set targets is outlined in table 1. Details of the report are in Annex.

Table AB: Sustainable Energy Use In Households And Industry (Seuhi) Project Progress Report June – September 1999

OUTPUT	TARGETS	ACHIEVEMENTS	COMMENTS
Output 01: Cookstove Dissemination	6 training w/shops for Soroti; 180 people trained 6 local certified stove trainers commissioned in Soroti 24 model stoves to be constructed - Draft cookstove/rational energy use manual ready by September. - Commission an NGO to carry out cookstove dissemination in Adjumani	6 workshops held; 150 people trained 4 trainers commissioned 24 model stoves were built in kitchens participants 1st Draft ready - ACORD Commissioned in August to carry out the assignment	- Some invited candidates did not show up. - They can ably conduct a rural workshop on their own - This was part of the hands-on-training for w/shop participants. - The activity commenced a monitoring team is to travel to Adjumani in December
Output 02: Afforestation	- Commission agency to carry out offorestation in Adjumani - Develop 5 nurseries at 5 sub-county headquarters in Tororo district as models.	- ACORD was commissioned in August and commenced with the activity 3 Nurseries developed at Rubongi, Molo and Butalya - Inputs like seeds watering cans, etc provided to he sub-counties	Retraining to be carried in the sub-counties lagging behind to achieve goal in Nov/Dec. nursery season
Output 03: Charcoal production improvement	4 Training workshops for charcoalers 50 trained charcoalers	1 workshop held in Luwero 3 in Masindi; 3 in Nakasongola 25 trained in Luwero district; 25 in Masindi; 30 in Nakasongola 90 bags of high quality charcoal was produced during training. 280 litres of pyroligenous acid were produced	- The charcoalers involved so far have begun appreciating some of advantages attached to the New Technology. - Anticipate to involve more charcoalers on procurement of ore training (order made) - Some charcoalers have tried out the pryoligenous acid for meat seasons. More training to be carried out. - There was some resistance from Luwero charcoalers due to earlier

	• 2 charcoalers groups mobilised in to marketing society • Survey for charcoal markets in Kampala	• 2 groups mobilised in Masindi; 1 group in Nakasongola • Identified 47 major charcoal dealers in Kampala; Nakawa, Bwaise, Katwe, etc.	involvement of the DFO's staff had poor working relations with the charcoalers. The problem has been overcome. • Dealers with capacity to purchase a lorry load of 120 bags. Propose to install revolving fund to assist charcoalers to transport product to the market at the beginning of the cycle then guide them to proceed on their own
Output 4: Lime Production Improvement	• Visit Homa Lime Company, Kisumu, Kenya • Commissioning of the lime kiln by end of September	• 2 Project staff and members of lime Producers Association visited Homa Lime Co. in July 1999. • Material schedule done and procurement commenced	• A lot of experience gained in mode of operation of a vertical shaft kiln identical to the proposed Tororo kiln. • An agreement was struck with the Ministry of Works, Housing and Telecommunications to work jointly on lime production improvement in Tororo, Kisoro and Kasese.
Output 5: Awareness Campaigns	• Production of Radio programmes and brochures	• Easy to read materials produced for cookstoves, charcoal production • 10 Radio programmes on both FM and Radio Uganda.	• The public has started responding by paying visits to the Ministry for advice and guidance.
Output 6: Monitoring and Evaluation	• Set up a continuous monitoring and evaluation mechanism.	• Sub-county project co-ordinators have picked the skill in taking inventory of progress of activities and documentation. • Women members of Parliament, District Forestry Officers are playing a key role in this endeavour.	• Up to date information is available most of the time

ANNEX 9: UGANDA RENEWABLE ENERGY ASSOCIATION (UREA)

UREA was formed in 1995 and it comprises an association of about 25 private Ugandan companies, Training institutions, and consultants promoting the development and use of Renewable Energy Technologies (RETs). The Association brings together the key players in the new and renewable energy sources field. Its members are committed to the strengthening and expanding of the use of RETs in Uganda through commercial Channels.

Interests

RETs publicity and quality regulation in Uganda.

Activities

UREA is largely in its formative stages, however it has a great potential. Key activities include the sourcing and distribution of RET Journals, information dissemination, the establishment of a RET Code OF Conduct and the publication of quarterly newsletter.

UREA is to facilitate its members to organize and participate in expositions, trade fairs, and public events aimed at demonstrating and explaining PV technology. It is also hoped that UREA would play a regulatory role in vendor/installer licensing and technician certification and co-ordinating, liaison, and lobbying role on behalf of its members with the Government, donor agencies, NGOs and financial institutions.

MEMBERS OF UGANDA RENEWABLE ENERGY ASSOCIATION

COMPANY

CONTACT PERSONS

Afro-Kai Solar (U) Ltd.

P.O. Box 3460, Kampala
Tel: 256-41-532 547
Fax: 256-41-532 547
Mobile: 075 691 237
E-Mail jsabiiti@infocom.co.ug

Enock Sabiiti

Sale and installation
of PV system

AIP

P.O. Box 12376, Kampala
Tel: 256-41-220 526
Fax: 256-41-413071
Mobile: 077 413 071
E-Mail gakwya@avumuk.ac.ug

Hellen Gakwaya

RE Consultant

Boomer Systems (U) Ltd.

Plot 12 Wampewo Avenue
P.O. Box 7742, Kampala
Tel: 256-41-233479/235083/259679
Fax: 256-41-235083
Mobile: 077 455 401
E-Mail: ymrug@starcom.co.ug

Musoke Kivumbi

PV Systems Sale
and Installation

Bulagayi Enterprises Ltd

Plot 61/67 Nkrumah Rd.

Keneth Balijuna

(former Custodian Board Buld-1st fl.)
P.O. Box 8201, Kampala
Tel: 256-41-235 691
Mobile: 075 697 552

Sale & Installation

**Centre for Renewabel Energy & Environment
Programme**

P.O. Box 29, Kyambogo
Tel: 256-41-349 220/285 211/3
Fax: 256-41 345 597
Mobile: 075 691 237

Wilson Okaka

RE Consultant

GITT Uganda

P.O. Box 6511, Kampala
Tel: 256-41-349 055
Fax: 256-41-348 112
Mobile: 075 691 237
E-Mail: gitt@starcom.co.ug.

Steven Ssekandi

PV system sale and
installation

Globa Energy and Environment Consult

P.O. Box 22149, Kampala
Tel: 256-41-222 003/285 322
Mobile: 075 693 834

George Sizoomu

RE Consultant

Incafex Solar Systems

P.O. Box 8867, Kampala
Tel: 256-41-250 008/251 812
Mobile: 075 750 008 (Henry)
Mobile: 075 423 911 (Abdalla)
E-Mail: incafex@swiftuganda.com

Henry Nganwa
Kyezira Abdalla

Installation

Kabagambe

C/o Mr. E. Kyalimpa
P.O. Box 7270 Kampala
Tel: 256-41-235 889
Fax: 256-41-349 342

John Kabagambe

PV Consultant

Laura Enterprises.

P.O. Box 1299, Kampala
18D Elizabeth Av., Kololo
Tel: 256-41-259 128 (Res)
Fax: 256-41-251797
E-mail: c/o Mr. A.K Magezi
Bapuuli@starcom.co.ug.

Gertrude Magezi
RE Consultant

(Sociologist)

Subject: UREA attention: S.A.K. Magezi

Louineau Jean-Paul

P.O. Box 6228, Kampala
Tel: 256-41-266 549
E-Mail: suniplkg@imul.com

Jean-Paul Louineau

RE consultant

Lwanga Electrical & Electronic Machines

P.O. Box 15248, Kampala
Tel: 256-41-250 294

Charles Lwanga

Manufacture of charge

Fax: 256-41-236 890

Magnet International

C/o P.O. Box 2128, Kampala

Tel: 256-41-250 294

Fax: 256-41-236 890

Magric (U) Ltd.

P.O. Box 3218, Kampala

Tel: 256-41-232 100/29646

Fax: 256-41-269 890

E-Mail: magric@imul.com

Metco Sales Int. Ltd.

Plot 761, 2nd Floor, flat 4A, Kampal Rd.

P.O. Box 8759, Kampala

Tel/fax: 256-41-342 224

Mobile: 077 405 634

Muhabura Poly Solar Systems

P.O. Box 26404

Mobile: 077 505 564

Sale & Installation

Roko Technical Services

P.O. Box 172, Kampala

Tel: 256-41-347 130

Fax: 256-41-567 784

E-Mail: rts@imul.com.

Afro-Kai Solar (U) Ltd.

Shell House 7th Street Ind. Area

P.O. Box 7082, Kampala

Tel: 256-41-254 060

Fax: 256-41-255 560

Mobile: 075 754 084

E-Mail: Nafula N. Awori@sul.simis.com

Solar Electric Energy (U) Ltd

P.O. Box 14, Kabale

Mobile: 077 434 539/077 415 084

Solar Energy for Africa Inc.

P.O. Box 4155, Kampala

Tel: 256-41-250 131 or 250 125

Fax: 256-41-250 131

Mobile: 075 647 733

E-Mail: solar@swiftuganda.com

Solar Energy Uganda Ltd.

P.O. Box 8016, Kampala

Tel/Fax: 256-41-232 114

Sollatex (K) Ltd.

Controllers and de lights

Mulindwa Christopher

PV System Sale &
installation

Johnson Iumba

PV System Sale &
Installation

Benon Muyamba

PV system sale and
Installation

Cleophas Nsaba

Solar Power Systems

Ranen D Samuel

Solar Power Systems
& Installation

Nafula Awori

Erisa Twinomujuni

Kimbowe Emmy

PV System sale and
Installation

Richard Kanyike

PV system sale &
Installaion

Kithinji Musyoka B.

P.O. Box 7784, Kampala
Tel: 256-41-349 800
Mobile: 075 694 102

Sunset Solar Systems & Installation

P.O. Box 30074, Kampala
Mob. 077 423 464

Sun Power Systems Ltd

P.O. Box 28984, Kampala
C/o Peter Tumramye
Tel: 256-41-349 276

Sun Trade & Consulting Ltd.

P.O. Box 10192, Kampala
Mobile: 077 502 330
(for Msgs)-256-41 286 690
Fax: 256-41 286 692

Vicotoria Pumps

Tel: 256-41-342 483
Fax: 256-41-259966
E-mail: ypl@infocom.co.ug

Warugaba Electronics

Kabwohe Town
P.O. Box 166, Kabwohe
Bushenyi District
Mobile: 075 699 048 (Caltex)
Fax: 0485 20880 or 21304

Wilken Telecommunications

P.O. Box 1090, Kampala
Tel: 256-41-231 873
Mobile: 077 429 158
Fax: 235180 & 256-41
E-mail: wiltel@starcom.co

UREA HEAD OFFICE Contact:

Amber House 2nd Floor – Room B 201
P.O. Box 24577
Tel: 256-41 257 863/349276
Fax: 256-41 349 342
E-Mail: uppre@infocom.co.ug

PV system Sale and
Installation

Nimanya Darius

PV systems & Installation

Twesigomwe Bernard

PV System Sale &
Installation

Fritz Plattner
PV system sale and
installation

Irene Muyindike

PV system sale and
Installation

Tumusiime Yosam
Sales & PV Installation
Agent

Michael Lukwago

PV System Sale &
Installation

Josh Mabonga-Mwisaka
Manager

UGANDA

Agip (Uganda) Ltd.

P.O. Box 3955
Kampal, Uganda
Tel: 041 256889, 245039
Fax: 041 244476

Francis K. Bwanika

Magric (U) Ltd.

P.O. Box 3218
Kampala, Uganda
Tel: 041-259646/232100/256220
Fax: 041 244606
E-mail: magric@imul.com
Attn: Mike Magney
Affiliation: BP Agents
Products: PV sales

Uganda Batteries Ltd.

P.O. Box 7049
Kampala, Uganda
Tel: 243150,231075, 230734
Fax: 243292
Products; Batteries

Willy Mayanja

CDK Engineering Ltd

P.O. Box 1173
Kampala, Uganda
Tel: 041 259902
Att: Director

Fruits of the Nile

P.O. Box 725
Kampala, Uganda
Tel: 273274
Fax: 345580
Products: Solar drying

Angello Nydaguma

Solar Energy for Africa

P.O. Box 4155
Kampala, Uganda
Tel: 256 41 271399
Fax: 256-41245594
E-mail: solar@swiftuganda.com
Products: Solar PV

Att: Major Kayanja

Sun-Trade & Consulting International

P.O. Box 10192, Kampala, Uganda
Tel: 256-41250160/244123

Att: Fritz Platter

Fax: 259019/245711
Products: PV sales

Renewable Energy Technologies

P.O. Box 4798, Kampala, Uganda
Tel: 041 540 885
Fax: 041 530 412
Product: Solar PV

Att: Charles Lutalo

Uganda Fabricators Co Ltd.

P.O. Box 4391, Kampala, Uganda
Tel: 255681/231752
Fax: 041 231 752
Products: Solar Water heaters

Att: Aksel Bjerregaard

Boomer Ltd.

P.O. Box 7742, Kampala Uganda
Tel: 041 235083
Fax: 041 235 083
Att: Simon Herd
Products: Solar PV

Att: Simon Herd

INCAFEX Solar Systems

P.O. Box 886, Kampala, Uganda
Tel: 041 250008/2518812
Fax: 041 250427
Mobile Tel: 075 693 834
Products: Solar PV

Henry Nganwa

MULTI-KONSULT

P.O. Box 5390, Kampala, Uganda
Tel: 2413211
Fax: 237836

DR. KATAHOIRE

AFROKAI LTD

P.O. Box 3460, Kampala, Uganda
Tel: 256 41 250 661
Fax: 256 41 250661
Mobile Tel: 075 691 237
Products: PV sales and installation

WILKEN COMMUNICATIONS

P.O. Box 1090, Kampala, Uganda
Tel: 256 41 231 873
Fax: 256 41 235 180
E-mail: wilken@starcom. Co
Products: PV sales & installation

SOLAR ENERGY UGANDA

P.O. Box 4155, Kampala, Uganda
Tel: 25641 232114
Fax: 256 41 251 448
Products: PV sales & installation

Battery Power System

P.O. box 6511, Kampala, Uganda
Tel: 256-41-25 1344
Fax: 256-41-348 112
Products: Battery Assembly

Hanshard Patel

Centre for Renewable Energy

Wilson Okaka

& Development Programme

P.O. Box 29, Kyambogo, Uganda
Tel: 256 41 349220/285211/3
Fax: 256-41345597
Products: RE Consultant

GITTU Uganda

P.O. Box 6511, Kampala, Uganda
Tel: 256 41 349055
Fax: 256-41 348112
Email: gitt@starcom.co.ug
Products: PV Sytem sale & installation

Steven Ssekandi

Global Energy Environment

George Sizoomu

Consult

P.O. Box 22149, Kampala, Uganda
Tel: 256 41 222003/285322
Mobile: 075 750008
Products: RE Consultant

Johnson Kabagambe

C/o Mr. E. Kyalimba
P.O. Box 7270
Kampal, Uganda
Tel: 256 41 235 889
Fax: 256 41 349 342
Products: Solar PV

Metco Sales International Ltd

Benon Muyomba

P.O. Box 8759, Kampala, Uganda
Tel: 256-41 342224
Mobile 077 405 634
Products: PV sales & installation

Muhabura Poly Solar systems

Cleophas Nsaba

P.O. Box 26404, Kampala, Uganda
Mobile: 077 505 564

Laura Enterprises

Gerturude Magezi

P.O. Box 1299, Kampala, Uganda
Tel: 259128

Louinean Jean-Paul

Jean Paul Louinean

P.O. Box 6228, Kampala, Uganda
Tel: 256-41-266549
E-mail: sunjpkg@imul.com

Lwanga Electrical & Electronic Machines

Charles Lwanga

P.O. Box 15248, Kampala, Uganda
Tel: 256-41-250294
Fax: 256-41-236890
Products: Charge Controllers & DC lights

Solatek (K) Ltd.

Kithinji Musyoka B

P.O. Box 7784, Kampala, Uganda
Tel: 256-41-234390
Mobile: 075 694 102
Products: PV System sales & Charge controller

Victoria Pumps**Irene N. Muyindike**

P.O. Box 620, Kampala Uganda
Tel: 256-41-342483
Fax: 256-41341625
E-mail: vpl@infocom.co.ug
Products: PV Sales

Warugaba Electronics**Tumusiime Yosam**

P.O. Box 166
Kabwohe Town
Mobile: 075 699048
Products: PV Sales

YWCA-Uganda

Helen Gakwaya

P.O. Box 2108, Kampala, Uganda
Tel: 256-41-342024
Fax: 256-41-341519
Products: RE Consultant