

# **MALAWI GOVERNMENT**

## **CONCEPT PAPER FOR THE ENERGY SECTOR**

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### **PROMOTING PUBLIC PRIVATE PARTNERSHIPS IN ELECTRICITY GENERATION FOR RURAL AREAS**

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# ACRONYMS AND ABBREVIATIONS

AfDB	African Development Bank
AfDF	African Development Fund
BOO	Build, Own and Operate
BOOT	Build, Own, Operate and Transfer
CDC	Commonwealth Development Corporation
DoEA	Department of Energy Affairs
EIA	Environmental Impact Assessment
EIB	European Investment Bank
ESCOM	Electricity Supply Corporation of Malawi
ESIA	Environmental and Social Impact Assessment
FIRR	Financial Internal Rate of Return
GDP	Gross Domestic Product
GHG	Green House Gases
GoM	Government of Malawi
GPOBA	Global Partnership on Output Based Aid
HH	Household
HPP	Hydro Power Plant
HV	High voltage
IDA	International Development Association
IDC	International Development Corporation (RSA)
IPP	Independent Power Producer
JICA	Japanese International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau (German Development Bank)
MAREP	Malawi Rural Electrification Program
MCA	Millennium Challenge Account
MCA-M	Millennium Challenge Account - Malawi
MCC	Millennium Challenge Corporation
MERA	Malawi Energy Regulatory Authority
MGDS	Malawi Growth and Development Strategy
NECO	National Electricity Council
NORAD	Norwegian Agency for Development
NRM	Natural Resources Management
OBA	Output Based Aid
PC	Privatization Commission
PCC	Petroleum Control Commission
PPP	Public Private Partnership
PV	Photovoltaic
SIDA	Swedish International Development Agency
SUCOMA	Sugar Corporation of Malawi
WB	World Bank
WTP	Willingness-To-Pay

# I. SUMMARY OF THE INVESTMENT CASE

## 1.1 INTRODUCTION

Malawi is a land locked country with a population of 13million, of which 85% lives in the rural areas. It is one of the poorest countries with a per capita GDP of US\$313. The economy is driven by agricultural production from small holder farmers in the rural areas. This group of people depends on firewood or crop vegetation waste for cooking and paraffin or kerosene for lighting. In a few cases candles are used for lighting and charcoal is used for cooking.

### 1.1.1 The Electricity Sector

Malawi is one of the least electrified countries in the SADC region, with an average per capita consumption of 111kWh per annum. This is among the lowest in the world. However average household consumption in urban areas is one of the highest in Africa, registering above 2500 kWh per annum. Although the transmission lines extend the entire length of the country, and despite the fact that most villages are situated quite near the grid, access to electricity is only 7.6% of the population. This figure accounts for 20% of the urban population and only 1% of the rural population. The figure of 1% has remained static over the last 16 years although the urban population has experienced increases over the same period. This is despite the Electricity Supply Corporation of Malawi (ESCOM), and recently, the Department of Energy Affairs (DoEA) making effort to increase access to electricity both in the rural and peri-urban areas. (ESCOM is a wholly government owned company responsible for generation, transmission, distribution, retail, import and export of electricity throughout Malawi).

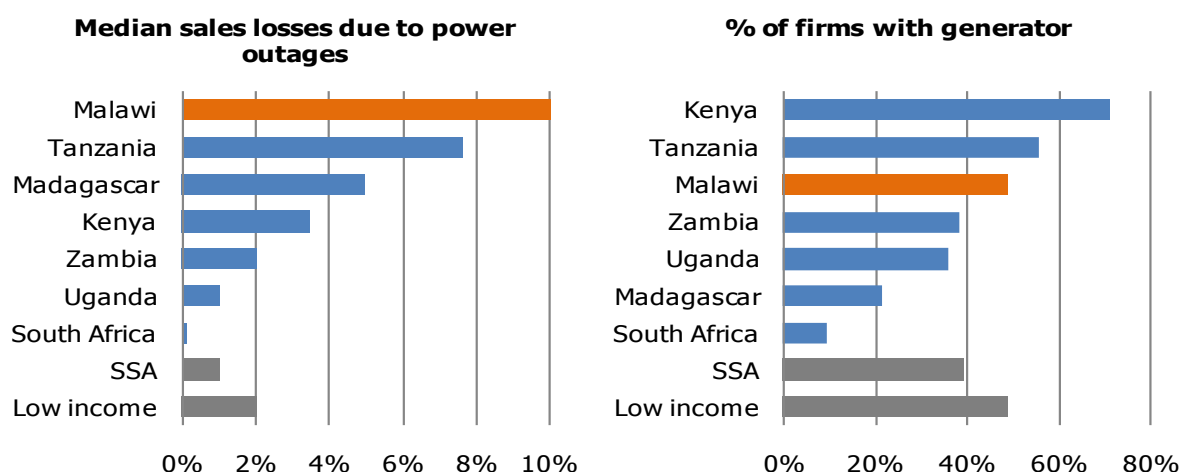
Although studies have shown that electricity, at current prices, is cheaper than firewood, charcoal, kerosene and even gas, the rural people have no access to electricity. In some areas, the Department of Energy Affairs, through the Malawi Rural Electrification Program (MAREP) extended the existing grid to some trading centers. However, the implementation of MAREP has been affected, by among others, high connection costs (wire extension to houses and metering).

Currently ESCOM remains the sole supplier of commercial electricity in Malawi. The total installed capacity is 284 MW, 98.4% of which comes from cascaded run-of-the-river power plants on the Shire River the only outlet of Lake Malawi. Although the peak demand is estimated at 267 MW, it is evident that this is suppressed demand. This is because load shedding is rampant following the loss of 40 MW of generation capacity in 2001 when one of the power stations was flooded. Only 20 MW was restored and the remaining 20 MW is expected to come on line towards the end of 2009. In 2003 another 100 MW was lost as a

result of flooding. The power station was restored within 4 months, however the efficiency of the plant has been negatively affected, and the life span of some major components has been reduced drastically. In 2009, weed infestation caused damage to the intake screens of the biggest power station. This took out 124 MW. The repair works lasted for a week. Siltation of the intake reservoirs has reduced pondage resulting in reduced energy outputs from each power station.

A Power development and Operational study conducted by external consultants in 1998, recommended generation options to increase capacity, rehabilitate and reinforce the existing power stations and the associated transmission and distribution systems. The required investments totaled US\$292.7 million spread over a period of 15 years. Scarce financial resources arising from contraction of the Malawi economy, volatility of the Malawi Kwacha (the local currency), hyperinflation, inadequate tariff increases, and a freeze of donor aid, rendered it impossible for ESCOM to collect adequate revenues to obtain the much needed foreign currency to invest in the power network.

The underinvestment has resulted in acute shortages of generation capacities and deterioration in the quality of supply such that the system is operating on negative generation reserve capacity. It is estimated that the investment needed to bring the system to deliver electricity at acceptable levels is in the order of US\$400 million. ESCOM cannot fund this out of its balance sheet. The lines and transformers in the transmission and distribution systems are overloaded, requiring up-rating. Also most of the switchgear is obsolete. The end result has been unprecedented power outages. This has caused a major outcry from the private sector which has suffered equipment damage and increased production losses. Some manufacturers have claimed losing as much as 10% of production due to power outages.



**Figure 1: Malawi Ranking in Sub-Saharan Africa on Power Outages**

As figure 1 show, the majority of industries and an extensive number of urban dwellers have resorted to investing in private generation, using diesel plant and solar installations. In 2006,

the total number of registered private generators was more than 70 MVA. The World Bank reports that Malawi's power outages are the highest in Africa. This has been identified as a major constraint on Malawi's competitiveness and its ability to attract foreign investment.

Under the Malawi Growth and Development Strategy, a medium term operational framework, the Government of Malawi recognizes that increases in electricity generation and supply is one of the six key priority areas to stimulate economic growth, reduce poverty and accelerate the attainment of the Millennium Development Goals. The Government has since provided funds to the tune of US\$55 million out of the fuel levy to ESCOM to build an additional 64 MW which will bring the total installed capacity to 348 MW by 2012.

The Government of the United States of America is providing assistance in the form of a grant under the Millennium Challenge Corporation to rehabilitate ESCOM's power network. It is expected that other institutions such as the World Bank will follow suit.

The Power Sector Reform Strategy which was approved in 2003 as part of the Malawi Energy Sector Reform Program allows private investors to develop, build, own and operate power generation plants as independent power producers, or in partnership with the public sector. This is a way of introducing competition and increasing generation capacities.

### **1.1.2 Rural Electrification in Malawi**

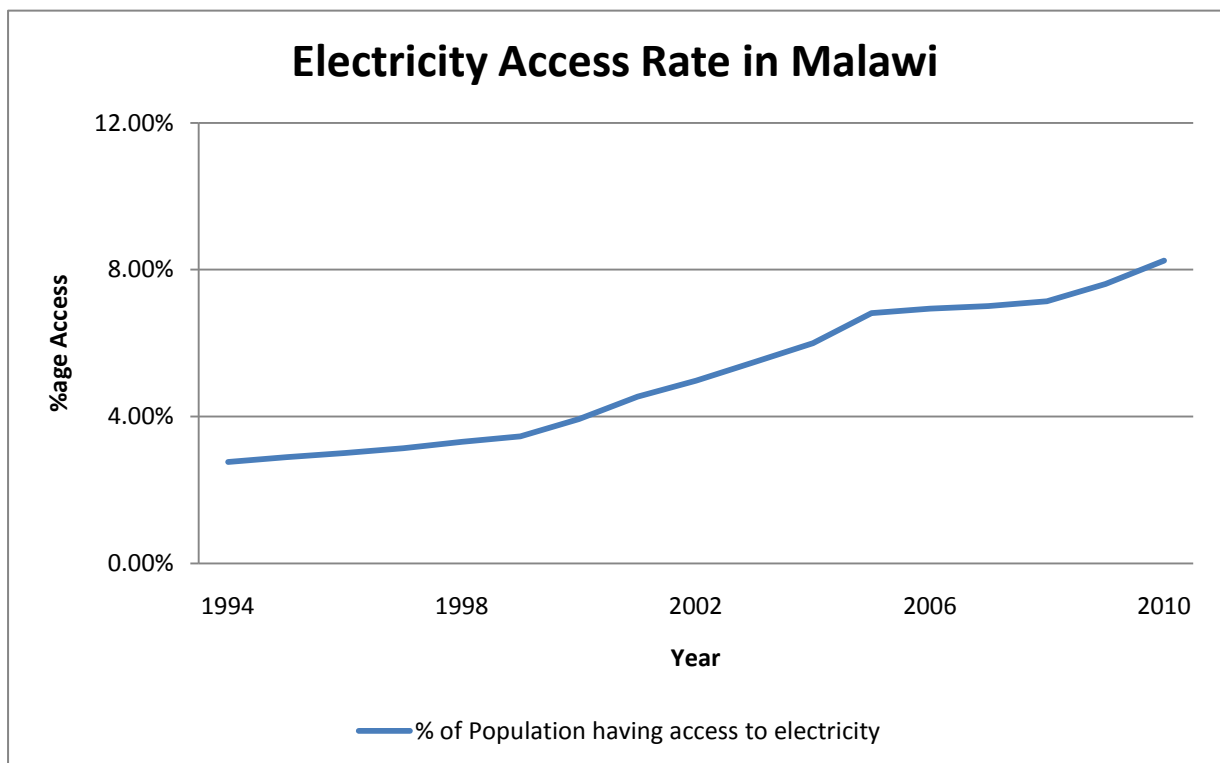
Previous practice for electricity connections required the customer to pay capital contribution for the investment that ESCOM would incur in extending the distribution system to the customer both in rural and urban areas. In each case the level of electricity utilization by the customer determined the charges to be paid for network extension. The plan was to invest in areas where the returns would cover the cost of the infrastructure. This has been the major constraint on the majority of the rural and urban population to access electricity.

From the early 80s to the late 90s, ESCOM implemented a Rural Electrification Program (REP) phases I, II, and III as a way of increasing access to electricity in the rural and peri-urban areas. Phase I consisted of extending the distribution lines to the peri-urban and rural areas surrounding the main towns of Blantyre, Lilongwe, Zomba, Mzuzu, Nkhotakota, Kasungu and the tobacco estates of the central region.

Phase II was the construction of the 4.5 MW Wovwe Hydro-electric Power Plant in the Northern part of Malawi to supply the rural centers/towns of Uliwa, Chilumba, Livingstonia and Karonga as an isolated grid. The project was funded by a grant from the German Government through KfW, the German Development Bank. The Project was appraised in 1991. Construction started in 1992 and the Power plant was commissioned in June 1995. Later on, because of increased outages on the 33kV sub transmission line to Mzuzu and frequent breakdown of the diesel generation plant at Mzuzu, ESCOM borrowed money from

the International Development Corporation (IDC) of South Africa and extended lines to connect the isolated power plant to the main grid in order to supply the towns of Chitipa, Bwengu, Rumphu and part of Mzuzu.

Phase III started just before the appraisal of Wovwe and was completed before the commissioning of Wovwe. This consisted of extending the distribution lines and connecting end customers in some 38 trading centers throughout the country under ESCOM's own financial resources. By the end of 1995 access to electricity was just below 3% of the population.



**Figure 2: Access to Electricity in Malawi**

The Government of Malawi recognizes the need to promote and provide reliable low cost quality electricity to meet the needs of low income customers, particularly those in the rural areas. Hence, Renewable technologies are now receiving more attention in order to increase access to electricity, encourage income generating activities such as cottage industries (that is, small-scale welding, milling, agro processing, community water supply and irrigation), and extend working hours (performing household chores in the evening). It is anticipated that this will discourage rural – urban migration, increase access to modern entertainment and information systems, and improve the standard and quality of life of the rural people through poverty reduction.

Thus in 1995, the Government of Malawi, took over the implementation of rural electrification and entrusted it to the Department of Energy Affairs (DoEA), under the

Ministry of Energy and Mines, to be financed from fuel levy, electricity sales surtax and donor grants.

With assistance from the Government of Japan, DoEA formulated a Rural Electrification Master Plan with the aim to increase access to electricity to not less than 30% of the population by the year 2020. This is to be achieved under the Malawi Rural Electrification Program (MAREP) through grid extensions. It does not envisage introducing new generation capacity to the system thereby exacerbating ESCOM's load shedding problems.

From 2003 to date, the Ministry of Energy and Mines, through DoEA has commissioned two grid extension and three solar-wind hybrid projects under MAREP:

Phase IV:	Grid electrification of 97 trading centers;
Phase V:	Grid electrification of 27 trading centers;
Phase VI:	Proposed Grid electrification of 54 trading centers. This is currently under detailed costing studies.
Phase VII:	Proposed Grid electrification of 81 trading centers. Subject to agreement, the DoEA is proposing to finance this under MCC compact for Malawi.
Solar-Wind	Three x 20.1 kW village solar-wind hybrid stations, one each in the South, Centre and Northern regions of the country.

### **1.1.3 Private Sector Participation**

The climate of doing business in Malawi has improved in recent years as the Government has shifted its policy in favor of provision of services by the private sector. Improvements in governance and macroeconomic stability have helped the country to experience an increase in Direct Foreign Investments in the mining, retail, banking, and telecommunications industries. However, the poor supply of electricity remains a problem. This creates a great opportunity for investors in the power sector or the independent power producers to get involved in improving the supplies.

The Power Sector Reform Strategy (PSRS) approved in 2003 allows private sector participation and competition as a driver of the overall National Energy Policy and it highlights the strategies for Energy Supply Industries. The Legal and Regulatory framework is contained in the Energy Laws of December 2007, and covers the Energy Regulatory Act No. 20 of 2004, Rural Electrification Act No. 21, Electricity Act No. 22, Liquid Fuels and Gas, Production and supply Act No. 23, all of these were also passed in 2004. However the Electricity By-Laws are still under scrutiny by the Justice department. They will be gazetted only after the Justice Department has vetted them.

The Malawi Energy Regulatory Authority is now mandated to oversee increasing access to electricity by developing system expansion studies and issuing tenders for new generation to meet the country's demand. The Authority is also mandated to review and set tariffs for

all players in the energy sector. Currently electricity tariffs average US\$0.043/ kWh. MERA has just proposed a 54% increase spread over the next 4 years. This will increase the average tariff to just over US\$0.065/kWh

## **1.2 Project Rationale**

Private sector participation in the generation of electricity in Malawi is almost nil, except for a few thermal plants using coal, diesel and bagasse that have been installed for private use.

ESCOM has followed a Least Cost Development Plan (LCDP) to develop new generation capacity. These have been funded using soft loans and grants provided by traditional partners such as the World Bank/IDA, KfW, SIDA, NORAD, AfDB/AfDF, EIB and CDC through the GoM.

ESCOM's demand projections to 2010, 2015, and 2020 are 324.8 MW, 478 MW and 757 MW respectively. MAREP is connecting rural trading centers and households using grid extensions. This compounds the problems of ESCOM to meet demand. As financial resources are scarce, investments for new generation can only be leveraged by involving the private sector.

Off-grid installations implemented by MAREP are limited to solar-wind hybrid technology of 20.1 kW, one each in the southern, central and northern regions of Malawi. This limits the time of use to 3hrs a day from 18h00 to 21h00. It also limits the use of other appliances and machinery for milling, drilling, welding, baking, heating, and so on. The rest of the day the system is used for pumping water.

The development of a medium, small or mini power station under a PPP arrangement will go a long way in improving the lives of rural people through increased productivity as they establish cottage industries or home businesses.

## II. INVESTMENT OBJECTIVE AND OUTCOMES

### 2.1 Desired Long Term Sector Objective

The long-term compact goal for Malawi is to promote economic growth and reduce poverty through increasing competitiveness of agricultural and manufactured products. This will be ensured through the project investments by increasing accessibility to more reliable and quality power supply in rural areas.

In order to achieve this long-term goal, the project outcomes will include the development of mini to small power plants using renewable energy technologies either on or off-grid developed by the private sector in partnership with the government<sup>1</sup>. The main objective is to increase generation capacity required to supply electricity at an affordable or subsidized price to selected rural areas in Malawi. The second outcome is to increase access to quality and reliable power supply to un-served users in remote rural areas. The project investments used are expected to connect over 30,000 households and businesses in the targeted areas over the project period. Figure 1 outlines the program logic for the off-grid power project.

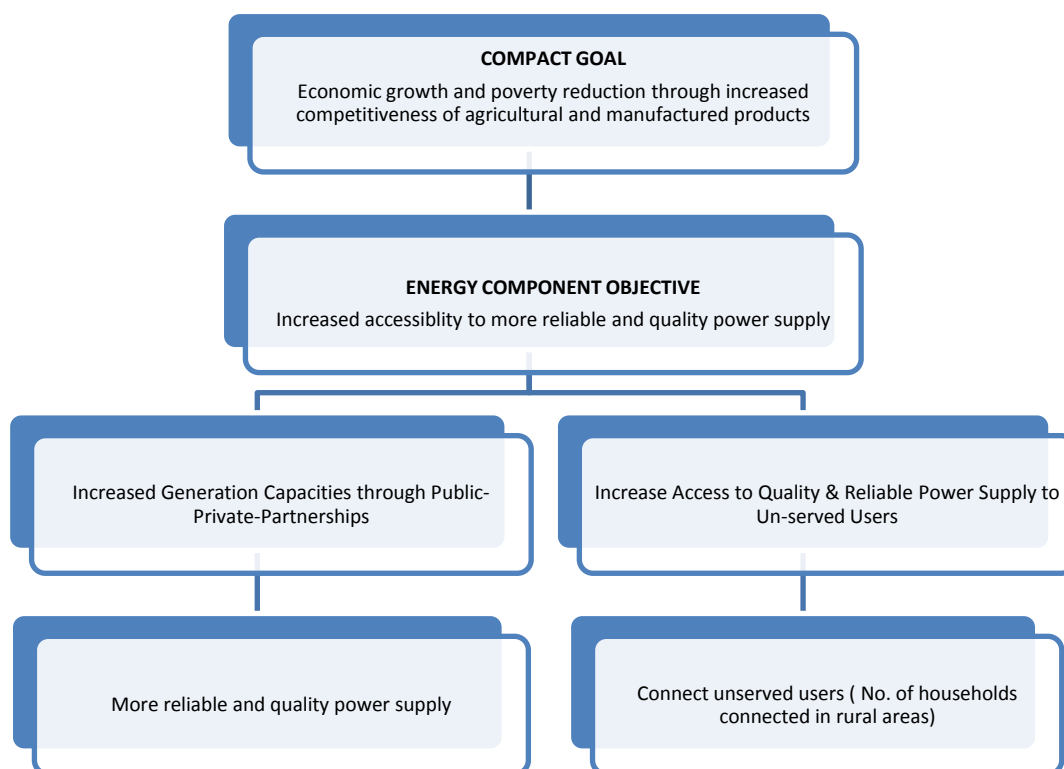


Figure 3: Program Logic for On/Off – Grid Power Solutions

<sup>1</sup> We assume the following categories of power plants: micro (5kW-100kW); mini (>100kW-1MW); small (>1MW-15MW); Medium (>15MW-100MW); and large (>100MW)

## **2.2 Expected Project Outcomes**

### **2.2.1 Investment Outcome 1 – Development of New Generation Power Plants under Public-Private Partnership (PPP)**

The Malawi Government is concerned that access to electricity in the rural areas has stagnated at only 1% of the entire population having access to electricity in the rural areas. To increase access, effort is needed to develop power plants close to the end users in the rural areas. Alternatively, new generation plants could be connected to the grid to make them feasible and economically viable to both the Government and the Private investor. An extension of the grid at a suitable point would be built to feed the selected rural area to be electrified for on-grid PPP projects. This is preferred by the Department of Energy Affairs.

#### ***2.2.1.1 Large Scale Power Plants***

Large power plants are categorized as those greater than 100MW. Some sites have been identified for PPP options in the power sector. Currently, the Government of Malawi is focusing on developing Lower Fufu project on South Rukuru River as a PPP project, which is assessed to have a maximum installed capacity of over 140 MW. The African Development Bank has expressed interest to fund the full-feasibility study of the project. The logistics of selecting the private investor are vested with MERA for the time being but later on the Privatization Commission will be responsible for PPP projects once the PPP policy and PPP bill are passed by cabinet and parliament, respectively. Tenders for the development of the Lower Fufu HPP will be issued after completion of the full-feasibility study.

The Power Development and Operational Study of 1998 also identified Mpatamanga gorge with an assessed capacity of 135-300 MW on the Shire River as the next feasible hydro-power plant to follow after Lower Fufu. This too could be developed under a PPP arrangement.

Songwe River has potential sites for hydro-power generation of up to 130 MW. A joint initiative between the Governments of Tanzania and Malawi is currently underway and pre-feasibility studies are being conducted for possible options of putting up a power generation plant. This is also a potential site for a PPP option.

#### ***2.2.1.2 Medium, Small and Mini Hydro Power Plants***

Several sites have been identified in the medium, small and mini power plant category. The 1986 National Water Resources Master Plan for Malawi prepared by the Government of Malawi with the assistance of the UNDP identified potential sites for the development of small to mini hydro power schemes<sup>2</sup>. A total of 12 potential sites were identified in the

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<sup>2</sup> See footnote 1.

Northern Region alone within Karonga and Chitipa districts. These include the following: North Rukuru 1, 2, & 3, upstream & downstream; Lufira site; Kalenje site; Kaseye site; Wovwe site; Chitimba site; Chambo site; Mbalizi site; and Songwe River. Out of these sites, only Wovwe has been developed with an installed capacity of 4.5 MW.

The hydrology of the Wovwe River indicates that the capacity could be increased to 15 MW depending on the size and position of the weir. The additional 10 MW could supply targeted villages through grid extensions.

The Ruo River, which flows from the Mulanje massif, is a tributary of the Shire River in the Southern region of the country. It has a mean average annual flow of 15m<sup>3</sup>/sec. A small hydro of about of 5 MW could be developed on Zoa falls and has the potential to generate between 25-45MW.

Studies conducted in 2002 by JICA for the Malawi Rural Electrification Plan (MAREP) identified additional potential sites suitable for micro hydro power plants. However, these are too small and not economically viable to be developed under a PPP.

### ***2.2.1.3 Bagasse Energy Generation***

The sugar corporation industry in Malawi generates electricity using residuals from sugar extraction (bagasse) and is used to drive thermal/ steam power plants. This is the most efficient way of getting rid of the waste. This has assisted the sugar industry to offset power shortages.

There are two sugar plants in the country situated in the central and southern regions namely: Dwangwa Sugar Corporation (DWASCO) in Nkhotakota district of the central region and Sugar Corporation of Malawi (SUCOMA) in Chikwawa district of the southern region. Currently DWASCO generates 7.0 MW whereas SUCOMA generates 11.5 MW. It is estimated that the total installed capacity using biomass at DWASCO and SUCOMA have the potential of generating 10MW and 28MW, respectively. Thus, potential interventions may be earmarked to increase and promote energy generation as well as access to rural communities within an approachable range of surrounding rural areas

There are approximately 280 smallholder farmers in Dwangwa and 310 smallholder farmers in Nchalo (Chikwawa) supporting the sugar industry through the supply of sugarcane who could benefit from the project investments. Investments can, therefore, be used to increase energy generation at the two sugar plants by increasing the use of bagasse energy generation. More efficient boilers and generation plants at the two sites may be installed with assistance from MCC project funds to promote cogeneration using bagasse technology through a PPP option. The additional capacity could benefit a lot of rural households, businesses and trading centers as well as the sugar plants projected at around 30,000

beneficiaries at Dwangwa and SUCOMA sugar plants and spanning to several trading centers from the generating plants.

#### **2.2.1.4 Biomass Electricity Generation**

The Chikangawa forest in the Northern region of Malawi has more than 50,000 hectares of pine trees. A lot of trees are cut down annual that leave a lot of residues from the bulk. A factory established under a concession uses the timber to make various wood products. The concession area is only 9,000 hectares. Other merchants are harvesting the rest of the timber for export.

The Forest is underutilized and is not well managed. However, if properly managed, it is a potential source of fuel for a thermal power plant. Estimates indicate that a power plant of 20 MW or higher would be viable and sustainable. This is an attractive option as it could easily be connected to the national grid. The cost of the transmission line would be relatively low when compared with the small/mini-hydro options.

#### **2.2.1.5 Other Technologies**

The DoEA is experimenting with small solar-wind hybrid stations around the country. The average solar insulation level in Malawi is about 20MJ/m<sup>2</sup> which is relatively high. Cheaper solar panels of good quality and large installations could power institutional buildings in the rural areas such as schools, clinics and households. The private developer is free to come up with other technologies which may prove viable.

### **2.2.2 Investment Outcome 2 - Increase Access to Quality and Reliable Power Supply to Un-Served Users**

The second outcome is to increase access to un-served users in selected sites. These will depend on the selected project investments agreeable between the Government and the private investor. The project is expected to promote the use of mini to small power plants that can be off-grid (depending on the locality and demand within the vicinity of the plant) or on-grid (which can be used to supply electricity in some identified rural areas). The project is expected to focus on mini to small power plants, of which the number of beneficiaries to benefit from such investments range from 800 (for 100kW power plant) to 120,000 (for a 15 MW power plant) households and businesses located within rural areas<sup>3</sup>.

However, consumers will not afford the cost of connection to their dwellings. In order to facilitate the connection process and increase access, the investment requirements in the proposed sites are earmarked to contribute to public equity funds and will be used for extending distribution lines to the targeted sites and financing connection costs that have been regarded as a constraint to increasing access of rural households and businesses.

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<sup>3</sup> See table 1 under section IV

### **III. USE OF INVESTMENT FUNDS**

The use of investments funds will depend on viable projects based on a demand analysis once the rightful PPP project has been selected. The selected projects to be financed under the MCC funds are earmarked for *mini to small power plants*. The potential sites have been identified within cogeneration using bagasse, biomass, renewable energies and hydro power plants. MCC funds will be used as public equity on behalf of the Government of Malawi and will form part of capital costs aimed at funding distribution and connection costs to increase access to electricity for rural households and businesses.

In terms of the intended projects, we envisage that a full analysis will be conducted to assess the level of demand and willingness to pay particularly focusing on investments that will improve access to rural communities as part of the government objective of increasing rural productivity. Where the projects will require additional support, sources of performance-based subsidies will be assessed both from Government's contribution and other stakeholders.

It is important to note that all selected investments must pass the lowest MCC calculated hurdle rate for Malawi, currently estimated at 12.5%. On financial terms, in order to attract PPPs in the power sector, we assume that the viable financial internal rate of return should not be less than the base lending rate for Malawi, which is currently at 15%.

For the selected power projects, it will be necessary that consumer analyses should be undertaken in the targeted rural areas to assess, among other things, the following:

- (a) The probable uses that are expected to demand the required power needs. This will determine the level and type of technology required and availability of resources for power generation;
- (b) The level of tariffs or user fees that customers are willing to pay based on the level of usage; and
- (c) Determine price structures that are affordable based on categories of customers in different regions.

In addition, the prospective private partners in PPP projects will be expected to perform their own detailed research and analysis that will confirm consumer demand, affordability and the willingness to pay.

#### **3.1 PPP Enterprise and Equity Ratios (Capital Structure)**

The capital structure of the PPP will depend on the level of agreement between the Government and the private investor. The debt-equity ratio will be determined by the private company on how it wants to leverage the company's total equity. The articles of

agreement between parties involved (Government and the private company) will determine how shareholders equity will be leveraged, that is, majority, minority, joint venture, etc.

For example, a 40% share of the PPP enterprise may form part of the shareholders' equity of which there may be either a 70:30 or 60:40 ratio on the share equity between the private operator (private equity) and the Public enterprise (public equity). Government can then source its share equity either locally, through budget provision or from an external source such as the grants from MCC to facilitate this process as part of capital contribution on public equity. Proposed capital contributions for initial public investments are assumed to be within the range of **US\$10-15 million** that will be leveraged by MCC. The remaining 60% is assumed to be covered by private debt accrued to the private company. However, these ratios will depend on the agreements between the two parties.

### **3.2 Performance Based Subsidies**

Initial assessments on increasing access to rural areas have shown that there are low returns to investments. In order for the PPP projects to be financially viable, Government and the private operator will go into an agreement that will outline how operations will be subsidized for a limited period of time to cover full costs of operations. For the selected projects to be beneficial to all parties, only viable projects that would offer a transitional subsidy will be selected. This is based on the notion that user charges will increase at an agreed rate per annum commensurate to meeting full costs realized by the investment.

Due to the strain on Government resources and the need to extend services to other priority areas, it is not expected that within the proposed investment period Government will manage to honor its part on the subsidy requirements. The lists of category projects selected are expected to benefit from external resources such as the Global Partnership on Output-Based Aid (GPOBA) which offer performance based subsidies for a limited period of time of up to a maximum of **US\$7 million**. Annex 1 provides a list of potential PPP projects that may benefit from this arrangement for mini and small power projects.

## IV. PROJECT BENEFITS AND BENEFICIARIES

### 4.1 Beneficiary Analysis

Annex 1 lists some of the potential PPP options available in the country. These sites span from HPPs (large, small, mini and micro), biomass (bagasse and forest waste), and renewable energy. These options are available to any private investor interested in operating on a PPP basis.

The impact of each intervention is, therefore, dependent on the viable PPP option that will be agreed between Government and the Private Operator. Each project agreement is expected to conduct a full-feasibility study that will assess the demand and willingness to pay by the consumers. This information will be used to assess the viability of each project and identify the least-cost option for providing the service using private sector expertise and experience. The demand analysis is expected to identify possible demand options for each proposed investments. Some preliminary capital expenditures for possible PPP options have been previously assessed by Government (see annex 1). However, detailed technical and financial assessments will be done by the private operator.

The intended PPP power/generation projects are expected to extend connections to unserved users in rural areas. The project beneficiaries will depend on the PPP project option agreed. Depending on the type of PPP option, some of the expected beneficiaries (both households and small businesses) based on recent demand scenarios and the capacity of the power plant are projected as follows:

**Table 1: Potential Beneficiaries for PPP Options**

PPP Option	MW	No. hours	Estimated Number of Household & Business Connections			
			Low Demand	Medium Demand	High Demand	Average
100kW Power Plant	0.1	8,760	791	427	183	467
500kW Power Plant	0.5	8,760	3,954	2,137	913	2,335
1 MW Power Plant	1.0	8,760	7,908	4,275	1,825	4,669
5 MW Power Plant	5.0	8,760	39,542	21,374	9,125	23,347
10 MW Power Plant	10.0	8,760	79,083	42,748	18,250	46,694
15 MW Power Plant	15.0	8,760	118,625	64,122	27,375	70,041
20 MW Power Plant	20.0	8,760	158,167	85,495	36,500	93,387
25 MW Power Plant	25.0	8,760	197,708	106,869	45,625	116,734
50 MW Power Plant	50.0	8,760	395,417	213,739	91,250	233,468
100 MW Power Plant	100.0	8,760	790,833	427,477	182,500	466,937

From table 1, we assume a low demand for energy of 60kW/month, medium demand of 111kW/month based on GDP per capita consumption, and a high demand for urban areas of 260kW/month. The level of demand forecast is based on a 65% load factor.

These investments are expected, in the short to medium term, to increase cottage industries and further promote production activities of rural households and businesses in the long term. It is widely acknowledged that increasing access to electricity in rural areas of developing countries offer considerable financial benefits to the communities being served. Some of the immediate financial benefits realized are on the cost savings from using kerosene lamps in which some cases beneficiaries can save up to 85% of their monthly expenses. Others include education, health benefits and social benefits.

Since the aim of these investments is to increase access to electricity in disadvantaged areas, the economic analysis will be based on the sustainability of the project and willingness to pay by consumers. Following Government’s policy recommendation of providing subsidies to Independent Power Producers or concessionaires that will increase access to electricity in rural areas, the public equity supported by MCC investments will be used to subsidize capital and connection costs in the selected areas. The viability of each selected project will be based, therefore, on the financial performance of each PPP and the subsidy required to sustain the project. Sub-section 2 below sets the assumptions and provides a benchmark for IRRs to be followed.

## 4.2 Required FIRR for the Proposed Investments

The design of the PPP project may take the following form of investments. For example, from annex 1, the proposed investments for the construction of a 10MW hydro power plant in Rumphi is estimated to cost US\$80 million. From such investments, the proposed breakdown between public debt and equity could be as follows:

**Table 2: PPP Option for the Construction of a 10MW Power Plant**

Cost Item	Unit	Estimated Cost (US\$)
Private Debt (60% of total costs)		\$48,000,000
<b>Total Private Debt</b>		<b>\$48,000,000</b>
Private Equity (60% of equity ratio)		\$19,200,000
Public Equity (40% of equity ratio)		\$12,800,000
<b>Total Equity (40% of total cost)</b>		<b>\$32,000,000</b>
<b>Total Project Costs</b>		<b>\$80,000,000</b>

Therefore, public contribution in the PPP option will depend on the cost of construction and the agreed ratios between Government and the private operator. The investments will require that they pass a hurdle rate of which in this case the PPP option is expected to pass the MCC hurdle rate for Malawi projected at 12.5% or the financial cost of capital in Malawi as projected by the base lending rate of 15%.

Since low returns are expected as a result of such public investments aiming at extending rural access to electricity, performance based subsidies will be required to offset operational costs incurred by the private operator. These subsidies are assumed to be offset by an OBA subsidy with financing from GPOBA. For sustainability purposes, the arrangement assumes a transitional subsidy regime over the projected period of each project output life. Initial estimates of OBA subsidies towards operation and maintenance for the PPP option will be estimated and will depend on the level of capital costs for the project. Larger PPP investments in the power sector will be connected to the grid through a wheeling agreement between the private generator and the transmission company that is mandated by law to purchase power generated by an independent power producer.

The tariff or user fees will depend on the demand assessments per region which may take the form of monthly contributions or tariffs charged by the regulator. For a simple analysis, individual households may be required to contribute on a monthly basis an amount equivalent to MK1, 000.00 (or US\$7.14) which may be revised based on changes of certain economic variables such as inflation, exchange rate movements and capital or efficiency gains in the PPP Company. The OBA subsidy will depend on the model of the HPP installed and the number of beneficiaries and is expected to decline on an annual basis on an agreed rate between the two parties. The adjustments made to the beneficiary monthly contribution will be commensurate to the requirements aimed at covering full costs of operation. It is expected that the larger the generation plant the more expensive will the subsidy be if the power plant is targeted for rural areas.

## **V. SUPPORTING TECHNICAL INFORMATION**

This section provides a summary of supporting technical information that will assist in the implementation of the PPP arrangements. Reforms in the Electricity sector go back to 1998 when the new Electricity Act divested the regulatory function from ESCOM and given to the National Electricity Council. The process still continues with the formation of MERA combining the roles played by the former National Electricity Council (NECO) and the Petroleum Control Commission (PCC).

The current Energy Reform Program is built on four pillars

### **5.1 Policy Framework**

PPP arrangements in the energy sector are supported by the following policies:

- (a) National Energy Policy approved in 2003;
- (b) Strategies for Energy Supply Industries; and
- (c) PPP Policy yet to be approved by Cabinet by December 2009.

### **5.2 Legal Framework**

The PPP options in Malawi have been well supported by the following energy rules and regulation:

- (a) Energy Laws which came into effect in December 2007 and constitute
  - i) Energy Regulation Act No. 20 of 2004;
  - ii) Rural Electrification Act No. 21 of 2004;
  - iii) Electricity Act No. 22 of 2004;
  - iv) Liquid Fuels and Gas, (Production and Supply Act) No. 23 of 2004; and
  - v) PPP Bill yet to be passed by Parliament.

### **5.3 Regulatory Framework**

The PPP arrangements will be supported by the following institutions and regulations:

- (a) Independent Energy Regulator-Malawi Energy Regulatory Authority [MERA]. MERA replaces the Petroleum Control Commission and National Electricity Council
- (b) Energy Regulations gazetted February 2009 and consist of:
  - i) Energy Regulation By-laws 2008;
  - ii) Rural Electrification Regulations 2008;
  - iii) Electricity By-laws 2008 yet to be gazetted in May 2009; and

## 5.4 Commercial Framework

The PPP will also operate in an environment favorable for private sector operations. These include the following:

- Competition for and within markets and existence of the Competition and Fair Trading Act of 2008;
- Third Party access to Transmission and Storage;
- Investment models: PPP (BOOT, BOT, Concession); and
- Pricing Models: Efficiency caps & performance based return on investment (PROI).

The Malawi Energy Regulatory Authority is now mandated to oversee increasing access to electricity by developing system expansion studies and issuing tenders for new generation to meet the country's demand. The Authority is also mandated, among many other duties, to receive, evaluate, decide, issue licenses for undertakers in generation, transmission, distribution, export and import of electricity.

- Arbitrate on disputes between customers and undertakers
- Develop and enforce technical standards, safety regulations and quality of service
- Analyze and approve tariffs as proposed by undertakers
- Recommend reforms to the Energy Laws and the Acts.

It is expected that new legislation will be passed soon for the regulation of PPPs and Bio-fuels now that the new Government is in place. The time frame for this will be known later. Suffice to mention that one of Government's priority areas under the Malawi Growth and Development Strategy (MGDS) focuses on energy generation and supply as one of the key constraints to economic growth in Malawi.

## VI. ENVIRONMENTAL AND SOCIAL RISKS

It was recognized through the screening process that the areas to be affected by the proposed large, small and mini Hydro Power Plants (HPPs) are relatively small and therefore the impact on the social and natural environment could be small. However, as a precautionary measure, the projects should be subjected to the EIA process in accordance with the Malawi Environmental Management Act of 1996, Environmental Impact Assessment Guidelines of 1997 and all relevant natural resources management policies and legislation.

The following NRM laws will particularly be applicable: The land Act, the Water Resources Act, the Forest Act, the Fisheries Act, the National Parks and Wildlife Act, the Town and Country Planning Act and the Public Health Act. The EIA process should also conform to the MCC and World Bank Social and Environmental Impact Assessment guidelines.

### 6.1 Large, Small and Mini Hydro Power Plants

Through these projects, power will be extended to un-served areas and this will have long-term social and economic benefits which will contribute significantly to household income levels and improved standards of living of the rural people and industrial production. Limited impacts on the social and natural environment are anticipated in view of the small areas that will be covered by these projects and include the following:

- (a) **Fauna and Flora** - the majority of the potential sites for the proposed Hydro-power plants are in Karonga and Chitipa districts in the Northern Region with only one in Mulanje in the Southern Region. There will be little clearance of vegetation related to the installation of the power plants and any special ecological niches existing in the affected catchments will be identified during the preparation of the Environmental Impact Assessment report. Appropriate mitigation measures will be taken to protect them. During the preparation of the EIA, particular attention shall be given to ensure that sedimentation, downstream flows, water usage and quality and their effect on flora, fauna and the people are adequately investigated.
- (b) **Land Use** - only a few settlements will be affected by these developments. There are a few agricultural activities in the catchments in which the Hydro-power plants are located. Consequently, limited compensation and resettlements will be required. Details will be identified as part of the ESIA process.
- (c) **Construction work impact** - minimum land clearing is anticipated at all project sites and any negative environmental impacts resulting from the construction activities will be addressed during the production of the EIA.

## **6.2 Bagasse and other Biomass Energy Generation**

In the national energy policy of 2003, cogeneration of biomass from the agriculture sector is considered to be a potential source of energy for the rural as well as the industrial sectors. The Dwangwa and Nchalo sugar plantations waste materials in the form of bagasse and molasses go to the thermal power generation for the producers own use. Nearly two thirds of the molasses are converted into ethanol fuel at the plant in Dwangwa.

Energy generation from bagasse and other biomass will create an enabling environment for the PPP and is a priority for Malawi. The amount of GHG emissions arising from the cogeneration of biomass at SUCOMA and Dwangwa are currently minimal. However, expansion of bagasse and biomass energy generation through involvement of the private sector will require that Environmental Audit of the proposed activities be conducted.

Health considerations and GHG reductions are the factors that will need to be taken into consideration. This is necessary because even with proper design and management of the Biomass energy generation equipment to be installed, there may still be circumstances that could represent significant health risks and pollution to the environment. Environmental Audits of the proposed activities, therefore, will need to be carried out.

## **VII. PROJECT SUSTAINABILITY**

### **7.1 Operation and Maintenance – Financial**

The Government of Malawi established, through the Energy Laws of 2004, the Malawi Rural Electrification Fund which, among other purposes, is used to finance capital, operational and maintenance costs incurred by rural electrification projects in the country. These investments are made in order to make the rural projects viable (Rural Electrification Act No. 21 of 2004, section 13). However, the level of these funds may be limited or inadequate and will require external assistance from donors to support the proposed activities outlined in this concept paper. The GPOBA funds are earmarked, therefore, to support such initiatives in the rural areas through the promotion of rural electrification in the country.

The Energy Laws also mandates the Department of Energy Affairs to enter into a grant and subsidy agreement of which the funds allocated are to be used by the operating entity or concessionaire to finance capital and operational costs incurred by a rural electrification project (Rural Electrification Act No. 21 of 2004, section 20 (2)). The disbursement of such funds will be in accordance with progress of works and limited to the concession or impact area.

### **7.2 Operational and Maintenance – Institutional**

The proposed organizational restructuring of ESCOM into holding companies and subsidiaries is geared towards improving power service delivery in Malawi by encouraging the private sector to be involved in electricity generation, transmission and distribution. The current law has set standards of how each interested entity is supposed to operate. Only a single player in the energy market is to obtain one license either in generation of electricity for sale, operation of a transmission network, operation of a distribution network for the supply of electricity, importation of electricity into Malawi, exportation of electricity out of Malawi, and renewable energy for off-grid. Furthermore, the law allows other licensees to own shares in another licensee as long as the share equity does not exceed 5%.

The jurisdiction of granting an energy license is in the hands of the regulatory authority. Every application for the license will have a schedule of proposed tariffs which the licensee will charge to customers. The amendment and revocation of any license will be done by the regulatory authority. In order to mitigate any environmental and social risks, each license will be accompanied by safety measures such as environmental impact mitigation measures proposed by the licensee, obligations of the licensee of disposing related infrastructure and restoration of land, safety and security measures for compliance (Electricity Act No. 22 of 2004, section 9 (2)).

The validity of each license depends on the type of license offered. The following are the gazetted lengths of period for each licensee (Electricity Act No. 22 of 2004, section 12 (1)):

- (a) Generation license, fifty years;
- (b) Transmission license, thirty years;
- (c) Distribution license, twenty years; and
- (d) Export and import license, thirty years.

### **7.3 Tariffs and User Fees**

Any tariff charged by the licensee is subject to the regulatory authority's approval on the level of tariff that each licensee will charge for both grid and off-grid rural electrification. The approved tariff charged will be accompanied by the pricing formula for adjustment which will include a base tariff. The adjustment formula will account for exchange rate movements, changes in the consumer price index and other unavoidable cost increases and expected efficiency gains accrued to the licensee (Electricity Act No. 22 of 2004, section 16 (2)).

It is also important to note that tariffs for new entrants will be set at levels sufficient to allow the licensee to recover full costs of service, including a reasonable return on capital and encourage efficiency (Electricity Act No. 22 of 2004, section 18).

### **7.4 Legal and Regulatory Issues**

One critical area of conflict will be on the handling of PPP procurement as they are significantly different from traditional procurement arrangements whereby the Government simply buys and the private sector sells. PPP arrangements require business orientations similar to private sector joint ventures. In this regard, it may be of importance that Government procurement policies, laws, regulations and procedures be modified in order to encompass the new paradigm shift. This may be in the form of new PPP policies, regulations and procedures being developed or amended in existing rules and regulations such as the Public Procurement Act of 2003.

The Privatization Commission (PC) has been mandated to perform the functions of a PPP Unit and has submitted a draft PPP policy and PPP bill to be passed and enacted by Government (cabinet committee on reforms) and parliament, respectively. This is expected to be done once the new government and parliament commence their duties and proceedings.

## **VIII. IMPLEMENTATION ARRANGEMENTS**

The implementation arrangements will depend on the size of the investment and the technology adopted. Assuming the private investor goes for small to medium plants, the Government of Malawi can enter into joint venture with the developer or just take a shareholding value or leave it entirely to the private developer. A draft letter of Invitation is attached to this document.

The structure of the joint venture could take the form shown in Figure 2 below. This arrangement is likely to fast track the issue of licenses, rights and consents. These include Access roads, purchase of land, compensation of land owners, customs and environmental clearances etc.

The PPP Company will own the assets and the revenue generated by the plant. The Developer/Investor will recover his investment and a reasonable return during the life cycle of the plant. It may be necessary to recruit a suitable transaction adviser knowledgeable in commercial and financial development and engineering of infrastructure projects. The agreement should include Exit Options from the PPP company, management and control, currency risks, and other legal, tax and financial considerations.

Regardless of the plant being an isolated or on grid, a life line should be provided to the disadvantaged rural masses. The agreements between the developer, the Government and the end users should be very simple on a win-win situation. In the case of thermal power plant using bagasse or the Chikangawa forest, a bulk medium term fuel purchase agreement (5-10 years) must be negotiated up front.

Since the Privatization Committee will oversee the technical and financial aspects of the PPP options, it is expected that the PC will have an oversight of the project process in the country. A Joint Steering Committee consisting of the developer, the Department of Energy Affairs, MERA, the PC and MCA-Malawi may be formed. Overall supervision of the implementation of the projects will be done by PC and MCA-Malawi in conjunction with MCC.

Where the new power plant is connected to ESCOM grid, the role of ESCOM as a wheeling and/or power purchase entity should also be negotiated upfront.

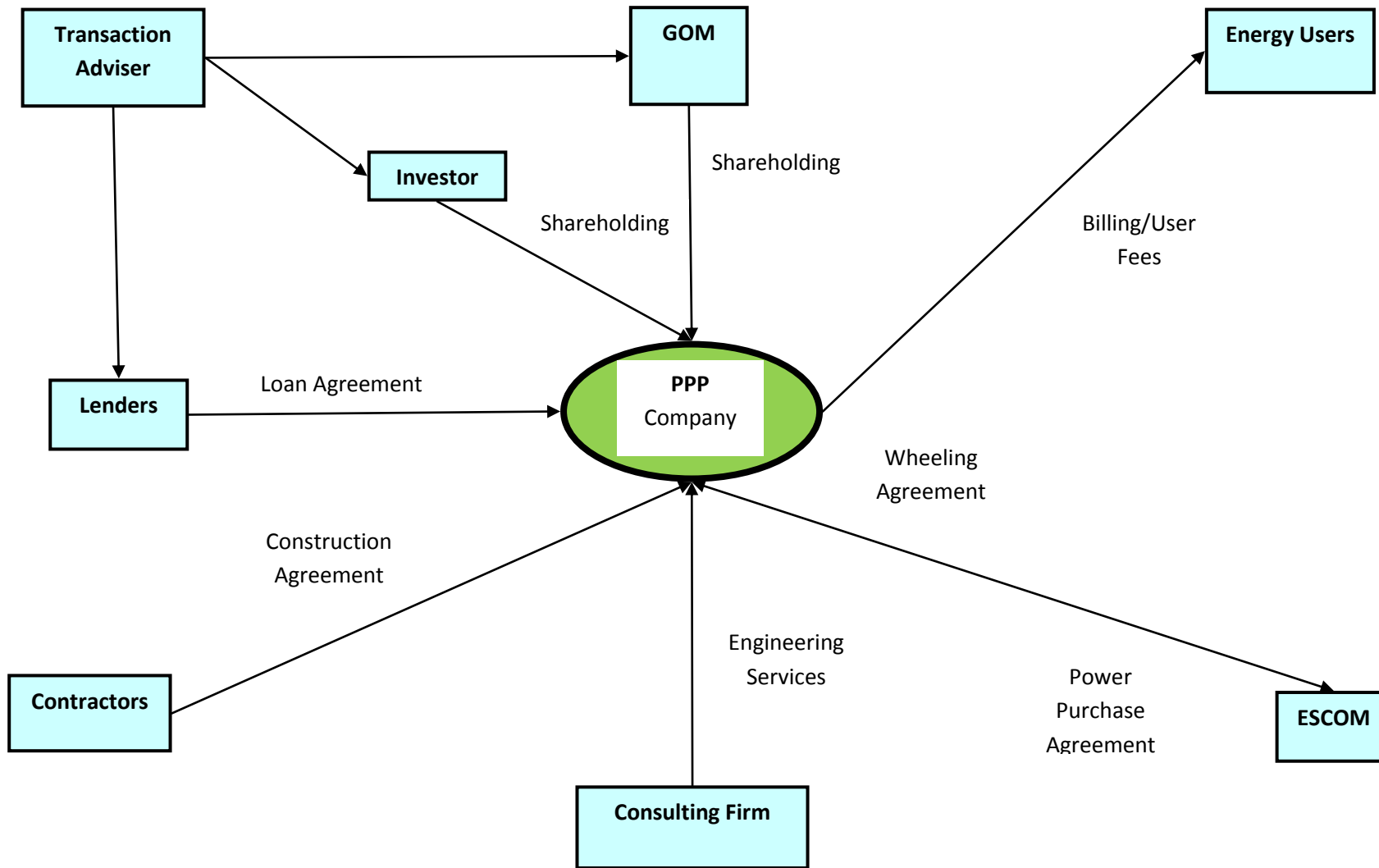


Figure 4: PPP Structure

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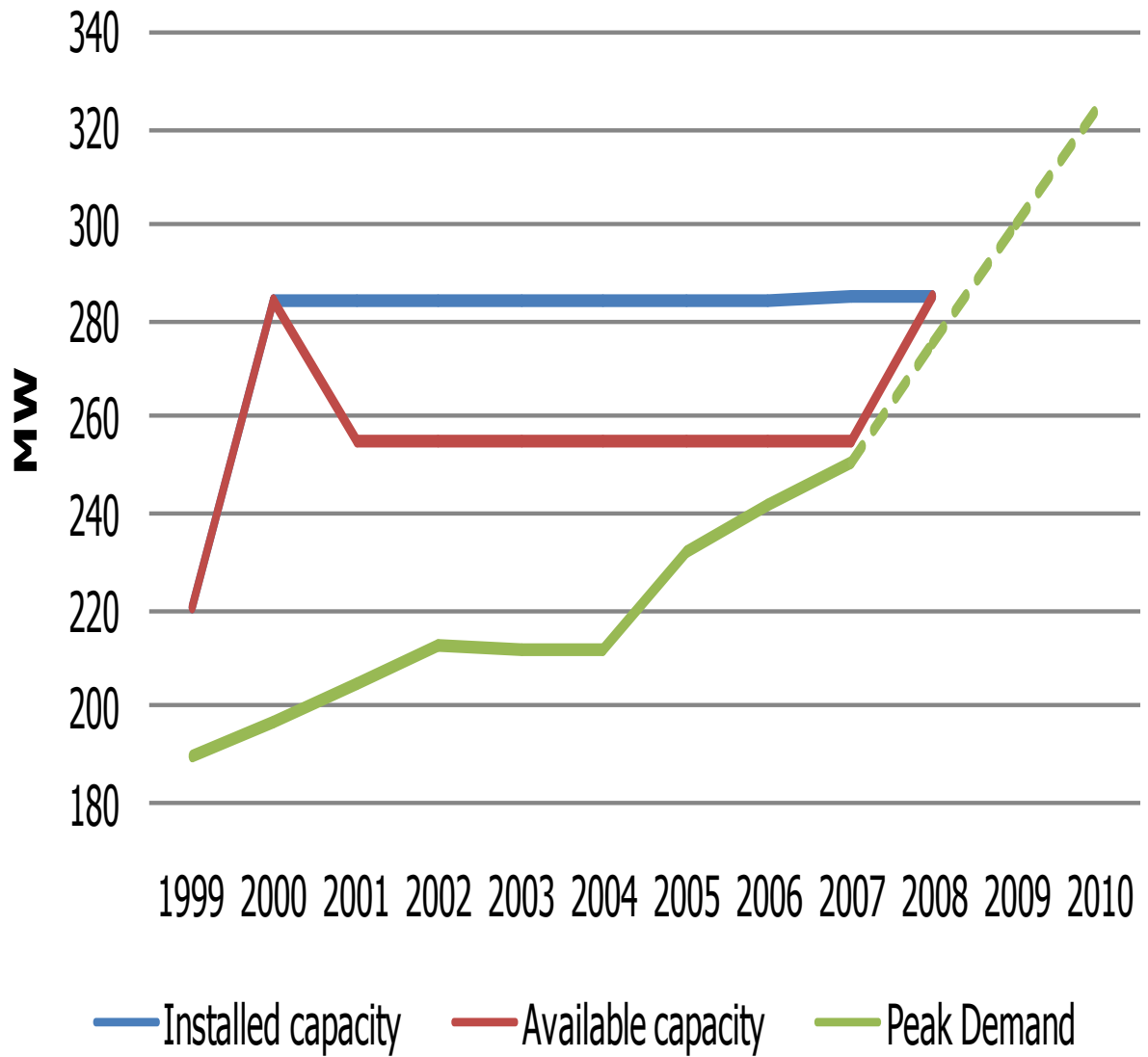
# X.ANNEX

## Annex 1: COST ESTIMATES FOR PROPOSED PROJECT OUTPUTS

### Potential Sites for a PPP Arrangement

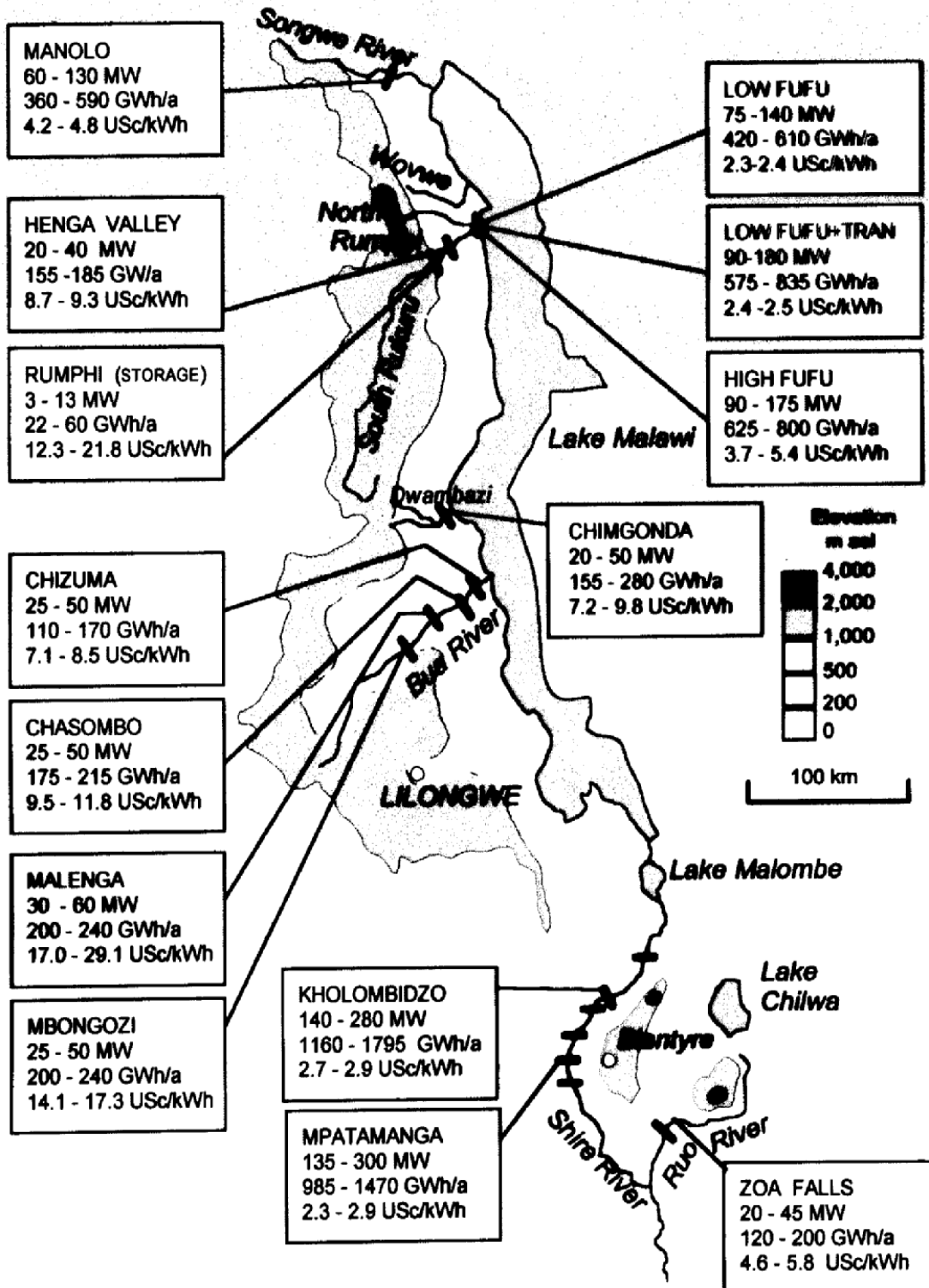
River/Project	Rated Capacity	Basic Cost (US\$'000,000)
<b>Large HPPs</b>		
<b><u>Songwe River</u></b>		
Manolo B	125MW	210
<b><u>Shire River</u></b>		
Kholombidzo	180MW	230
Mpatamanga	300MW	
<b><u>Bua River</u></b>		
Mbongozi	38MW	270
Malenga	62MW	330
Chasombo	54MW	175
Chizuma	50MW	100
<b><u>South Rukuru River</u></b>		
Lower Fufu	100MW	135
High Fufu Falls	174MW	235
Lower Fufu Falls	144MW	110
Henga Valley	28MW	125
Rumphi	10MW	80
<b><u>Dwambazi River</u></b>		
Chimgonda A	50MW	185
Wowwe (currently operating 4.5MW)	15MW	
<b>Small HPPs</b>		
North Rukuru River	5MW	
<b>Other HPPs</b>		
Sere River	TBD	
Manchewe/Kazichi Rivers	TBD	
Lufira River	TBD	
Kalenje River	TBD	
Kaseye River	TBD	
Chitimba River	TBD	
<b>Micro HPPs</b>		
Chingoti River	TBD	
Hewe River	TBD	
Nchenachena River	TBD	
Sasasa River	TBD	
Nswadzi River	TBD	
Lizunkhuni River	TBD	
<b>Biomass</b>		
Dwangwa Sugar Corporation	10MW	
Sugar Corporation of Malawi (Nchalo)	28MW	
Chikangawa Forest		
<b>Renewable Energy (Solar/Wind)</b>		
Likoma Island	TBD	

## Annex 2: ESCOM Projected Power Demand for Malawi



Annex 3: Map Showing Potential HPP Sites in Malawi

## Untapped Hydro Resources of Malawi



## **Annex 4: Expressions of Interest Proposed Format**

### **Letter of Invitation for Expression of Interest**

#### **General**

The Government of Malawi (GoM) has received a grant of approximately US\$10million from the Government of the United States of America, through the Millennium Challenge Corporation (MCC) and intends to use part of the proceeds for the development of a Power Generation Plant (the project) under a Public-Private-Partnership arrangement. The General Terms of the arrangement will be in the form of a Joint Venture and will be guided by the Terms of the grant support.

The project aims at increasing access to electricity to selected rural areas to stimulate economic growth and foster poverty reduction and improvement in the quality of life.

The GoM now invites eligible developers/investors to submit their interest in the Joint Venture. Interested developers/investors should provide information on previous or current ventures undertaken, experience of working in Sub-Saharan Africa, type of technology chosen in previous assignments, size of their firm and the number and type of professionals in the firm.

#### **Selection of Investors**

Short listed investors will be requested to submit proposals. A letter of Invitation shall be sent at an appropriate date, together with the Terms and Conditions for the proposals.

#### **Submission of Interest**

The expression of Interest shall be submitted to the address below at 16H00 local time on.....(day) .....(date) 2010 in a clear marked envelope “**EXPRESSION OF INTEREST FOR A JOINT VENTURE**”

**The Programme Coordinator,  
Millennium Challenge Account-Malawi  
P. O. Box 31513  
Lilongwe  
Malawi.  
Tel: +265 1774 303.**

**E-mail: [sam.kakhobwe@mca-m.gov.mw](mailto:sam.kakhobwe@mca-m.gov.mw)**