ENERGY SCOPING AND PARTNERSHIPS SCOPING REPORT

Prepared for:

USAID UGANDA

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1. Executive Summary

Uganda presents one of the most attractive investment destinations for renewable energy in sub-Saharan Africa. Favored with an abundance of natural resources and a strong energy policy and regulatory framework, the Country has the fundamental characteristics required for a vibrant, private sector led energy generation sub-sector. However, Uganda still faces chronic energy poverty with dismal grid access rates and frequent electricity load shedding exercises.

Uganda's evolution into an energy secure nation will be a long drawn out journey that will employ different resources and strategies over a number of decades. This report seeks to establish the most immediate steps into that journey by identifying projects, opportunities and challenges that USAID can work to promote or overcome as the case maybe.

The practicality of rapidly increasing power generation in economies such as Uganda, which are defined by low per capita electricity consumption and whose power is distributed via old and inefficient grid lines, dictates a short-term reliance (estimated at 5 – 8 years) on small power plants that can generate between 1 – 20 MW. A summary analysis of the different power generation options within this scale is provided as thus:

- **Small Hydro** –With over 2,000 MW potential power generation capacity and a growing pool of local expertise, small hydro is Uganda's most viable electricity generation option as it combines the requisite technical, financial and sustainable indicators for utility scale generation.
- **Biomass** – This energy source represents the second most viable opportunity within the renewable energy options in Uganda as it is readily available and provides electricity that can be generated year round. A key challenge in this sector is the reliable supply of feed stock needed for sustainable operations.
- **Geothermal** – Like wind, there is very little available data on the availability of sites on which geothermal energy can be generated in Uganda. The success of any investments in this sector dictate the need for increased government and or donor support during the very high risk drilling and exploration phase, something which Uganda lacks and which is arguably the reason why it drastically lags behind neighboring economies like Kenya, which are making very successful strides in the commercialization of this resource.
- **Solar PV** – Solar PV has enjoyed a dramatic reduction in total capital costs but remains an expensive electricity generation source as it requires a tariff that is well above what the Government is currently offering. This is demonstrated by the fact that the only two grid connected solar PV projects have been heavily supported by the Get Fit program in the Country which has been discussed in Annex 4 to this report below.
- **Wind** - The Government of Uganda published a brief profile of the opportunities for wind generation in Uganda but stated that the wind speeds in the country were too low for commercial energy development. However, a review of the data availed revealed that the wind measurement approach employed was erroneous as it referenced wind masts that were of lower height than industrial standard measurement heights.

Challenges

1. Renewable energy investments are still new to the region with many project developers lacking the sophistication to navigate through the project development hurdles. To this extent there is a need to build capacity across the early stage technical resources available to project developers, especially in consideration of the importance of a bankable Feasibility Study.
2. The availability of long-term project finance (debt) is a major hindrance for the development of energy transactions in Uganda. Local lenders have not adopted project finance models which prompts them to offer very stringent debt finance terms that are both restrictive and expensive. Furthermore, the lack of access to long-term, hard currency (USD) prohibits lenders from providing finance at tenors required to make an energy transaction viable. In addition to the lack of appropriate capital, there are a number of real and perceived challenges that bar the ability of commercial lenders to rapidly avail finance to energy projects in the Country. As will be discussed later in this report, credit enhancements, including liquidity facilities and partial risk guarantees, have the potential to rapidly and significantly improve debt financier confidence.

Solutions

We believe that the successful development of a portfolio of projects is necessary to stimulate investment into the small-scale renewable energy sector. This will encourage investors to enter into transactions at earlier stages, develop capacity across all stakeholders of the project development process, and educate financiers on the appropriate structures for a project finance transaction. USAID Uganda is in a unique position to work alongside the private sector in making this portfolio a reality. The most critical element of this approach is that it demands efficiency and accountability from developers as well as their advisors and investors. The recommendation is to avail development stage support through the direct financing of third party services so as to reach financial close at a much faster pace than developers would be able to attain independently.

For example, in a small hydro power project, it is common to see developers promoting a transaction that has not had a holistic and credible hydrological assessment carried out. Being the most critical technical element, this will certainly become a major barrier in the project reaching financial close at a later stage. Our recommended intervention would not lead to a provision of funding to the developer, but rather a direct purchase of the hydrological study by USAID Uganda and subsequent delivery of the study to the project developer for inclusion into their relevant project documentation.

This approach leads to direct and immediate support for project developers where they need it most without over subsidizing the project. Furthermore this approach creates a cost effective and relatively simple model which can be applied to numerous small scale projects to overcome their most practical barriers.

Key interventions for USAID Uganda consideration include:

- **Direct funding for Development Phase Activities** – a frontloaded investment approach which provides small amounts of crucial financing for particular components of the development phase, particularly the technical and financial surveys and studies that drive a project's representation to investors as being worthy of implementation financing.
- **Provision of Credit Enhancement Mechanisms** – the availability of Partial Risk Guarantees, Tenor Extensions and Insurance significantly improves the ability of viable small-scale projects to attract debt financing from local and international banks, which are typically risk adverse a situation which becomes particularly heightened with financiers perceived PPA risks.

Project Portfolio:

While dozens of transactions were reviewed and investigated for part of this assignment our technical and financial analysis has included the following as the most likely to reach financial close with immediate support from USAID Uganda:

	Project Name	Project Capacity	Project Location	Projected Timeline to Financial Close	Status	USAID Interventions	Cost (USD)
1.	Nyabuhuka Mujunju	3.2 MW	Kabarole District, Western Uganda	6 months	Feasibility Study	Preliminary design drawings	25,000
2.	Keere SHP	6.3- 11 MW	Kween District, Eastern Uganda	6 months	Pre-Feasibility Study	Hydrological and Topographical studies	25,000
3.	Ngoryomwo SHP	12 MW	Kapchorwa District, Eastern Uganda	8 months	Pre-feasibility Study	Technical Studies	75,000
4.	Mt. Elgon Hydropower Limited Company	7.2 MW	Bulambuli District, Eastern Uganda	12 months	Pre-feasibility Study	Preliminary design drawings & Developer capacity building	25,000
5.	Ngenge SHP	4 MW	Bududa District, Eastern Uganda	12 months	Feasibility Study	Technical Resource evaluation assessments	70,000
6.	Rushaya HPP	3-8 MW	Rukungiri District, Western Uganda	12 months	Pre-feasibility Study	Hydrological, Geotechnical and Topographical Studies	65,000
7.	Lower Nsongya Hydropower Limited	9.4 MW	Kabarole District, Western Uganda	16 months	Pre-feasibility study	Technical Resource evaluation assessments and Grid Connection study	75,000
8.	Rubicon Power	4.5 MW	Western Uganda	16 months	Pre-feasibility Study	Hydrological and Topographical studies	20,000
Total		**49.6 MW**					**$380,000**

A detailed analysis of each of the above listed transactions is provided in Section 5 below which features the ranking rationale applied as well their respective permit/licensing status.

As has been shown in the table above, the current phase of the identified projects is pre-financial negotiations. Until the project advances further in its development phase, specific financiers cannot be identified nor credit enhancement mechanisms be recommended.

The interventions proposed herein are designed as a stop-gap measure to catalyse small-scale renewable investments rather than to create a dependency of project developers on foreign support to subsidize project development costs. As with all other sectors of the economy increased activity in the small scale renewable space will see a reduction in costs for different component costs as well as increased debt and equity finance confidence which will lead to a reduced dependence on donor intervention.

We would like to thank the team in USAID Uganda for all the support provided in the compilation of this report. We are confident that Uganda presents a very attractive energy investment destination and that our proposed solutions are the key to unlocking even more opportunity in the country.

Yours Sincerely,

Kyle R. Denning
Managing Director
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LIST OF ACCRONYMS

DFI	Development Financial Institutions
EIA	Environmental Impact Assessment
EPC	Electricity Procurement & Construction
ERA	Electricity Regulatory Authority
ERT	Energy for Rural Transformation
FiT	Feed-in-Tariff
FtF	Feed the Future
GoU	Government of Uganda
IPP	Independent Power Producer
KIL	Kilembe Investments Limited
Kv	Kilo Volt
Kwh	Kilo Watt Hour
m/s	Meters per second
MEMD	Ministry of Energy and Mineral Development
MW	Mega Watt
NGO	Non-Governmental Organizations
PRLA	Power For Rural Livelihood Activity
PSFU	Public Sector Foundation of Uganda
PV	Photo Voltaic
REA	Rural Electrification Authority
RfP	Request for Proposal
SMEs	Small and Medium-sized Enterprises
SPPA	Standard Power Purchase Agreement
UEB	Uganda Electricity Board
UECCC	Uganda Energy Credit Capitalization Corporation
UEDCL	Uganda Electricity Distribution Company Limited
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited
WENRECO	West Nile Rural Electrification Company

2. Methodology

Viability Africa's core scope for this assignment was to identify and carry out a preliminary analysis of prospective renewable energy projects. To conduct the aforementioned scope of work, Viability Africa employed the following methodology:

- **Desktop Review**

The desktop review was carried out to analyse the statutory and policy regime in Uganda. The subsequent assessment comprehensively mapped out the country's legal and institutional framework, identifying key stakeholders and their respective mandate as well as on-going policy reforms. This analysis also identified the licensing procedure and developmental cycle for project developers in the electricity sub-sector. In addition to the policy scope, this review included an analysis of the Country's electricity implementation, generation and distribution statistics. The collation of this data opened a window into country specific barriers and challenges, which were further investigated in the interview phase of the methodology. Together, these data gathering exercises provide the backdrop against which appropriate solutions were proposed.

- **Interviews and Meetings with Regulators and other Public Sector Authorities**

To augment the data collated in the desk top reviews, Viability Africa met with key public sector authorities regulating the electricity sector. This provided an intimate and first hand elaboration of the Country's energy demand needs as well as the sector specific barriers from the public sector view.

- **Interviews and Meetings with Project Developers**

To initiate the ultimate objective of developing a project deal pipeline, it was imperative to meet with project developers in the country to establish not only the identity and viability of their proposed projects but also to understand the challenges faced in execution of the development phase. A complete list of the relevant persons interviewed has been provided in Annex 1 of this report.

3. Interviews with Energy Sector Stakeholders

In a bid to ensure a collation of accurate, diverse and representative views from the wide spectrum of energy sector stakeholders, Viability Africa sought ought and interviewed the following industry players:

1. Project Developers
2. Regulatory Authorities
3. Technology Suppliers and Consultants
4. Debt Financiers
5. Equity Partners
6. Developmental Finance Institutions/Donors

The views of these different market participants provides a complete overview of the Ugandan energy sector from project conception to post financial close management and operation and are summarized below:

Project Developers
Key Takeaways: • **Limited willingness and resources to engage competent third party experts** • **Lack of experience and understanding of project finance** • **Overvaluation of contribution to project** • **Strong ability to identify project opportunities and manage local community**
For small-scale renewable energy power projects, project developers come in many forms. The nature of a project developer can vary significantly, from a retired engineer of the local utility company to a professional firm building a portfolio of transactions. Despite these differences, there are numerous consistencies that can be found when analysing the challenges, roles and goals of project developers. A project developer is defined as the initial and primary project proponent. Typically, the project developer represents the local component of the project; the resource charged with organizing land, licenses and permits, and generally bringing all pieces of the transaction together to reach financial close and subsequent implementation. For small-scale renewable energy projects in Uganda, the project developer is most often a local sponsor who is intimately familiar with the project area and surrounding community, and therefore has an established understanding of how to navigate the local and national politics (a critical element for bringing a project to fruition). The largest challenge facing the project developer is that they typically lack the resources and experience to successfully develop a project finance transaction. What little resource they do have is too often quickly spent on the non-critical components of the project, leaving the developer with nothing more than an unpolished idea that they are trying to sell to a market seeking advanced transactions. Their lack of experience brings limitations in their capabilities, most often seen by the project developer overvaluing what they are providing to the project and not accepting offers from potential partners for what would be viewed by the market as fair and reasonable terms. The goal of a project developer should be focused on one critical milestone; reaching financial close. This is the point of the transaction where the primary financiers enter into the transaction and oversee the implementation of the project. The project developer is rewarded through what is referred to as the

"developer fee". The developer fee is an amount allocated to the developer based on the valuation of the project. If the developer was able to reach financial close on their own and without an equity sponsor, the developer fee is provided to the project developer alone. However, if the equity sponsor entered the transaction with pre-financial close support and offered resources in the development phase, then the developer fee is shared between the parties. The developer fee can either by "cashed in" at certain milestones (typically at financial close and Commercial Operation Date (COD)), or can be contributed back into the project for what is referred to as "free carry" (the developers ongoing stake in the transaction). The most common treatment of the developer fee is a split of both cash payment and free carry, ensuring that the developer reaps some form of immediate reward for their efforts while simultaneously linking them to the long-term success of the project.

In Uganda, there are few project developers operating on the ground with a sound understanding of project finance and, more explicitly, what a transaction requires in order to successfully secure finance. Discussions with project developers highlighted the above described overvaluation challenge, with developers not having a clear realization of the value they are bringing and furthermore how much they require in support. Project developers interviewed can be termed as "passive" project developers, where they are developing energy projects as a side venture rather than their primary focus. This is a dangerous and risky approach for developers, as without a full commitment they can ultimately spend a significant amount of time with nothing to show for it, as successfully developing a project requires constant pressure and persistence to keep pushing transactions forward. It was also noted from interviews with project developers that there was a reluctance to accept that the project development phase is not something that would happen quickly but rather take years to complete. It was typical of developers to believe that "within a few months" they should "have everything wrapped up" and be ready to begin construction, whereas in the process of development they had yet to even complete a feasibility study or start PPA negotiations.

Regulatory Authorities

Key Takeaways:

- **Proactive approach to the sector**
- **Policies and procedure evolving to meet market requirements**
- **Difficulty in establishing distinctions between speculators and real project developers**
- **Non-compliance of EIAs with international Environmental and Social Standards**

Ugandan Regulatory agencies and other allied institutions have in depth knowledge of both the key market players and project development risks and opportunities. The ERA in particular demonstrated a very pragmatic approach to energy regulation which allows it to modify its core policy and practice to match up with developer needs and the broader macroeconomic Country energy needs.

Rather than adopting a traditional bureaucratic approach that sees developer inputs as a check list of pertinent requirements for licensing and approvals, the Uganda regulatory framework employs a pro-active approach that sees it engage different stakeholders in workshops and training sessions to continuously assess the state of the energy sector in the country and to identify areas in which different state players in the sector can further improve to rapidly augment development efforts from the private sector.

Uganda adopted a policy of privatisation of its energy sector which goes on to this day. This approach has a created a very unique differentiation of the energy framework in Uganda in comparison to its regional counterparts which are still pegged down to more centralised utilities and distribution networks.

In discussions with DFIs/ Donors, it became apparent that compliance with international environmental standards, such as the International Finance Corporation (IFC) Performance Standards is still lacking in the environmental impact assessments (EIA) conducted locally. Whereas the policy framework provides rigorous EIA protocols, it was highlighted that regulatory bodies responsible for environmental licensing would occasionally overlook the more stringent requirements and issue licenses for projects which were

not in full compliance with the aforementioned standards.

The primary concern of regulatory authorities was in being able to determine which developers and subsequently which transactions were most likely to become real implementations. This presents a challenge in that regulatory authorities are unable to appropriately plan for the Country's energy generation and distribution rollout, as they cannot project exactly when and where power generation plants will come online. The ERA and other regulatory authorities have introduced new mechanisms to curtail speculator inputs to overall pipeline development such as the introduction of license/permit fees and stricter evaluation of developer financial and technical capacity.

Despite this challenge, the regulatory authorities in Uganda continue to evolve and are increasingly able to remedy their own weaknesses. A prime example and attestation to this fact is the introduction of permit/ license application fees and stricter evaluation of project developer financial and technical capacity. This growing sophistication negates the need for direct USAID intervention at the regulatory level, laying greater emphasis on project developer support to ensure more and more RE project hit financial close and become operational.

Technology Suppliers and Technical Consultants

Key Takeaways:

- **Comfortable with contractual structure and rule of law**
- **Willingness to participate actively in project development**
- **Limited experience of local contractors**
- **Growing availability and capability of local consultants**

Renewable energy technology suppliers' play in this market is often structured to combine foreign machinery supply with local procurement and construction services. To this extent, our stakeholder interviews approached technology suppliers addressed both supplier categories. These interviews also sought the inputs of local technical consultants to gauge the level of technical expertise in Country.

Foreign machinery suppliers didn't raise any contractual or political risks as a barrier to trading in the country. Contracting is based on standardized templates which are common place internationally and designed specifically to address risks accruable to both the contractors and the project developers. A specific challenge identified was the quality of designs developed by project developers as a backdrop for project construction costs. The typical selection protocol is a competitive bidding process which sees multiple suppliers bidding to supply machinery against the project costs determined by the project developer designs. In many cases this occasions a significant overvaluation or undervaluation of true project costs which often leads to post contractual cost revisions or revisions to the initial designs. This again is a developer side challenge but the specific impacts of this are directly transferred to machinery suppliers.

Local contractors and procurement companies are engaged in the construction phase for civil works and infrastructural necessities such as road and grid line development. Contractors often work based on designs from developers/ machinery suppliers which are plug and play at that point, which negates the possibility of challenges at this phase. More importantly, from discussion with suppliers and contractors, the increase in renewable energy investments has stimulated a major expansion in technology transfer with more local engineering talent being applied to energy specific projects as a diversification from traditional civil engineering works.

As a marked advantage of the available local talent for the technical consulting and resource evaluation in Uganda by comparison to other regional economies, we found a number of consultants who were not only able to carry out technically sound feasibility studies but also consultants who were able to work within very aggressive timelines and at competitive costs to complete assignments. All consultants interviewed observed that a major challenge in their new and growing industry is that developers are more often than not very eager to sign up Consultants but very reluctant to meet their

financial obligations. In turn, Consultants have often had to withhold studies from developers until full completion of payment which further delays project development timelines. This data provided a very unique interplay between project developer needs in comparison to Consultant expectations where developers downplay the value and quality of works provided by local consultants creating the impression that available technical capacity is inadequate for the country needs. Whereas Uganda can greatly benefit from addition technical capacity, the small pool of experienced local players will go well and above what is needed to meet the demands of the most viable investment opportunities.

Debt Financiers

Key Takeaways:

- **Minimal access to long-term hard currency financing**
- **Lack of understanding of project financing and structures**
- **Inability to appropriately assess risk**
- **Require support of credit enhancement mechanisms**

There are very few project finance lenders in Uganda as compared to neighbouring, more advanced project finance markets such as Kenya and Tanzania. However, without a doubt there are more financing options than there is a demand for project finance (based on the number of transactions that would be justified in requesting project finance), and therefore the lack of options should not be seen as a major impediment to projects reaching financial close but rather something that should be viewed as a future risk if project developers are able to develop bankable transactions at scale.

For those lenders that do exist in the market and have an interest in project finance, two primary barriers exist. The first is the lack of understanding of structuring a project finance transaction. Project finance is significantly different than traditional bank finance, which seeks certain degrees of collateral and a history of cash flows to justify the provision of capital. In project finance, the collateral is comparatively weak or not as tangible (the PPA, for example, is one of the most valuable forms of collateral in an energy project finance transaction). Lending is made based on the projection of cash flows, not the history, and therefore the project documents that govern cash flows becomes the primary component of importance for a lender when making a decision to lend into a project finance structure. Also it is important to note that because of the special purpose vehicle structure associated with project finance transactions, it is rare to see any form of corporate or personal guarantees behind the financing behind provided.

The second challenge facing lenders is the ability to lend long-term and in a hard currency, such as the United States Dollar which is the currency of reference in Uganda's Power Purchase Agreement. Local commercial banks in particular have limited access to the hard currency, and therefore have constraints related to both the tenor and size of the debt. Interviews with local commercial banks highlighted a need for a facility supported by the international community that would provide either access to liquidity or guarantees behind the financing that would be utilized for project finance transactions of the local banks. This would lead to an expanded appetite for transactions in addition to providing a general capability that currently does not exist at a large-scale.

As a final note from discussions with lenders, it was not clear whether or not they had an interest in growing capabilities in house to specifically manage project finance transactions. One of the lenders, Stanbic Bank, has a strong project finance team in Kenya that is able to push transactions, but they are alone in having a locally based support team. Other financiers either outsource it to their non-Africa based headquarters, or simply rely on those with the experience to lead the transaction and follow in the form of syndication or purchasing the financing outright after the transaction has closed.

Equity Investors

Key Takeaways:

- **Numerous players and plentiful capital available**
- **Potential willingness to participate and invest during development phase**
- **Need to witness successful implementation from developers**
- **Challenges in negotiating partnership structures with developers**

While there are numerous equity investors pursuing transactions in the Uganda renewable energy space, very few are likely to ultimately participate in projects. This is caused by strict parameters within which projects must lay in order to be considered viable investments. While the most common parameters viewed are investment size and return threshold, the most prevalent barrier for an equity investor is to identify transactions advanced enough and that do not require significant support in the development phase (effectively, transactions that are already deemed "bankable").

Two equity funds, Frontier and responsAbility (rA), are representing a more innovative form of equity investment fund where the capabilities of the fund advisor allow for an earlier stage entry. This provides much needed capital to complete the development phase, as well as a confirmed equity investor for when the project is ready to realize financial close. Furthermore it ensures that the development phase is managed by a sophisticated and professional team. One major challenge experienced by both of these funds is that developers, even at an early stage, expect significant compensation or free carry positions in exchange for allowing the fund to enter into the transaction. This decreases the potential return to the fund even though they are taking on significantly more risk by entering at an early stage.

For small-scale renewable energy projects, the range of investors is much broader than that for large-scale, project finance transactions. At the smaller range, equity sponsors are not only dedicated energy investors but also come in the form of high net worth individuals (domestic and foreign), impact investors, or corporations looking to diversify their asset holding. This promotes more innovative (yet often complex) investment structures to meet the needs and requirements of the various stakeholders, a benefit to small-scale renewable energy projects as they are able to have more creative options in obtaining investment.

Developmental Finance Institutions/ Donors

Key Takeaways:

- **DFI support from the Get Fit program has catalysed RE investments**
- **Focus on off-grid and point of use energy systems rather than grid connected projects**
- **Get Fit focussed on tariff and financial incentives disregarding development phase requirements**
- **Need for practical solution for direct developer support**

Uganda has benefitted greatly from the direct participation of DFIs in the energy sector. The most vivid illustration of this is the Get Fit program, which has been analysed in greater detail in Annex 4 below. The program, which is supported by the German development bank KfW, essentially injects cash into the project at the end of construction and then roles out an ongoing payment for 5 years, which is paid out in tandem with utility payments pegged to the PPA. At the end of 2014, the program had supported 17 projects including two 10 MW solar transactions, 1 biomass based power project (utilizing maize as a feedstock) and two bagasse tractions with the rest of the portfolio dominate by small hydro power projects. The Global Village energy Partnership (GVEP), a charitable organization dedicated to reducing energy poverty, has set up shop in Uganda with the sole objective of increasing energy access in the Country by 2030. The programs energy commitments run across different energy application from micro grids, utility scale electricity and point of use domestic products like Solar PV.

DFI financing models outside of GetFiT are typically structured as reimbursements on project construction costs. The model works but the overall time horizon for in the pre-construction phase can be long drawn when compared to models that front load capital to projects. DFIs are risk adverse which rationalises the reimbursement model by mitigating the potential risk of errant project developers from illegal appropriations of grant financing.

4. Outline of Identified Project Opportunities/Pipeline

The selection criteria of viable transactions to include in the project pipeline was developed as a function of both individual project developer assessment as well as the project specific needs of each identified venture. The transactions outlined were discovered from interactions with project developers, financiers and regulators in Uganda during the course of this assignment.

The list has been presented in a tabular format with projects ranked in order of their proximity to Financial Close. As all these projects are small hydro based, they will all share similarities in their sustainable development key indicators which negates the need to use sustainable development as a comparative metric for this analysis. This presentation will not only demonstrate the financial and technical project specific metric per project but also identify some of the immediate interventions required to allow developers to overcome individual project development challenges. The computation of costs applied to total proposed USAID interventions are strictly based on project specific needs needed to meet the partial costs of developing complete feasibility studies. In so doing, the approach formulated avoids any direct cash payments to developers or the inclusion of incentives such as developer fees or other pecuniary benefits to project developers.

Each project has been graded based on the following scorecard:

Technical Capacity – A weight of 50% has been attributed to this metric. The evaluation of projects under this metric includes a review of the completeness of technical studies and preliminary analysis of available site specific data (including pre-feasibility studies)

Financial Capacity - A weight of 20% has been attributed to this metric. The evaluation of projects under this metric is a function of project developer capacity to meet initial development phase costs, ease of project structuring and additional tariff increments if any from programs such as the Get Fit program.

Social and environmental Impacts - A weight of 15% has been attributed to this metric. This metric will be evaluated based on the project's approval or proximity to approval of an EIA license. As all the projects in the portfolio are small hydro power projects, there are minimal adverse socio-environmental impacts.

Development Phase requirements - A weight of 15% has been attributed to this metric. Projects which require less support to reach financial close have a higher scoring for this particular metric. Projects may have varied levels of inputs required from USAID interventions as the interventions have been designed to include a balanced approach seeking support from USAID matched with subsequent investment from equity partners/ project developers.

Pipeline Scoring	**1**			
Project Name	**Nyabuhuka Mujunju SHP**			
Project Pipeline Score Card	**Evaluation Criteria**			
	Technical capacity (50%)	Financial capacity (20%)	Social and environmental Impacts (15%)	Development Phase requirements (15%)
	Project Specific Scoring			
	40	17	12	12
	A complete feasibility study has been completed but still requires additional technical designs and drawings to facilitate Contract selection.	With the additional incentive from Get Fit Financing this project will enjoy higher economic returns than other transactions.	A complete EIA study has been completed and submitted to NEMA for approval. As a Run of River hydro projects there are minimal socio-environmental impacts.	With the majority of the technical studies complete, this project requires very little development stage support and is at the right stage to start evaluating different financing interventions such as Risk Guarantees.
Project Capacity	3.2 MW			
Project Location	Kabarole District, Western Uganda			
Total Project Cost	$ 7,900,000			
Technology Type	Run of River Small Hydro			
Project Development Status	Feasibility Study Complete			
Technical and Financial viability	The project's technical viability has been confirmed by a detailed review of the feasibility study report. The project applied for and was qualified for the Get Fit program which ensures an above par tariff rate and guarantees strong economic returns for both the project developer and equity investors.			
Licensing/ Permit Status	• ERA development permit acquired • Environmental Impact Assessment completed and submitted to NEMA awaiting approval • On-going PPA negotiations pending conclusion of Get Fit funding • Procurement of water abstraction permit ongoing			
Identified/Potential sources of finance	The Project developer has not secured any third party financing outside of a Get Fit increment on its Feed in Tariff payment: • Berkley energy considering Equity Financing • Debt term sheets requested from prospective lenders • Additional Equity Financing from project developers • Get Fit increment on base tariff rate increment on base tariff rate •			
Required Action items preventing project from reaching Financial Close	• Design drawings and BOQ preparation • SPV registration • PPA execution • EPC Negotiations • Equity Sponsor negotiations • Debt Financial Term sheets			

Forecast timeline to Financial Close	6 months		
Proposed USAID interventions	**Proposed Interventions**		**Estimated Costs**
	Design drawings and Bills of Quantity (BoQ) preparation		$ 25,000
Potential Risks accruable to USAID Intervention	Project Developer Risk	**Risk Profile** Low	The project developer is reputable business man who has demonstrable success in the management of several business ventures in Uganda.
	Project Development Risk	**Risk Profile** Low	The project has completed its feasibility study, has on-going PPA negotiations and will seek to select project contractors after the completion of design drawings.
	USAID Reputational Risks	**Risk Profile** Low	The project will not displace local communities. All funding for the project will be utilized by third party experts and will be paid out on milestone deliverables. The project developer is of good standing in the community and is not associated with any illegal activities.
	Environmental Risks	**Risk Profile** Low	The project has completed an environmental impact assessment which proved minimal adverse environmental impacts.

Pipeline Scoring	**2**			
Project Name	**Keere SHP**			
Project Pipeline Score Card	**Evaluation Criteria**			
	Technical capacity (50%)	Financial capacity (20%)	Social and environmental Impacts (15%)	Development Phase requirements (15%)
	Project Specific Scoring			
	25	10	10	10
	The immediate project analysis from the pre-feasibility study demonstrates key project strengths but the project requires a detailed feasibility study complete with project specific data resource evaluations.	Preliminary financial models yield a project IRR of 18% with an equity IRR of 25%. These are strong indicators but the true financial viability of the project will only become materially significant after feasibility study completion which will allow developers to accurately forecast total development costs.	As a run of river small hydro project, there are minimal adverse environmental impacts forecast for this activity. That said, the project developer has not yet executed a complete EIA.	The project will require series of technical studies as outlined below to complete its feasibility study. Its immediate project development needs lower its overall investment readiness in the project portfolio.
Project Capacity	6.3 MW			
Project Location	Kween District, Eastern Uganda			
Total Project Cost	$ 14,000,000			
Technology Type	Run of River Small Hydro			
Project Development Status	Pre-Feasibility Study Complete			
Technical and Financial viability	The project developers of this transaction have completed a pre-feasibility study. This study confirms some of the preliminary assumptions in the project financial model, which demonstrates strong economic returns. The methodology employed for the completion of the pre-feasibility study is in line with industry standard and lays a solid foundation for a detailed feasibility study.			
Licensing/ Permit Status	• ERA development permit acquired			
Identified/ Potential sources of finance	• The project will be financed by a combination of debt and equity under a non-recourse finance structure. In addition to its pre-construction investments, the project developer will also make cash contribution to meet the cost of construction as part of the overall project equity.			
Required Action items preventing project from reaching Financial	• SPV registration • Topographical Survey • Hydrological analysis • Geotechnical and Geological Investigations			

Close	• Grid connection study • Environmental Impact Assessment • Preliminary Design Drawings		
Forecast timeline to Financial Close	6 months		
Proposed USAID interventions	**Proposed Interventions**		**Estimated Costs**
	Topographical Survey		$ 15,000
	Hydrological analysis		$ 10,000
Potential Risks accruable to USAID Intervention	Project Developer Risk	**Risk Profile** Low	The project developer is constituted of a partnership of reputable business persons in Uganda and Kenya who have demonstrable success in the management of several business ventures regionally.
	Project Development Risk	**Risk Profile** Low	The combined managerial and technical sophistication of the project developers negates any possibility of this project not maturing into construction and eventual operation.
	USAID Reputational Risks	**Risk Profile** Low	The project will not displace local communities. All funding for the project will be utilized by third party experts and will be paid out on milestone deliverables. The project developer is of good standing in the community and is not associated with any illegal activities.
	Environmental Risks	**Risk Profile** Low	As a run-of-river hydro scheme, the environmental risk attributes of the proposed project are negligible.

Pipeline Scoring	**3**			
Project Name	**Ngoryomwo SHP**			
Project Pipeline Score Card	**Evaluation Criteria**			
	Technical capacity (50%)	Financial capacity (20%)	Social and environmental Impacts (15%)	Development Phase requirements (15%)
	Project Specific Scoring			
	25	10	10	10
	The immediate project analysis from the pre-feasibility study demonstrates key project strengths but a detailed feasibility study complete with project specific data resource evaluations.	The project's generation capacity occasions economies of scale that lower the project construction costs on a per MW scale.	As a run of river small hydro project, there are minimal adverse environmental impacts forecast for this activity. That said, the project developer has not yet executed a complete EIA.	The project will require series of technical studies as outlined below to complete its feasibility study. Its immediate project development needs lower its overall investment readiness in the project portfolio.
Project Capacity	12 MW			
Project Location	Kapchorwa District, Eastern Uganda			
Total Project Cost	$ 24,000,000			
Technology Type	Run of River Small Hydro			
Project Development Status	Pre-Feasibility Study Complete			
Technical and Financial viability	The project developers on this transaction display a greater detail of sophistication and comprehension of the technical and financial metrics of hydro power development. A preliminary financial model has been developed in tandem with the pre-feasibility study with a carefully detailed implementation plan.			
Licensing/ Permit Status	• ERA development permit acquired •			
Identified/ Potential sources of finance	• The Project developer has not secured any third party financing. The developer however has committed to meet 6.3% of total project costs as developer equity contribution.			
Required Action items preventing project from reaching Financial Close	• SPV registration • Topographical Survey • Hydrological analysis • Geotechnical and Geological Investigations • Grid connection study • Environmental Impact Assessment • Preliminary Design Drawings			
Forecast timeline to Financial Close	8 months			
Proposed USAID interventions	**Proposed Interventions**		**Estimated Costs**	
	Topographical Survey		$ 20,000	
	Hydrological Survey		$ 15,000	

	Geotechnical and Geological investigations		$ 20,000
	Grid Connection Study		$ 20,000
Potential Risks accruable to USAID Intervention	Project Developer Risk	**Risk Profile** Low	The project developer is constituted of a partnership of reputable business persons in Uganda and Kenya who have demonstrable success in the management of several business ventures regionally.
	Project Development Risk	**Risk Profile** Low	The combined managerial and technical sophistication of the project developers negates any possibility of this project not maturing into construction and eventual operation.
	USAID Reputational Risks	**Risk Profile** Low	The project will not displace local communities. All funding for the project will be utilized by third party experts and will be paid out on milestone deliverables. The project developer is of good standing in the community and is not associated with any illegal activities.
	Environmental Risks	**Risk Profile** Low	As a run-of-river hydro scheme, the environmental risk attributes of the proposed project are negligible.

Pipeline Scoring	**4**			
Project Name	**Mt. Elgon Hydro Power Project**			
Project Pipeline Score Card	**Evaluation Criteria**			
	Technical capacity (50%)	Financial capacity (20%)	Social and environmental Impacts (15%)	Development Phase requirements (15%)
	Project Specific Scoring			
	23	10	10	10
	The immediate project analysis from the pre-feasibility study demonstrates key project strengths but a detailed feasibility study complete with project specific data resource evaluations.	The project's generation capacity occasions economies of scale that lower the project construction costs on a per MW scale.	As a run of river small hydro project, there are minimal adverse environmental impacts forecast for this activity. That said, the project developer has not yet executed a complete EIA.	The project will require series of technical studies as outlined below to complete its feasibility study. Its immediate project development needs lower its overall investment readiness in the project portfolio.
Project Capacity	7.2 MW			
Project Location	Balambuli District, Eastern Uganda			
Total Project Cost	$ 13.5 Million			
Technology Type	Run off river Small hydro			
Project Development Status	Pre-Feasibility Study			
Technical and Financial viability	The project displays strong preliminary scoring on project specific technical and financial parameters.			
Licensing/ Permit Status	• ERA development permit acquired			
Identified/ Potential sources of finance	• The project activity will be financed via a combination of debt and equity			
Required Action items preventing project from reaching Financial Close	• SPV registration • Topographical Survey • Hydrological analysis • Geotechnical and Geological Investigations • Grid connection study • Environmental Impact Assessment • Preliminary Design Drawings			
Forecast timeline to Financial Close	12 Months			
Proposed USAID interventions	**Proposed Interventions**		**Estimated Costs**	
	Preliminary Design Drawings		$ 25,000	

Potential Risks accruable to USAID Intervention	Project Developer Risk	**Risk Profile** Low	The project developer is a reputable business persons in Uganda and Kenya who has demonstrable success in the management of several business ventures regionally.
	Project Development Risk	**Risk Profile** Low	The combined managerial and technical sophistication of the project developers negates any possibility of this project not maturing into construction and eventual operation. Having developed a small hydro power project in Kenya, there is a very strong likelihood of replicable success for this venture as well.
	USAID Reputational Risks	**Risk Profile** Low	The project will not displace local communities. All funding for the project will be utilized by third party experts and will be paid out on milestone deliverables. The project developer is of good standing in the community and is not associated with any illegal activities.
	Environmental Risks	**Risk Profile** Low	As a run-of-river hydro scheme, the environmental risk attributes of the proposed project are negligible.

Pipeline Scoring	**5**			
Project Name	**Ngenge Hydro Power Project**			
Project Pipeline Score Card	**Evaluation Criteria**			
	Technical capacity (50%)	Financial capacity (20%)	Social and environmental Impacts (15%)	Development Phase requirements (15%)
	Project Specific Scoring			
	23	10	10	10
	The immediate project analysis from the pre-feasibility study demonstrates key project strengths but a detailed feasibility study complete with project specific data resource evaluations.	The project's generation capacity occasions economies of scale that lower the project construction costs on a per MW scale.	As a run of river small hydro project, there are minimal adverse environmental impacts forecast for this activity. That said, the project developer has not yet executed a complete EIA.	The project will require series of technical studies as outlined below to complete its feasibility study. Its immediate project development needs lower its overall investment readiness in the project portfolio.
Project Capacity	4 MW			
Project Location	Mt. Elgon region , Eastern Uganda			
Total Project Cost	$ 6.5 Million			
Technology Type	Run of River Small Hydro			
Project Development Status	Pre-Feasibility Study Complete			
Technical and Financial viability	The project displays strong preliminary scoring on project specific technical and financial parameters.			
Licensing/ Permit Status	ERA development permit on-going			
Identified/ Potential sources of finance	The project activity will be financed via a combination of debt and equity			
Required Action items preventing project from reaching Financial Close	• SPV registration • Topographical Survey • Hydrological analysis • Geotechnical and Geological Investigations • Grid connection study • Environmental Impact Assessment • Preliminary Design Drawings			
Forecast timeline to Financial Close	12 Months			
Proposed USAID interventions	**Proposed Interventions**		**Estimated Costs**	
	Topographical Survey		$ 10,000	
	Hydrological Survey		$ 10,000	
	Geotechnical and Geological investigations		$ 15,000	

	Grid Connection Study		$ 10,000
	Preliminary design drawings		$ 25,000
Potential Risks accruable to USAID Intervention	Project Developer Risk	**Risk Profile** Low	The project developer is a reputable business persons in Uganda and Kenya who has demonstrable success in the management of several business ventures regionally.
	Project Development Risk	**Risk Profile** Low	The combined managerial and technical sophistication of the project developers negates any possibility of this project not maturing into construction and eventual operation. Having developed a small hydro power project in Kenya, there is a very strong likelihood of replicable success for this venture as well.
	USAID Reputational Risks	**Risk Profile** Low	The project will not displace local communities. All funding for the project will be utilized by third party experts and will be paid out on milestone deliverables. The project developer is of good standing in the community and is not associated with any illegal activities.
	Environmental Risks	**Risk Profile** Low	As a run-of-river hydro scheme, the environmental risk attributes of the proposed project are negligible.

Pipeline Scoring	**6**			
Project Name	**Rushaya SHP**			
Project Pipeline Score Card	**Evaluation Criteria**			
	Technical capacity (50%)	Financial capacity (20%)	Social and environmental Impacts (15%)	Development Phase requirements (15%)
	Project Specific Scoring			
	17	15	10	10
	The project developer is still completing a prefeasibility analysis of the site but has a developed a prospectus developed with hydrologists who have determined very initial but strong project strengths.	A key feature of this project is that the developer will lease the energy generation assets to interested investors for a 20 year period during which compensation shall be tabulated by a complete displacement of the energy costs of the project owner's limestone factory.	As a run of river small hydro project, there are minimal adverse environmental impacts forecast for this activity. That said, the project developer has not yet executed a complete EIA.	The project will require series of technical studies as outlined below to complete its feasibility study. Its immediate project development needs lower its overall investment readiness in the project portfolio.
Project Capacity	3 MW			
Project Location	Rukungiri District, Western Uganda			
Total Project Cost	$ 6.5 Million			
Technology Type	Run of River Small Hydro			
Project Development Status	Pre-Feasibility Study on-going			
Technical and Financial viability	The proposed structure which offers a lease hold concession to investors offers a strategic advantage to interested equity investors whom are occasionally wary of working with project developers whose reluctance to cede controlling shareholding often renders workable financing structures difficult to operate.			
Licensing/ Permit Status	Process to be initiated post contractually after investors have been awarded concession to develop the proposed site.			
Identified/ Potential sources of finance	TBD post contractually			
Required Action items preventing project from reaching Financial Close	• SPV registration • Topographical Survey • Hydrological analysis • Geotechnical and Geological Investigations • Grid connection study • Environmental Impact Assessment • Preliminary Design Drawings			
Forecast timeline to Financial Close	12 Months			

Proposed USAID interventions	**Proposed Interventions**		**Estimated Costs**
	Topographical Survey		$ 10,000
	Hydrological Survey		$ 10,000
	Geotechnical and Geological investigations		$ 15,000
	Grid Connection Study		$ 10,000
	Preliminary design drawings		$ 20,000
Potential Risks accruable to USAID Intervention	Project Developer Risk	**Risk Profile** Low	The project owner/ land concessionaire is a reputable business person in Uganda who has demonstrable success in the management of a successful limestone manufacturing plant.
	Project Development Risk	**Risk Profile** Low	The management of the company will be operated under a 20 year lease agreement which is contractually bound to ensure a steady stream of resources from electricity generation negating any potential risk of project collapse.
	USAID Reputational Risks	**Risk Profile** Low	The project will not displace local communities. All funding for the project will be utilized by third party experts and will be paid out on milestone deliverables. The project developer is of good standing in the community and is not associated with any illegal activities.
	Environmental Risks	**Risk Profile** Low	As a run-of-river hydro scheme, the environmental risk attributes of the proposed project are negligible.

Pipeline Scoring	**7**			
Project Name	**Lower Nsongya SHP**			
Project Pipeline Score Card	**Evaluation Criteria**			
	Technical capacity (50%)	Financial capacity (20%)	Social and environmental Impacts (15%)	Development Phase requirements (15%)
	Project Specific Scoring			
	20	10	7	10
	The project developer has completed a pre-feasibility study which has been reviewed and demonstrates key financial and economic strengths.	Despite potentially strong economic returns, the project sponsor has yet to secure control of the land which in effect negates the possibility of immediate investment.	As a run of river small hydro project, there are minimal adverse environmental impacts forecast for this activity. That said, the project developer has not yet executed a complete EIA.	The project will require series of technical studies as outlined below to complete its feasibility study. Its immediate project development needs lower its overall investment readiness in the project portfolio.
Project Capacity	9.4 MW			
Project Location	Kabarole District, Western Uganda			
Total Project Cost	$ 19.5 Million			
Technology Type	Run of River Small Hydro			
Project Development Status	Pre-Feasibility Study on-going			
Technical and Financial viability	The project displays strong preliminary scoring on project specific technical and financial parameters but still requires initial project structuring before any real investments can be channeled to it.			
Licensing/ Permit Status	ERA permit to be acquired after initial project structuring is complete.			
Identified/ Potential sources of finance	The project activity will be financed via a combination of debt and equity			
Required Action items preventing project from reaching Financial Close	• SPV registration • Topographical Survey • Hydrological analysis • Geotechnical and Geological Investigations • Grid connection study • Environmental Impact Assessment • Preliminary Design Drawings			
Forecast timeline to Financial Close	16 Months			
Proposed USAID interventions	**Proposed Interventions**		**Estimated Costs**	
	Topographical Survey		$ 20,000	
	Hydrological Survey		$ 15,000	
	Geotechnical and Geological investigations		$ 20,000	

	Grid Connection Study		$ 20,000
Potential Risks accruable to USAID Intervention	Project Developer Risk	**Risk Profile** Low	The project developer is reputable business man who has demonstrable success in the management of several business ventures in Uganda.
	Project Development Risk	**Risk Profile** Low	The combined managerial and technical sophistication of the project developers negates any possibility of this project not maturing into construction and eventual operation.
	USAID Reputational Risks	**Risk Profile** Low	The project will not displace local communities. All funding for the project will be utilized by third party experts and will be paid out on milestone deliverables. The project developer is of good standing in the community and is not associated with any illegal activities.
	Environmental Risks	**Risk Profile** Low	As a run-of-river hydro scheme, the environmental risk attributes of the proposed project are negligible.

Pipeline Scoring	**8**			
Project Name	**Rubicon Power**			
Project Pipeline Score Card	**Evaluation Criteria**			
	Technical capacity (50%)	Financial capacity (20%)	Social and environmental Impacts (15%)	Development Phase requirements (15%)
	Project Specific Scoring			
	15	10	7	10
	The project developer has identified a site and provided very preliminary technical data, which, while strong is far too early to develop detailed analysis or comparative metrics against.	Solely projected against the Feed In Tariff and potential energy generation, the economic returns of these project are viable. However without a detailed analysis of site specific civil works, capital costs are still uncertain.	As a run of river small hydro project, there are minimal adverse environmental impacts forecast for this activity. That said, the project developer has not yet executed a complete EIA.	The project will require series of technical studies as outlined below to complete its feasibility study. Its immediate project development needs lower its overall investment readiness in the project portfolio.
Project Capacity	4.5 MW			
Project Location	Western Uganda			
Total Project Cost	$ 9 Million			
Technology Type	Run of River Small Hydro			
Project Development Status	Pre-Feasibility Study to be initiated post project structuring			
Technical and Financial viability	The project displays strong preliminary scoring on generalized project technical and financial parameters but still requires initial project structuring and project specific resource evaluations.			
Licensing/ Permit Status	ERA permit to be acquired after initial project studies, structuring and pre-feasibility study are completed.			
Identified/ Potential sources of finance	The project activity will be financed via a combination of debt and equity			
Required Action items preventing project from reaching Financial Close	• SPV registration • Topographical Survey • Hydrological analysis • Geotechnical and Geological Investigations • Grid connection study • Environmental Impact Assessment • Preliminary Design Drawings			
Forecast timeline to Financial Close	16 Months			
Proposed USAID interventions	**Proposed Interventions**		**Estimated Costs**	
	Topographical Survey		$ 10,000	

	Hydrological Survey		$ 10,000
Potential Risks accruable to USAID Intervention	Project Developer Risk	**Risk Profile** Low	The project developer is reputable business man who has demonstrable success in the management of several business ventures in Uganda.
	Project Development Risk	**Risk Profile** Low	The combined managerial and technical sophistication of the project developers negates any possibility of this project not maturing into construction and eventual operation.
	USAID Reputational Risks	**Risk Profile** Low	The project will not displace local communities. All funding for the project will be utilized by third party experts and will be paid out on milestone deliverables. The project developer is of good standing in the community and is not associated with any illegal activities.
	Environmental Risks	**Risk Profile** Low	As a run-of-river hydro scheme, the environmental risk attributes of the proposed project are negligible.

5. Renewable Energy Opportunities in Uganda

In assessing which renewable energy sources available in Uganda are most ready for investment Viability Africa sought to perform an analysis based on the following variables:

- Proven/forecast energy potential by source
- Availability of existing data and resource assessments
- Availability of technical capacity by source
- Comparative levelised cost of electricity
- Real/perceived risk profile

The resulting analysis defined the most tangible investment opportunities in the following order:

1. Small Hydro
2. Biomass (including peat, agro–processing waste and bagasse)
3. Geothermal
4. Solar PV
5. Wind

1. Small Hydro Power	
Proven/ Forecast Potential	600 – 2000 MW
Availability of Existing Data	A total of 21 of the 31 ERA licensed electricity generation projects are small hydro power projects. Existing policy and research papers published by the Ministry of Energy and Mineral Development demonstrate strong generation potential from this energy source.
Availability of Technical Capacity	Interviews with technical consultants and project developers demonstrated that there exists a growing body of qualified service providers but remain out of reach to project developers due to financial constraints.
Comparative Levelised Cost of Electricity	This measures the total cost of electricity generation using metrics such as project development costs, total revenue generation over a twenty year horizon, and sustainability indicators such as CO_2 emissions and other associated environmental impacts. The output of this analysis of is the cost required to be paid out by utilities to sustain the operation and profitability of a power plant. Small hydro power projects are valued at between USD 0.08 to 0.23. Small hydro power projects in Uganda which have qualified for Get Fit financing, have enjoyed a tariff increment which averages out at $0.014 per kWh in addition to the base tariff rate which ranges between $0.085 and $0.115.
Real/Perceived Risk Profile	The variables which dictate small hydro project risks are often tied to ability to connect to the national grid as well certainties of the resource evaluation. Small hydro power has a very low risk profile because of the numerous studies that are tied to resource evaluation which have been explained in Annex 8 below. Electricity generated from this power source can be generated 24 hours a day and almost year round which

	negates any technical risks associated with grid connection.
Conclusion	Small hydropower is, by all metrics, Uganda's most formidable solution for a low cost renewable energy source to alleviate existing demand pressure as well as to meet the needs of future energy demands.

2. Biomass Power	
Proven/ Forecast Potential	2450 MW
Availability of Existing Data	Only 4 out of the 31 ERA approved power projects are biomass based. There is no shortage of biomass opportunities in Uganda but there is still a shortfall in the number of proven studies that accurately describe the sustainability of feedstock inventories required to build out energy projects to truly capitalize on this energy generation platform.
Availability of Technical Capacity	With a very vibrant forestry sector and an abundance of specialized expertise in feedstock analysis and geospatial imaging, Uganda has the requisite expertise to develop biomass based energy transactions.
Comparative Levelised Cost of Electricity	The LCOE for these power projects ranges between $0.05 and 0.12. Uganda's Feed In Tariff ranges between 0.08 and 0.12 with very high escalation for MSW, biogas and bagasse based projects. Biomass projects were also eligible for Get Fit financing and those which qualified a $0.01 tariff increment in addition to base tariff rates.
Real/Perceived Risk Profile	The risk profile for biomass is almost solely weighted on the ability of project developers to sustainably manage their feedstock inventories over the lifetime of a PPA. This is major risk factor in emerging economies where land use is pre dominated by small scale agricultural practices. Where the project developer owns dedicated plantations or where the feedstock is of itself a parasitic crop this risk profile significantly diminishes.
Conclusion	Biomass remains the second most viable energy generation source after small hydro power. It provides reliable base load power 90% of the year and is comparatively less expensive than some of the other small scale renewables. With one project already licensed to generate electricity from the combustion of waste streams from a maize plantation, Uganda is slowly but surely making the right strides into the commercialization of this power source.

3. Geothermal Power	
Proven/ Forecast Potential	450 MW
Availability of Existing Data	There are no licensed Geothermal power projects in Uganda. However the Government has concluded a number of surface studies that demonstrate the preliminary opportunity to further explore Geothermal energy as an alternative power generation source in the Country. There are a number of geothermal transactions including the 150 MW Katwe Geothermal power project that is already undergoing the

	procurement cycle for the necessary licence for exploration and which has been awarded a PPA. The Japan International Cooperation Agency (JICA) has recently engaged the sub sector, having conducted 17 site visits with plans to support surface studies in Panyimur (Nebbi District), Kibiro (Hoima), Katwe-Kikorongo (Kasese) and Buranga (Bundibugyo-Ntoroko) districts.
Availability of Technical Capacity	The Ministry of Energy and Mineral Development, Uganda has made strong attempts at increasing local technical capacity for geothermal power projects. However without any institutionalized curriculum or demonstrable work experience of local staff this indicator score low for this sub sector.
Comparative Levelised Cost of Electricity	The LCOE for these power projects ranges between $0.07 and 0.13. Geothermal energy has been lauded globally as a cheap base load power source which can significantly drop the overall cost of electrical energy from a macroeconomic perspective. Geothermal projects were not included in the list of eligible projects to receive Get FiT financing.
Real/Perceived Risk Profile	Overall, geothermal has a high risk profile pre-exploration and a low risk profile post exploration. Early stage drilling based on surface studies is an expensive exercise, which, if borne by project developers, accords these investors an incredible risk burden because of inherent uncertainties of volumes and quality of sub surface steam. Once resource assessment has been made, the project's risk substantially decreases as investors more or less can enter into a bidding phase to determine the lowest cost option for implementation.
Conclusion	The early stage risks and costs of geothermal energy exploration dictate Government/Donor support until a sufficient body of data has been collated, which would permit unsubsidised investments from the private sector. Geothermal power projects are very large investments, a level at which is likely to provide a platform for political interference and corruption. Once a supporting framework has been completely developed, geothermal energy can provide the cheap base load power that Uganda so desperately needs.

4. Solar PV	
Proven/ Forecast Potential	200 MW
Availability of Existing Data	5 of the 31 ERA licensed electricity generation projects will generate electricity from solar PV. There are also numerous projects and feasibility studies that demonstrate the potential use of solar PV for off grid energy generation in the Country.
Availability of Technical Capacity	Supported by DFIs such GIZ, a number of training programs and courses have been offered to local technicians in a bid to increase local expertise. These efforts have borne fruit with more local technicians in use for the development of Solar projects, experience which significantly improves this indicator score.
Comparative Levelised Cost of Electricity	The LCOE for solar power projects ranges between $0.16 and 0.40. Despite the overall reduction in solar PV costs over the

	last decade, the commercial operation of solar projects remains expensive for the utilities that purchase this electricity. Solar power can only be generated during the day and only becomes useful in the evening with expensive improvisations such as battery storage and or hybridization to include wind and/or fuel based systems are added on to initial designs.
Real/Perceived Risk Profile	Solar Power is intermittent which greatly enhances the risk profile insofar as grid connectivity is concerned. Uganda would need much smarter and much cleaner grid networks for it to seriously consider solar PV as available scalable power source. Solar PV does have some merits in that it has very simplified construction contracts and construction timelines.
Conclusion	Solar PV will continue to play a large role in off grid applications as well as small systems installed at Point of Use. The reality is that there is a very marginal role for this energy source to play in the ambition to increase electricity generation and grid access in Uganda until some of its inherent barriers have been addressed.

5. Wind Power	
Proven/ Forecast Potential	Unproven
Availability of Existing Data	Only 1 of the 31 ERA licensed electricity generation projects will generate electricity from wind. The existing ministerial data on wind paints a grim picture for commercial wind energy in the Country. However a review of the existing wind data clearly demonstrates that the wind data obtained was poorly obtained with and masts laid at a maximum of 10 metres instead of the average heights between 50 and 80 metres.
Availability of Technical Capacity	With little data available and very little commercial interest in wind energy development, there is glaring gap in the availability of the local technical resources. Wind experts regionally are few and far between which necessitates the need for foreign expertise to meet this gap. This is a reality across the East African region.
Comparative Levelised Cost of Electricity	The LCOE for wind power projects ranges between $0.09 and 0.20. It is within comparative range of other low cost renewables. Wind power projects were not eligible to receive Get FiT financing.
Real/Perceived Risk Profile	Wind energy is a high risk venture. The following list outlines just a few: • Operational Risks: Grid interconnectivity is difficult for multiple wind projects whose overall contribution to the energy mix is over 20%. Wind is also a poor source of power as its intermittency dictates power generation potential lasting only 34 – 40% of the year. • Product market risk: In addition to the risks associated with any energy investments, debt investors are particularly wary of wind transactions and demand even more credit enhancements than they would on similar transactions • Input risk: despite best attempts at collection of

	project specific data, wind variations can be erratic and more subject to variations in climatic changes
Conclusion	There is a need to invest in accurate wind data collection systems to demonstrate the true wind power potential of the country to investors and developers seeking out such ventures. In its absence wind is not a commercially viable alternative for increased power generation.

6. Challenges and Solutions

The attainment of Financial Close and the subsequent commencement of construction for any renewable energy transaction signify the most major milestone in the developmental process. The journey from project inception to Financial Close has been mapped out in Annex 8 of this report. The rigours of overcoming each step in that journey demand flexibility and innovation from developers and transaction advisors alike.

Our analysis of the Ugandan electricity sub sector culminates in an overall positive sentiment, highlighting specific challenges but ones with which direct interventions can be applied for high impact solutions. In tandem with each challenge outlined below a matching solution has been provided which in our opinion would serve to overcome the said barriers.

The key developmental challenges observed in Uganda from developers were as follows:

CHALLENGE:

- Traditional debt financing models:

Developers in Uganda have a significant set of challenges in finding debt financing for their energy projects. Commercial banks in the country offer high interest, short tenor loans which are difficult to obtain owing to rigorous appraisal protocols which are near always pegged by the bank's comprehension of asset based finance rather than project finance models. Banks (and equity partners to a certain extent) lop incremental burdens to the developers including the procurement of partial risk guarantees, direct agreements and the insertion of clauses into the PPA to make the same more viable. These are all vital elements of the developmental sequence but they are a major contributing factor to the delays that developers have in obtaining Financial Close.

PROPOSED SOLUTION:

- Innovative Credit enhancement Products

For commercial banks to provide long-term, cost effective project finance, they require support from Development Financing Institutions (DFIs) and other subsidy/donor based organizations that allow for:

- Enhanced tenor
- Competitive pricing
- Hard currency financing

Local commercial banks are often constrained in their capability to meet the above criteria for their project finance, especially considered the nature of the financing and type of transactions are well outside the scope of their normal business operations. As referenced in the Standardized Power Purchase Agreement (SPPA), Clause 8.4, the Government of Uganda encourages developers to secure guarantees and other financial products that will provide further support in financing and implementing their projects.

USAID Uganda can intervene and add tremendous value in securing finance through the provision of tenor extensions, liquidity lines, partial risk guarantees as well as various types of insurance that protect investors from political risk or non-compliance with the power purchase agreement by the off-take partner.

With direct reference to on-going programs and interventions which USAID has initiated in line with this proposed solution, the Development Credit Authority (DCA) may prove to be a valuable resource towards the objective of unlocking commercial capital for the debt requirements of renewable energy projects. The DCA program was designed to employ partial credit guarantees to catalyze financing in developing countries. These guarantees provide comfort to local lenders and financial partners who are already fearful of providing debt under a non-resource basis. As personal guarantees and collateralized loans are not an option for most project developers or not allowed by the equity sponsors supporting the project (especially private equity funds), project developers can take advantage of the DCA facility to seek competitive long tenor, low interest loans from local banks and financial institutions to ensure economic returns on investment which are suitable for equity sponsors.

Viability Africa would highlight the need for a portfolio approach to the sector, working with a selection of lenders with the liquidity and capabilities for project finance transactions and whom require the guarantee support to justify the risks that are unique to Uganda (and East Africa as a whole). A portfolio approach, where a USAID DCA guarantee is provided to the selected lenders and be can be utilized across multiple transactions simultaneously, allows for the provision of guarantees for a combination of multiple projects rather than a project by project approach, saving time and money for the lenders and DCA itself. This allows for speed, scale and private sector growth while furthermore giving the renewable energy market a much needed product for which debt can be provided on a competitive and market friendly basis. DCA should also explore tenor extension guarantees, where they would provide a long-term guarantee for successfully performing projects only (ensuring that the guarantee is not taking operational risk but rather simply ensuring lenders have liquidity to lend long-term).

CHALLENGE:

- Highly priced/Low Quality Technical and Transaction Advisory firms:

Engineering and Financial advisory capacity is not yet a sub sector large enough to subject itself to the governance of the rules of a free and fair market. There this a shortfall in the technical capacity required for energy project development. To this extent, we established that Ugandan developers typically can find two categories of consultants. On the one hand there are a number of engineering and accounting firms that present themselves to developers as competent professionals. These “experts” price their services at a price point that is low enough to attract initial investment by a developer who lacks the capacity to review or evaluate the services rendered. It has been typical experience that the quality of work offered by these consultants is so rudimentary that it often has to be redone, doubling the expense that developers spend in the pre-developmental phase.

On the other hand, there are a group of highly trained and competent consultant firms but whose price point is above reach of ordinary developers. These consultants’ have a price point

that can only be subsidized by DFI subsidies or Government support, or by developers with enough capital to invest at an early stage to cover these costs (rare to find in the market of project development).

PROPOSED SOLUTION:

- Pre-Construction Development Support

To overcome the challenges faced by developers in accessing affordable and high quality consultants required to perform resource evaluations, engineering designs and financial structuring, there is a need to identify a pool of qualified personnel who can be used to perform very specific services for the developers as a well as team on the back end to review the services rendered. USAID Uganda can overcome these challenges by directly contracting services required from these consultants and subsequently providing the deliverable to project developers.

An approach successfully adopted in other markets has been for service providers to create long-term partnerships with project developers and financiers where technical and financial advisory services are carried out but only paid for when the project reaches financial close. Financial close; representing the point at which large amounts of capital are made available to the project and the advisory fees become minimal compared to the overall project funding.

A second approach, which has been recommended throughout this report, is for USAID to directly fund certain development phase activities which will contribute to the completion of the project documents required for financial close. This approach, which is often supported through donor funding to the service provider to support costs during the long development phase, allows developers and interested stakeholders not only to rapidly mobilize experts to conduct the various studies but also to continuously evaluate site specific data to keep assessing the viability of project sites. The funding applied to this particular development serves to meet developer needs through the very early stage preliminary feasibility and detailed feasibility stages.

In line with this approach, Viability Africa will work with project developers in Uganda not only to identify pre-construction project specific needs but also to develop the terms of reference for third party consultants. This will ensure that the resource deployment matches the requirements needed to complete feasibility studies and subsequently reach financial close. Viability Africa will also play a critical role in the evaluation of third party deliverables to ensure consistency with technical scope of contracted assignments and also adherence to internal standards and practice.

As referenced in Annex 1 to this report, Viability Africa's long-term commitment towards supporting project development in Uganda is centred on a combination of developer/equity investor support alongside (where possible) DFI support during the developmental phase. This approach will play a central role in ensuring successful implementation of renewable energy projects in the country by enhancing the technical and financial resources available to project developers. This increase in capacity will not only drive developer's capability to implement viable transactions, but also grow local technical capability for these transactions.

7. Conclusions and Recommendations

Ultimately, most needed in the market is early stage support for developers and investors to bring projects to a state of "bankability". Too often in markets with tremendous opportunity are projects never realized simply because of the disconnected between developers, financiers, policy makers and local stakeholders. We summarize this disconnect with the following perspectives of each:

- Developers, often having spent a large amount of their personal funds into a very early stage assessment and in securing the site, are sceptical of third party investors who are seen as only wanting to enter the project, remove the developer and reap all of the rewards. Developers furthermore do not understand exactly the scope required to reach Financial Close, and delay their project in assuming that they are "almost there".

- Financiers are structured in a manner where their primarily role is to invest into projects, not develop them. When encountering projects that require a significant amount of resource, and not simply financial but also in managerial and technical, a challenge evolves in that they are not able to function in their natural role.

- Policy Makers see their success in the number of projects that are ultimately implemented and bring improvements to their constituents. The disconnect lays in a misunderstanding of what it means to have personal capital at risk in the projects.

- Local Stakeholders read about the great amount of investment in the local news and quickly assume that other parties are getting rich off of their own resource. This misunderstanding creates significant resentment between local stakeholders and international investors (or even local developers), as they see ownership in the local resource themselves.

All of these challenges are real and can be witnessed time and time again in renewable energy projects. Furthermore, they often exist throughout the development, implementation and operational phase of projects, and need to be managed consistently and thoroughly at all times. Our solutions all revolve around two primary characteristics; (1) Education and (2) Technical and Financial Support

Education to the four main groups identified above is critical in managing expectations. Once set accurately, the project can progress and be a success as all parties have a clear understanding of how it will be a benefit to them.

Technical and financial support, as outlined previously, can be made in a variety of ways. Most important is that what limited capital is available for early stage development is utilized in an efficient and effective manner. If USAID Uganda wishes to play a role in unlocking projects, a focus is required on creating a market where you have:

- Developers working closely with professional service providers and technology firms to complete development phase components of their projects,

- Financiers and technology suppliers with a capability to structure project finance transactions in a secure, viable and professional manner
- Policy makers with an understanding of the constraints faced by other parties and how to overcome those constraints
- Local stakeholders actively participating in consultations that showcase how the project will be beneficial to the communities within which it is implemented

The solutions proposed in this report allow USAID Uganda to directly support all the above parties in achieving their objectives and developing small scale grid connected renewable energy projects.

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ANNEX 1: IMPLEMENTATION PLAN

In completing its assignment, Viability Africa observed a significant gap in the number of competent transaction advisors for small scale renewable energy projects. Therefore with a proven demand pipeline of potentially viable transactions, Viability Africa intends to establish and operationalize its presence in Uganda for the purpose of supporting the development and financing of the aforementioned small scale transactions.

The execution of this expansion into Uganda will see Viability Africa implement a three phase approach of varied levels of investment:

Phase 1: Immediate Short Term Action Items

To establish its presence in the country, Viability Africa will identify a physical location in Kampala to base operations and begin recruiting a team (2-3 individuals) of local, experienced personnel. Viability Africa would seek to identify individuals with experience and expertise in engineering and finance in order to create a balance where the technical merits of projects can be reviewed and analyzed as well as the financial capabilities of the projects.

The goal of this team would be to provide a local "go to" resource for project developers in Uganda who currently have minimal guidance and support during the project development phase. While the major analysis, design and financial structuring would be managed from the Viability Africa headquarters in Nairobi, the Uganda satellite office will provide direct access to the market and an on the ground team to frequently liaison with the developers as well as the various government agencies.

Viability Africa would seek to establish mandates with at least three projects within its first three months of operations in Uganda. The estimated costs for this phase would be $38,000.

Phase 2: Medium Term Plan

Within the first year of having the team on the ground in Uganda, Viability Africa would expect to close its first transaction and secure at least five project mandates. Viability Africa would furthermore secure a dedicated equity investor to support a more scalable rollout of the company's project development plans and ensure that a reliable financial resource was in place as projects entered into the portfolio.

The team would grow over time to meet the requirements of the projects under mandate. A balance would be maintained between technical, financial and project management capacity as these are the primary requirements of the satellite office. The most important resource Viability Africa would be providing to project developers would be a dedicated team that focused on getting the project to financial close.

The estimated cost of operations for this phase would be $143,000.

Phase 3: Long Term Plan

Over two years of having an on the ground resource based in Uganda, Viability Africa would target closing at least 50 MW in transactions and to grow a team of at least six individuals. The transactions would most likely reflect the technologies represented in this report (predominately small hydro), but a diversified portfolio would be sought as other technologies did show that, if the right resources were dedicated to them and a balance of government support provided, they would have potential.

The goal of the company would be to develop a reliable brand that project developers trusted in managing their projects and financial investors/institutions relied on for structuring bankable investments for which they could pursue. The competitive advantage of Viability Africa lays in its niche focus of small-scale renewable energy projects, and furthermore is relevant to all stakeholders in that they have a one-stop shop for all service related requirements for their renewable energy project.

Challenges

Viability Africa's most significant challenge to rolling out the above plan will be in securing funding for the required operations. Because of the success fee nature of its contracts, the company cannot rely on revenues to sustain operations. Therefore, upfront investment for at least the short and medium term plan would be required in order for Viability Africa to realistically pursue the implementation plan. Currently, Viability Africa is reviewing its financial position based on the success it has had in Nairobi to determine the investment amount it is willing to make into the Uganda expansion.

Additionally, Viability Africa would need to overcome any current and future barriers presented by the Government of Uganda. While the report highlights that the processes and policies in place for small-scale renewable energy projects are strong and supportive, given the nature and history of countries in the region it is not unrealistic for things to change drastically and quickly. Viability Africa will remain involved in the discussions with the Government of Uganda on what is required to promote and expand renewable energy project development in the country, and will seek to establish and maintain strong relationships with key stakeholders involved in the formation of policy.

ANNEX 2: LIST OF KEY STAKEHOLDER INTERVIEWS

Uganda Energy Contact List		
Organization	**Name**	**Contact Information**
Regulators/ State Owned Energy Sector Players		
Ministry Of Energy	Emmanuel Buringuriza ERT Project Coordinator	buringiriza@gmail.com
Electricity Regulatory Authority (ERA)	Ivan Kisembo Projects Engineer	i.k.kisembo@era.or.ug
Rural Electrification Authority(REA)	Merdard Muganzi	mmuganzi@rea.or.ug
Uganda Energy Credit Capitalization Corporation(UECCC)	Roy Bugami General Manager	rbaguma@ueccc.or.ug
Private Sector Foundation For Uganda	Eng. Geoffrey Ssebuggwawo	gssebuggwawo@psfuganda.org.ug
Project Developers		
KSG IT. (U) Ltd	Kenneth Semafumu Managing Director	ksemafumu@gmail.com
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Rubicorn Power	Patrick Oketa	poketa@gmail.com
Lwere, Lwanyaga &Co. Advocates	Richard Adubango	adufengo@yahoo.com
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Developmental Financial Institutions		
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UNFCCC/ CDM RCC Kampala	Timothy Cowman	TCowman@unfccc.int
World Bank	Mbuso Gwafila	mgwafila@worldbank.org
GVEP	Julius Magala	Julius.Magala@gvepinternational.org
Equity Investors		
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IDEA Power	Mohamed Othman	m.osman@ideapowergroup.com
EA Power	Gilman Kasiga	gilman.kasiga@ea-power.com
Responsability	Joseph Nganga	joseph.nganga@responsability.com
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Debt Financiers		
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Technology Suppliers/ Technical Consultants		
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ANNEX 3: OVERVIEW OF UGANDA ENERGY SECTOR

Uganda Energy Power Sector:

- History

Like many sub-Saharan African countries, post-independence proved to be a difficult period for Uganda with political and social unrest. This subsequently retarded the growth of the power sector and severely diminished investor appetite for projects in the country, which all but destroyed the power sector as it then was. Reforms and revived investor and donor interest would not be seen in the country until 1986. As the nation's economy started to grow in the tail end of the 1980s, power demand far out-paced power generation and load shedding exercises commenced in 1988. In response to the need to revitalize the power sector in Uganda, the GoU carried out a number of exercises, including rehabilitating existing power plants and even increasing the nominal generation capacity of the operational hydropower sites. However structural reforms still needed to be executed owing to inherent inefficiencies at the Uganda Electricity Board (UEB). These inefficiencies included very high transmission and distribution losses as well as poor revenue collection, which went as low as a 50% collection rate from grid connected consumers in 1998.

To address the above identified systemic challenges, the Government of Uganda employed a very aggressive campaign for electricity sector reform which included the enactment of the Electricity Act 1999 and the establishment of the Electricity Regulatory Authority (ERA). A key turning point for the overall transformation was the unbundling of the Uganda Electricity Board (UEB) into the Uganda Electricity Transmission Company Limited (UETCL), the Uganda Electricity Generation Company Limited (UEGCL) and the Ugandan Electricity Distribution Company (UEDCL) which are each mandated with the tasks of electricity transmission, generation and distribution respectively. The reforms rolled out by the government were structurally effective but unable to protect the country from the threats posed by electricity generation pegged on the country's reliance on large dam based hydropower projects. A prolonged drought in 2006 and in 2011 drastically reduced the water capacity at the dam based hydropower projects which subsequently triggered wide spread load shedding exercises and increases in domestic and industrial power costs as the government had to result in purchasing power from thermal power generators.

Going forward, Uganda's electricity sub-sector is far better positioned than it was two decades ago when the government was grappling with the initiation of the reform policy. With a generation and distribution policy that is increasingly reliant on private sector capital and expertise, the investment framework in the country is well positioned to tap into the increasing market appetite for electricity generation projects in East Africa.

Law and Regulatory Framework

1) The Constitution of the Republic of Uganda 1995 (As Amended)

The constitution of the Republic of Uganda is the supreme law of the country and all other laws which are inconsistent with it are void to the extent of their inconsistency. The Constitution directs that the national government formulate and implement a national energy policy.

***2)* The Electricity Act, 1999**

Enacted in 1999, this statute is the principal body of law governing the electricity sub sector as a whole. Rather than examine all the provisions of the law, this section shall address itself to the components of the subsector from a power generation stand point owing to the fact that the other provisions are structurally tied to key stakeholders discussed further below in this section.

- Generation:

The nexus of the law and electricity generation is manifest in the provisions concerned with licensing of Independent Power Producers (IPPs). These provisions are contained in Part V of the Act (§ 29 – 50). The electricity generation licensing approach in Uganda is two-tiered, whose first phase culminates with the award of a permit and the second phase marked by the issuance of a generation license to the IPP.

The power generation permits vests exclusive rights to the IPP to carry out detailed feasibility studies and other ancillary activities and or studies necessary for development of the proposed project whereas the license confers on the IPP the power to implement the proposed power project.

3) National Policies

a) The National Energy Policy

Uganda's energy policy was initiated to comply with a 1995 Constitutional provision prompting the State to promote and implement energy policies that will ensure that people's basic needs and those of environmental preservation are met. At the time the national energy policy was written, national grid connectivity in the country stood at a meagre 5% and only 2% in rural regions of the country[1].

To address the challenge of low grid access, the energy policy specifically directed its attention to renewable energy as a least cost development power source to boost energy generation capacity as well as a targeted approach toward rural connectivity by augmenting the strategy codified in the Rural Electrification Strategy and Plan 2001. Indeed the policy went so far as to identify the specific renewable energy options such as wind, solar, biomass and hydropower. Of the different renewable energy alternatives proposed, hydropower came out as the most viable

[1] The Republic of Uganda, Ministry of Energy and Mineral Development
THE ENERGY POLICY FOR UGANDA

energy generation source for the country with a potential generation capacity greater than 2,000 MW.

b) Uganda Renewable Energy Policy

Approved by the Cabinet in the year 2007, the Renewable Energy policy was formulated to augment the strategic objectives laid out in the 2002 national energy Policy discussed above. The overall objective of this policy document is to increase the use of modern renewable energy from 4% to 61% by 2017. The policy lends itself to a proactive and pragmatic sequence of interventions in the electricity subsector including the need for standardized Power Purchase Agreements and Feed-in-Tariffs to attract private sector investments and subsequently inject more electricity to the national grid to meet the ultimate objective of increased power supply to domestic and institutional consumers. This policy document in many ways sought to address the need for diversification in electricity generation and supply to avoid the reoccurrence of this situation. By pegging renewable energy as a principal pillar for economic growth, poverty reduction and sustainable development, the policy sought to stimulate immediate Government action in areas such as publication and adoption of Standardized Power Purchase Agreements (SPPA) tied to Feed-In-Tariffs and Risk mitigation mechanisms and credit enhancement instruments to increase project developer confidence for energy investments.

4) Energy Sector Stakeholders

ENTITY	MANDATE
The Ministry of Energy and Mineral Development (MEMD)	The MEMD is tasked with the responsibility of policy formulation and implementation in the Energy sector.
The Electricity Regulatory Authority (ERA)	Created by the Electricity Act of 1999, ERA is the sole regulatory authority for the energy sector. ERA houses the Electricity Disputes Tribunal which manages appeals against decisions of the ERA. ERA functions include: 1. The licensing of all generation , transmission and distribution of electric power projects 2. Establishing tariffs structures
The Rural Electrification Agency (REA)	REA develops and promotes rural electrification and manages the Rural Electrification Fund. It is governed by the Rural Electrification Board (REB) which provides the subsidies required to support rural electrification projects.
Uganda Electricity Transmission Company (UETCL)	UETCL is the sole off take partner for all grid connected power projects and enters into Power Purchase Agreements (PPAs) with power generation companies. The Company owns all national transmission lines above 33kV.Uganda is a single buyer electricity market. 97% of the electricity consumed nationally is distributed by UMEME, the power distribution companies have negligible capacity.
Uganda Electricity Distribution Company	UEDCL owns Uganda's electricity distribution network. The company has outsourced the management of the distribution network to private companies such as UMEME Limited and other private electricity

	distribution companies highlighted in Table 2 below.
Uganda Electricity Generation Company	This company represents Uganda's national electricity generation arm of its overall utility functions. The company owns Kiira (200 MW) and Nalubaale (180 MW) hydropower projects.
Uganda Energy Credit Capitalization Company	(UECCC) is a government body established to provide credit enhancement services such as partial risk guarantees to mitigate real and perceived investment risks for energy projects in Uganda. The company manages and administers the Uganda Energy Capitalization Trust.
Private Sector Foundation of Uganda (PSFU)	The PSFU is a focal point for private sector advocacy and capacity building in Uganda. Its core functions include policy advocacy, business training and trade development.

Table 1: Energy Sector Stakeholders

Private Electricity Distribution Companies

DISTRIBUTION COMPANY	MANDATE
UMEME	500,000 consumers concessioned by UEDCL for a 20 year management contract beginning in 2004. The company serves 97% of all the grid connected consumers in the Country.
FERDSULT	Principally mandated to manage rural electricity distribution with a consumer base of approximately 10,000 consumers. The company's legal structure is mandated by a 10 year concession from the Rural Electrification Authority.
WEST NILE ELECTRICTY COMPANY (WENRECO)	This company operates an off-grid distribution network with 4,000 connected consumers. The principal energy source for the network is the 3.5 MW Nyagak Hydropower Station.
BUNDIBUGYO ENERGY COOP. SOCIETY (BECS)	With 1,500 consumers, this company manages electricity distribution in Bundibugyo district.
PADER-ABIM ENERGY COOPERATIVE	This company also manages 1,500 consumers located in the Pader, Abim and Agago districts of Uganda.
KILEMBE INVESTMENTS LIMITED (KIL)	The company was awarded a 10 year concession to distribute electricity in Kasese and Rubirizi districts and serves 2,000 consumers.

Table 2: Private Electricity Distribution Companies in Uganda

a) Uganda Energy Fact Sheet

Data Metric	Value
Total Electricity Generation Capacity:	810 MW[2]
Current National Grid Connectivity Rates:	15%[3]
Rural Electricity Connectivity Rates	6%[4]
Urban Electricity Connectivity Rates	46%[5]
Uganda Per Capita Electricity Consumption	75 kWh[6]
Global Per Capita Consumption	2806.92[7] kWh
GDP Growth Rate	6.6%[8]
Industrial Consumer Power Consumption[9]	60%
Annual Electricity Growth Consumption	10 – 12%[10]
Domestic Consumer Power Consumption	30%
Other Commercial Consumer Power Consumption	10%

Table 3: Energy Fact Sheet: Uganda

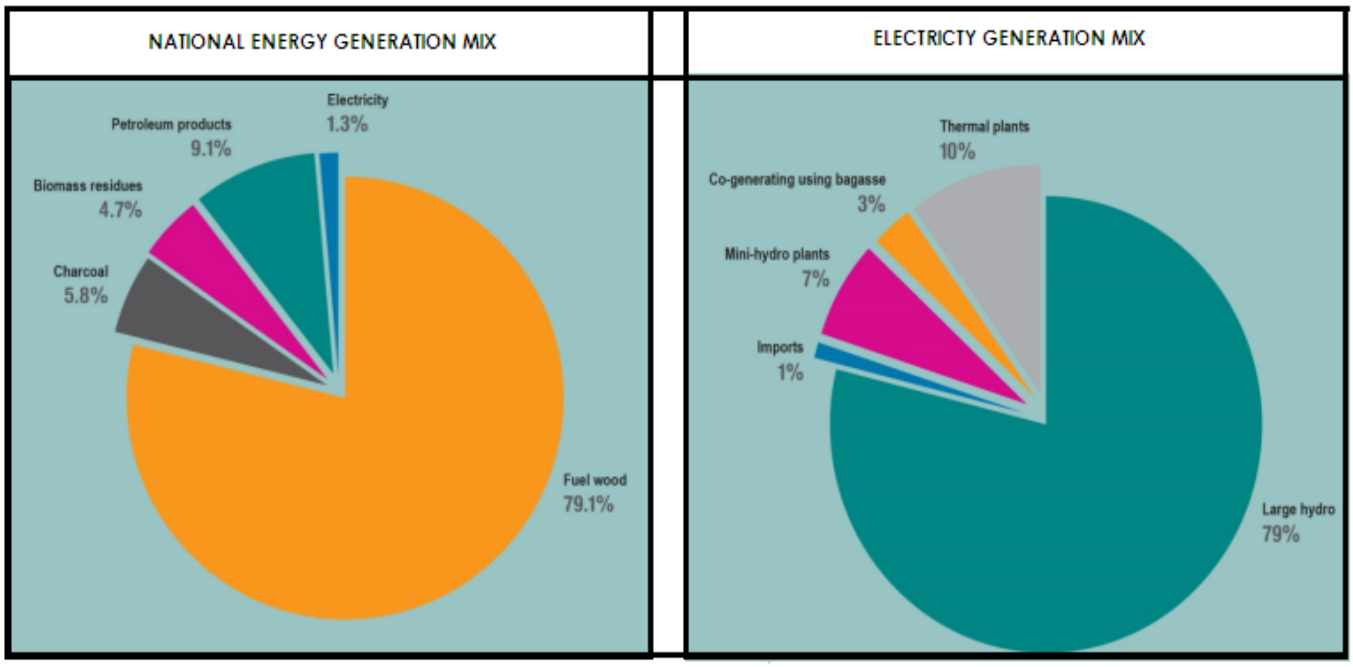

Figure 1: Energy and Electricity Generation Mix in Uganda

[2]http://www.umeme.co.ug/articles/TowardsuniversalenergyaccessinUgandaVisionMonitor10.09.14.pdf
[3]http://www.umeme.co.ug/articles/TowardsuniversalenergyaccessinUgandaVisionMonitor10.09.14.pdf
[4]http://www.umeme.co.ug/articles/TowardsuniversalenergyaccessinUgandaVisionMonitor10.09.14.pdf
[5] Joseph Mawejje, Ezra Munyambonera &Lawrence Bategeka. Economic Policy Research Centre, Makerere University Campus, Kampala, Uganda Powering Ahead: The Reform of the Electricity Sector in Uganda. November 4, 2013
[6]http://npa.ug/wp-content/themes/npatheme/documents/vision2040.pdf
[7]http://www.adb.org/sites/default/files/project-document/77505/42182-013-vie-rp-02.pdf
[8]http://www.afdb.org/en/countries/east-africa/uganda/uganda-economic-outlook/
[9]http://www.acode-u.org/documents/8891.pdf
[10] ERA Press Briefing January 1 2014

The chart in Figure 1 above provides a visual illustration of the energy and electricity generation mixes for Uganda. The Country has a nominal electricity generation capacity of 810 MW, 79% of which are sourced from large hydropower projects. The dependence on large hydropower leads to recurrent and seasonal fluctuations in energy generation capacity which renders effective generation capacity down to 588 MW. As is shown in the table below, despite the large nominal energy capacity of hydropower in Uganda, actual electricity purchases by UETCL demonstrate that thermal energy provides more than 35% of the actual electricity consumed in country.

ANNEX 4: PPA and Off-Take Opportunities

"PPAs define the rights and duties of investors and the state in private power projects and distribute the project risks and benefits."[11]

A PPA is a long-term (typically 15-30 years) power purchase contract between an IPP and an off-take partner. A Standardized PPA (SPPA) is a PPA that has been drafted and can be utilized by IPP without having to go through extensive negotiations with the off-take partner; it effectively provides certainty of the provisions with the PPA that the IPP will receive and encourages early stage investment into projects A wide variety of changes will occur in the lifetime of any project and this is particularly true of energy when viewed as a commodity. In determining the strengths and weakness of a PPA, developers and financiers are keen to analyse project risks and the procedure codified in the PPA to address the said risks. Risk mitigation and risk allocation therefore underpin this analysis. This section shall therefore examine some of the most common risks in any Power Purchase Agreements and assess the strengths and drawbacks of the Ugandan SPPA for each.

- Market Risks

Market risk is largely a function of the real or perceived inability of utilities to purchase and make payment for the electricity generated from IPPs. This is a utility specific barrier that is not necessarily tied to the provisions of the PPA, although there are mechanisms which can be built into PPAs to mitigate any negative impacts of this risk. At a macro-economic level, market risks are pegged on levels of economic growth and more specifically forecasted growth rates in electricity demand. At the utility itself, it is important to analyze the payment history and credit worthiness of the off-take partner.

To accurately visualize the impact of this risk we have to perceive electricity as the commodity that it is. Free market economics would dictate that an increase in electricity supply would instigate a drop in electricity purchase prices from the utility to the IPP. Whereas this is the ultimate objective of governments, IPPs do not find variable pricing mechanisms favorable as they need to provide a stable cash flow projection to their investors. The rationale for this is that IPPs purchase machinery and construction services at fixed price levels. The cost of capital required is also very rigid with fixed interest rates and tenure. Variations in price levels based on fluctuations in energy demand and production are therefore impracticable to financial models and the other instruments which IPPs use to forecast revenue generation. The unpredictability of these assumptions typically renders private sector energy generation an unviable business model. This is the very reason that Power Purchase Agreements were instituted.

Uganda specific market risks:

[11] Peter Bosshard. (Nov 12, 2002). "Private Gain-Public Risk, The International Experience with Power Purchase Agreements of Private Power Projects" International River Network, found at http://www.internationalrivers.org/files/bujagalippa-background.pdf

Consumer Demand: Uganda has sustained an annual GDP growth rate of over 7% over the last decade. The subsequent translation of this economic gain has been an overall reduction in per capita poverty levels as well as increased electricity demand. Prior to the electricity sector reforms, the electricity generation levels matched base demand, however since then, demand has overtaken supply which has thrown the country into a state of energy poverty. Increased power generation will not only meet the suppressed demand but also serve future energy demand loads projected at current economic growth rates.

Take or pay provisions: To provide further investor confidence in PPAs, single market utilities provide take or pay provisions that assure investors that they will pay for electricity procured or pay for electricity which has been generated but which has not been absorbed by the utility. Uganda offers explicit take or pay provisions for thermal power PPAs but makes this a negotiable provision from small hydropower projects[12].

- Off-take Partner Risks

This risk is directly pegged on the ability of the off take utility to meet its payments. Investors are often wary of defaults on payment and as rare as they are, they are a major investment concern. The UETCL enters into PPAs with IPPs and therefore this analysis shall focus on the former's ability to meet its obligations to the latter. It is however important to consider that the UETCL generates revenue from the concessionary agreements with companies such as UMEME which handle the distribution of electricity and collection of bills from customers nationwide. UMEME handles approximately 97% of all the grid connected consumers in Uganda purchase the electricity it distributes to consumers directly from the UETCL. UMEME has maintained a steady profit over and above its operating income since 2009. The Standardized PPA template for projects larger than 10 MW also features a direct payment guarantees which UETCL is required to issue to IPPs.

- Energy Generation and Absorption Risks

This is a risk allocated to the IPP's capacity to generate and deliver the forecasted energy projections that were committed to at the time the PPA was signed. For renewable energy projects, this risk is pegged on the availability of the natural resource (e.g. the hydrology of rivers on which hydro projects are built) and the ability of the machinery employed to convert the available resource into electricity. Machinery risks can be mitigated early by procuring manufacturer guarantees. Much of the risk with renewable energy investments remains tied to the weather and climate. This is a special risk when the impacts of climate change are factored, such as with hydrological estimations of floods and droughts.

Risk allocation in this perspective is also a function of the liquidated damages accruable to either party in the event of a shortfall in the amount of electricity generated or the ability of the utility to off take the electricity.

[12]Opportunities and Demand for generation projects and tariffs in Uganda.**Eriasi Kiyemba***Managing Director/Chief Executive OfficerUETCL*

1. UETCL is bound to pay liquidated damages where its system prevent the IPP from delivering electricity to it for any reason other than routine maintenance (a period which is restricted to only to 872 hours a year) .
2. The IPP is required to produce at least 95% of the power he projects to generate, failure to which attracts liquidated damages payable to UETCL.

- Price Risk

UETCL makes payment in Ugandan Shillings within sixty (60) Days of receipt of an invoice from IPPs. However, the price utilized in the invoice is pegged to the USD. Provided that the invoice is made in USD and the currency exchange is done on the date of payment and can be immediately converted back into hard currency (in this case, USD), then there is minimal currency risk to the financier. However, if the currency exchange is made on the date of invoice, and is not revised once payment is made, then a 60 day period is a risk for IPP to face as currency fluctuations can rapidly occur in developing nations such as Uganda.

This is critical for IPP as typically their largest source of capital (long-term debt, known as project finance), is preferred to be made in a hard currency where the pricing of said capital is lower than that of the local currency. In order to secure capital in the hard currency, the revenue streams of the project must be aligned with that currency. As the project finance has a drastic impact on the returns to equity investors, ultimately a PPA without a hard currency base becomes difficult, if not impossible to finance.

ANNEX 5: Project Development Process and Requirements

The renewable energy project development process varies across different technological applications. The common denominator across the different renewable energy applications is that the process is implemented as a function of resource evaluation, financial forecasts and license/permit acquisition. This analysis shall address itself to the small hydro development process, which is presented as the most viable renewable energy solution in Uganda.

Phase 1: Pre-Feasibility Assessment
Phase 2: Feasibility Study and PPA Execution
Phase 3: Financial Close and Contracting

The development process is designed to gradually evolve into a more precise estimation of the technical and financial viability of proposed power project, and is by and large a three tier sequence of phases:

1. **Phase 1: Pre-Feasibility Assessment**

Activity	Rationale	Deliverable and Projected Timelines
1. Site Visit	This allows engineers to develop preliminary estimates (e.g. strength of waterfall and or river flows, terrain and site layout) on the technical viability of proposed sites. The engineers also assess grid and road access for the site as part of their assessment of the overall viability of proposed sites.	Deliverable: Site Visit Report Timeline: 1 week
2. Topographical Survey	This assessment is conducted by a land surveyor with the principal objective of mapping out and determining the exact coordinates of site specific coordinates of different project components (e.g. power house, penstocks, weirs and canals.)	Deliverable: Topographical Survey Timeline: Dependent on project site terrain (typically 2- 4 months)
3. Hydrological Assessment	This constitutes the resource evaluation for hydropower projects. It provides site specific data on river flow rates which then allows project developers to determine the energy output of the proposed project. The survey will typically seek to install a meter on the River to collate hourly flow rates data for a twelve month horizons. The data is statistically correlated to catchment areas and seasonal flood patterns.	Deliverable: Hydrological Survey and Report Timeline: Complete Survey – 12 months. To this effect, this assessment carries forward to Phase 2 of the development cycle. However the first 4 months of the survey will allow the project developer to accurately forecast flow rates and develop the subsequent preliminary feasibility report.
4. Preliminary Feasibility Report	Using the site specific data collated from the topographical and hydrological survey, project engineers	Deliverable: Pre-Feasibility Report Timeline: 2 weeks after collation of

	will now compile a pre-feasibility survey that will determine nominal energy capacity, energy generation and sales to the national utility as well as preliminary estimates on project costs.	topographical and initial hydrological assessments.
5. Procurement of the ERA Permit	Once the pre-feasibility study is completed, the developer can apply to ERA for an electricity generation permit.	Deliverable: Permit Timeline: 30 – 60 days depending on public comments.

Phase 1 Outcome: At the end of this phase, the project developer has site specific data and a Permit to develop a complete feasibility Study. More importantly, the data collated at this stage confirms the technical viability of the project and lays a basis to develop accurate estimation of the economic viability of the project. ERA does require the developer to pay $3,000 as an application fee and demonstrate their technical and financial capacity to develop their projects.

Phase 1 Timeline: 6 months.

2. **Phase 2: Feasibility Study and PPA execution**

Activity	Rationale	Deliverable and Projected Timelines
1. Hydrological Survey	Hydrological studies are carried out in more detailed than those in Phase 1 to assess the available quantity of water in a given river basin in order to determine the power potential of that particular river These studies include assessment of total surface water availability, existing use, reasonable requirements of the sub-basin in the foreseeable future and determination of the order of surplus or deficit.	Deliverable: Conclusion of Hydrological Study Report Timeline: 8 months (depending on data availability, much shorter if data has already been gathered)
2. Environmental Impact Assessment (EIA) Study	An EIA is conducted in order to identify impacts of a project on the environment, predict likely changes on the environment as a result of the development, evaluate the impacts of the various alternatives on the project and propose mitigation measures for the significant negative impacts of the project on the environment. In recent years, the EIA has evolved into the ESIA, which includes a social evaluation component.	Deliverable: EIA Report Timeline: 3-6 months
3. Geotechnical Survey	This investigation evaluates the sub surface project specific properties of the project	Deliverable: Geotechnical Study Report

	site. This is a huge determinant for construction costs evaluation especially in the consideration of how many	Timeline: Complete Survey – 2 months.
4. Preliminary Design Drawings	Using the site specific data collated from the topographical, geotechnical study, EIA recommendations and hydrological survey, the project engineers will now move forward to compile a preliminary design drawing based of water flows and head presented in the hydrological report that will determine nominal energy capacity, energy generation and sales to the national utility as well as preliminary estimates on project costs.	Deliverable: Pre-Feasibility Report Timeline: 1 month weeks after collation of topographical and hydrological assessments.
5. Grid Study	The study will include investigation of all technical aspects of the connection of the power plant to the Grid so as to avoid risk of system separation i.e. feeding wrong voltage from the generation side to the national utility power lines. The will result to the design of transmission lines, sub-station and general electrical works basically which shall consists of layout selection, survey, sizing and specification of the works including drawings and bill of quantities preparation	Deliverable: Grid Interconnection Study Report Timeline: 1 month after receiving preliminary design report outlining possible generator characteristics and output power characteristics
6. Financial Model	After completion of all site specific investigation, a financial model can be developed that forecasts the project's capital costs, revenue streams, and operational/maintenance costs. Capital costs are derived from the bills of quantities which were a result of the preliminary design drawings. Revenue streams are calculated from projected energy generation and the tariff provided in the Feed-in-Tariff. Operations and Maintenance costs are project specific and derived from past experience and the capabilities of the project sponsors and implementation partners.	Deliverable: Financial Model Timeline: 1 month
7. Feasibility Study	Once all the above investigation have been completed and site investigation documented, then all reports are compiled into a full feasibility study in readiness to be presented for PPA negation and prospective financiers.	Deliverable: Detailed Feasibility Study Timeline: 1 weeks after receiving all the required documentations.

Phase 2 Outcome: At the end of this phase, the project developer has a Detailed Feasibility Study with the complete set of site specific data and analysis. Coupled with the financial model, the project can present itself as technically and financially viable and may now be submitted to the prospective off-take partner for PPA negotiations and to financiers for securing of funding for implementation.

Phase 2 Timeline: 6-12 months, depending on availability of data.

3. **Phase 3: Financial Close and Contracting**

Activity	Rationale	Deliverable and Projected Timelines
1. Power Purchase Agreement Negotiations	These are the negotiations that will be conducted between two parties, the generator of electricity (seller/IPP) for sale and the utility/off-take company (buyer). Among the items to be discussed will be the commercial terms for sale of electricity, schedule for delivery of electricity, penalties involved, payment terms, and condition for termination of the contract.	Deliverable: PPA Timeline: 3 Months
2. Request for Proposals for EPC contracting	This is an exercise that will be conducted by the project developer with the principal objective of contracting a partner for the construction of the power plant. The exercise will involve sending out of RfP to potential suppliers to submit proposals for evaluation and selection. The most common implementation relationship is the Engineering, Procurement and Construction contract where a full turnkey solution is provided by the contractor, although design and build solutions are often more viable for smaller projects (where contractors are individually contracted based on their specific requirement).	Deliverable: EPC Contract Timeline: 4 months
3. Conclusion of Equity Financing Partner	An equity partner is a financing partner secured to provide capital required to complete development and also fund the equity component of implementation (typically 30% of total project cost).	Deliverable: Shareholders Agreement Timeline: 2-6 Months
4. Conclusion for	The discussions for project finance lead	Deliverable: Finance Documents

Debt Financing Partner	to a high degree of long-term, cost effective leverage which acts as the primary funding source (typically 70%) for the project. Debt negotiations require determination of pricing, tenure, conditions precedent to financial close, and general responsibilities of the borrower throughout the life of the loan.	Timeline: 2-6 Months
5. Contracts Execution	Once all the negotiations are complete, the contracts will be executed for the EPC and equity and debt financiers for release of funds towards the project. Once all contracts are signed and funds released, the developer will begin the construction of the power plant.	Deliverable: Financial Close Timeline: 1 Month

Phase 3 Outcome: The project development cycle is concluded and the developer moves with into project construction with the contracted technical partner. Funds are disbursed based on a pre-determined schedule from the equity and debt partners. The construction period varies based on terrain and accessibility of the roads, but a two year horizon is typical for small-scale hydro projects.

Phase 3 Timeline: 4-8 months

ANNEX 6: LIST OF ERA APPROVED/ LICENSED PROJECTS

ERA Licensed Projects

Uganda Licensed Projects							
Project Developer	**Project name**	**Location**	**Technology**	**River**	**Capacity**	**Date of license**	**Period of license**
ARPE Ltd	83MW achwa HPP	Gulu & Pader Districts	Hydro	Achwa	83	2014-08- 24	40
Bwindi Community Micro Hydro Project Limited	Bwindi micro hydropower project	Kanungu District	Hydro	Munyaga	64	2014-09- 14	20
Elgon Hydro Siti (Pvt) Limited	Siti 2 HPP	Bukwo District	Hydro	Siti & Nyalit	16.5	2014-06- 01	22.4
Elgon Hydro Siti (Pvt) Limited.	Siti 1 HPP	Bukwo District	Hydro	Siti	5	2014-06- 01	22.4
Greenewus	Kakaka HPP	Kasese	Hydro	Rwimi	5	2014-01- 31	22.4

Energy Africa Ltd		District					
Hydromax (Nkusi) Limited	Waki Hydro Power Plant	Hoima & Buliisa District	Hydro	Waki	4.8	2014-07- 18	23
Kalangala Infrastructure Services	1.6MW solar-diesel hybrid power project	Kalangala District	Solar& Thermal	N/A	1.6	2009-01- 01	25
Kikagati Power Company Limited	Kikagati HPP Project	Isingiro Distic	Hydro	Kagera	16	2007-01- 01 2	20
Lubilia Kawembe Hydro Limited	Lubilia	Kasese	Hydro	Lubilia	5.4	2014-06- 01	22
Muvumbe Hydro (U) Limited	Nyakizumb a Hydro Power plan	Kabale District	Hydro	Nyakizum ba / Maziba	5.4	2014-07- 17	22
Pamoja Energy Limited	Muduuma Biomass plant	Mpigi District	-	N/A	32	2014-09- 11	10
Pamoja Energy Limited	Sekanyonyi Biomass & Solar plant	Mityana District	-	N/A	11	2014-09- 11	10
PH Industrial Farms Ltd	Biomass gasification power project	Gulu District	Biomass	N/A	1	2014-04- 20	21
Rwimi EP Company Limited	Rwimi Hydro Power Project	Kasese District	Hydro	Rwimi	5.5	2014-06- 01	22
South Asia Energy Management Systems LLC	Nyamwam ba hydro Power Project	Kasese District	Hydro	Nyamwa mba	9.2	2012-01- 10	20

Projects at Feasibility Study Stage							
Project Developer	**Project name**	**Location**	**Technolog y**	**River**	**Capaci ty**	**Expiry date**	
Albatros Energy (U) Ltd	50MW Crude Oil Power Plant	Hoima District	Thermal	N/A	50		

Butama Hydro Electricity Company Ltd.	Sindoro HPP	Bundibugyo District	Hydro	Sindoro	5.6	2014-01-06	
C&G Andijes Uganda Ltd	Bukwa HPP	Bukwo District	Hydro	Bukwa	9	2015-02-28	
Carbon Impacts Renewable Energy	10MW Solar-PV power project	Tororo District	Solar	-	10	2015-01-31	
Cresta Hydropower Limited	Cresta Mini Hydro Power	Rubirizi District	Hydro	Buhindagi	2	2015-08-23	
Eco clean Power	Sironko Hpp	Sironko District	Hydro	Sironko	7	2014-11-17	
Elementary Energy Limited	Nyamabuye HPP	Kisoro district	Hydro	River Kaku	2.2	2015-06-05	
Emerging Power Uganda Limited	Pv-Solar Power Project	Mayuge District	Solar	-	15	2014-10-06	
Fotowatio Renewable Ventures Limited	50MW PV-solar	Soroti district	Solar	-	50	2014-07-31	
Free Energy Uganda Limited	2*2MW Off-grid solar PV project	Kotido & Kaabong District	Solar	-	4	2015-03-14	
Kabale Energy Ltd	Kabale Peat power project	Kabale District	Peat	-	30	2015-03-09	
Keere Power Company Limited	Keere Small Hpp	Ween District	Hydro	Keere	6.3	2014-07-31	
Lake Albert Infrastructure	52 MW Natural Gas Power Project	Hoima District	Natural Gas		50	2015-06-15	
Mahoma Uganda Limited	Mahoma Hpp	Kabarole District	Hydro	Mahoma	3	2014-10-01	
Mayuge Sugar Industries Ltd	21-23 MW Bagase co-generation	Mayuge District	Bagasse	-	21	2015-07-16	
MSS Xsabo Power Limited	Solar Power Park	Gomba District	Solar	-	20	2014-08-29	
MSS Xsabo	Wind Power	Tororo	Wind	-	20	2014-08-29	

Power Limited	Project	District					
Mt. Elgon Hydropower Company Limited	Muyembe-Sirimityo HPP	Sironko District	Hydro	Muyembe	3.1	2014-09-09	
Network Civil Engineering Contractors Limited	Nyabuhuka-Mujunju HPP	Kabarole District	Hydro	Yerya	3.2	2014-10-15	7.873
Ngoromwo Small Hydro Limited	Ngoromwo HPP	Kapchorwa District	Hydro	Atari	8	2015-06-15	

ANNEX 7: IPP Experience in Uganda

Small Independent Power Producers contribute 11% of the total electricity generation mix in Uganda. A list of licensed IPPs in this category is provided below[13]:

Independent Power Producer	Project Type	Nominal Capacity Exported to the National Grid
Kakira Sugar Works	Bagasse based cogeneration	1 MW
Kinyara Sugar	Bagasse based cogeneration	5 MW
Kilembe Mines Limited	Small Hydro	3 MW
Kasese Cobalt	Small Hydro	2 MW
Tronder Power Limited	Small Hydro	13 MW
Electromax	Thermal (Heavy Fuel Oil (HFO))	8 MW
Africa EPM MPANGA	Small Hydro	18 MW
Eco Power Uganda Limited	Small Hydro	6. 6 MW
Hydromax Limited	Small Hydro	9 MW
WENRECO	Thermal (Heavy Fuel Oil (HFO))	3.5 MW Nyagak hydropower plant and 1.5 MW thermal (off-take tied to the West Nile Distribution network)

Table 4: List of operational IPPs in Uganda

The GoU's strategic investment plan specifically called for Independent Power Producers to lead an increase in energy generation projects and has made sufficient arrangements to facilitate this strategy.

- The country has instituted a Standardized Power Purchase Agreement (SPPA). Its individual merits are discussed below. In principle the instrument reduces the PPA negation period, allowing project developers to bring projects to market backed on signed PPAs in a much shorter period of time than would be possible with traditional negotiated PPAs.
- The country has backed the SPPA instrument against a Feed-in-Tariff (FiT) program, which establishes long-term price tariffs which mitigate off-take price risks.

The Feed-in-Tariff Policy[14]

A Feed-In-Tariff is a regulatory mechanism used by utilities to promote private sector electricity generation by establishing fixed tariff based on a levelized cost of production for a fixed period of time.

[13] ERA Developments and Investments opportunities in Renewable Energy Resources in Uganda
[14] Kisembo, ERA, Pretoria – South Africa, 2013 – Feed-in-Tariffs in Uganda

In 2007, Uganda became one of the first countries to enact and implement its Feed-in-Tariff regime. At its commencement the FiT was only applicable to bagasse based cogeneration projects and hydroelectric power projects. Initially designed to attract private capital, the FiT regime succeeded and under its mandate more than 50 MW worth of electricity generation projects were licensed. However, in the wake of international and regional events such as dramatic increase in the costs of steel and oil as well as the post-election violence in Kenya in 2007 – 2008, the rise in project construction costs rendered the economic viability of projects contracted under FiT rates bleak. The Government was forced to return to negations based power purchase agreements with project developers and completely abandon the FiT program. In 2011, the second phase of the program was launched and with it came a number of key improvements. These included the expansion of FiT inclusive power projects such as geothermal, biomass, landfill gas, biogas and solar. However unlike Phase 1, the new FiT program limited project capacity to 20 MW. Small hydro, geothermal, bagasse and wind projects were classified as Priority 1 projects with solar PV classed as secondary priority project. Phase 2 also saw the introduction of the Global Energy Transfer Feed-In-Tariffs (GET FiT) Program and the suspension of solar PV projects from applying to the FiT program and the removal of Solar PV projects from eligibility..

Key benefits of the existing FiT regime include:

1. Avoidance of currency risks – the FiT and the SPPA that it is based on are all pegged on the United States Dollar.
2. Avoidance of Inflationary risks – the FiT includes escalation factors to account for periodic increase in inflation
3. Off take benefits – the SPPA is based on the tariffs set out in the FiT program. The adoption of the SPPA negates off-take risks and reduces negation periods between developers and the UETCL.
4. Investment grade tariffs – Based on costs typically associated with implementation of each technology represented in the FiT, the tariffs will lead to a rate of return on investment acceptable to private sector financiers.

The FiT program is extremely important for any Government attempting to attract private sector capital for energy generation projects. It effectively creates the predictability and transparency that investors require to assess investment risks and forecast revenue generation and investment returns.

Current Feed-in-Tariff Rates (applicability: 2013 – 2016)

Technology	Tariff (US$/KWh)	O&M Escalation	Cumulative Capacity Limits				Payment Period
			2013	2014	2015	2016	
Hydro (9 – 20 MW)	0.079	7.61%	30	90	135	180	20
Hydro (1- 9 MW)	Linear Tariff[15] (0.082 - 0.092)	7.24%	30	75	105	135	20
Hydro (0.5 – 1MW)	0.109	7.08%	1	2	2.5	5.5	20
Bagasse	0.081	22.65%	30	70	95	120	20
Municipal Solid Waste	0.103	16.23%	5	15	25	45	20
Biogas	0.115	19.23%	5	15	25	45	20
Landfill	0.089	19.71%	0	10	20	40	20
Geothermal	0.077	4.29%	10	30	50	75	20
Wind	0.124	6.34%	25	75	100	150	20

Table 5: Feed In Tarriff Schedule

The Global Energy Transfer Feed-In-Tariff Program (GET-FiT)

The GET-FiT Program was initially constituted so as to support the efforts of East African economies pursuing climate resilient low-carbon development. The program was rolled out in Uganda and has successfully seen direct support to 15 renewable energy projects with a total generation capacity of 125 MW[16]. In addition to the energy generation benefits, the program's intervention to date will see the off set of more than 10 million tonnes of CO_2 emissions.

The program works hand in hand with the FiT program by offering RE projects which have valid ERA permits to apply for and receive premium payments on their FiT tariff. The process is competitive and transparent with all applicants required to seek participation through a rigorous RfP process.

The premium payment added to the FiT tariff is dependent on the RE technology and the scale of the project. It offers 1.4 US cents for hydropower projects and 1 US cent for Municipal Solid Waste and Bagasse projects.

[15] This is a range of tariff rates. Actual tariffs are calculated based on the GoU linear tariff calculation
[16] http://www.getfit-uganda.org/about-get-fit/

Additional Policy Features

- The Electricity Regulatory Authority (ERA) has proven to be a strong and independent energy regulator. ERA has weaned off donor funding and is now entirely financed from fees collected from licenses and other levies. In addition to this, the ERA's permit and license procedure is open and transparent. In equally important measure, the ERA has taken proactive measures to reduce the space for energy speculators in the electricity sub sector. By levying a $3,000 fee for permit acquisition, the ERA has effectively locked out spectators who seek to acquire exclusivity on attractive energy generation sites and sell them off to actual project developers. This measure is a first in the East African region and compliments the very strong energy regulatory space in the country.

- Energy investments are more often than not highly leveraged investments. It is far easier for project developers to access credit when such borrowing is supported by credit enhancements such as sovereign guarantees and financial risk guarantees. The UECCC is a government body that has been established for this sole reason – to provide credit enhancement mechanisms for renewable energy investments in the country. It offers Liquidity Refinance Options, Cash Reserving and Partial Risk Guarantee (PRG) to help improve the cost of financing and extend loan tenures.

In comparison to other East African economies, Uganda's strong regulatory environment, financial instruments and its credit enhancement opportunities make this a prime destination for renewable energy investments.

ANNEX 8: Agriculture and Energy Synergies

"Although agriculture is the main stay of Uganda's economy, the sector's fuel consumption is negligible because of the largely non-mechanical nature of the sector. Therefore energy consumption in agriculture is not usually accounted for in the national energy balance of Uganda. However, agro-processing industries use a fairly substantial amount of fuel, including fuel wood and heavy diesel. "

The Uganda Energy Policy

Uganda's Agricultural Sector Fact Sheet:

Parameter	Value
Contribution to GDP	37%[17]
Contribution to Total Exports[18]	90%
Contribution to national employment and household income	76.8%[19]
Major Cash crops	Coffee, Cotton, Tea and Tobacco
Staple Foods	Maize, Millet, Sorghum, Cassava, Sweet potatoes[20]

Table 6: Uganda Agricultural Fact Sheet

As has been demonstrated in the fact sheet above, the agricultural sector is a principal driver of the Ugandan economy. Despite its importance to the national economy, agricultural productivity is largely based traditional means of production. Non-mechanization stifles the ability of the sector to modernize, which impedes subsequent benefits down the value chain including farmer's livelihoods, loss of potential revenue generation from value addition and direct losses stemming from farmer's inability to store agricultural produce and take advantage of cyclical commodity price fluctuations.

Renewable energy can play a practical role in the agricultural sector in a variety of ways. The obvious intervention would be a direct injection of electricity to agro processing industries as off take partners for Independent Power Producers. This would effectively allow these small and cottage industries to increase their value addition capacity and storage capacity. Indeed this very application of renewable energy is one which has been codified in policy under the GoU's

[17] http://www.pwc.com/ug/en/industries/agriculture.jhtml
[18] Uganda Bureau of Statistics: THE INTEGRATED FRAMEWORK FOR THE DEVELOPMENT OF AGRICULTURAL STATISTICS IN UGANDA
[19] Patterns of Agricultural Growth and Overall growth of Ugandan Economy; Niringiye Aggrey
[20] http://www.fao.org/ag/AGN/nutrition/uga_en.stm

Plan for Modernisation of Agriculture[21]. In this policy document, the GoU rightly identified agro-processing as a private sector activity effectively restricting its role to that of facilitation of a conducive environment. There are also a number of challenges that restrict private sector energy investments whose off take partner are small cooperative agro-processing industries. The primary reason that transactions of this nature are difficult to finance is because lenders are risk adverse and smaller agro-processing facilities have limited capacity to demonstrate their ability to meet power purchase liabilities for the lifetime of the project. In similar fashion, investors are more inclined to invest capital in projects with higher economic returns, which in many instances are projects with greater energy generation. Simply put, the various fixed costs of a power project decrease as project's increase in size as they are spread out over a larger capacity. Smaller agro processing industries have restrained energy consumption capacities typically lower than 500kW. While this does not completely lock out investors with an appetite for energy, it does reduce the viability of micro sized energy projects as a means to modernize the agricultural sector. This is an important backdrop to the analysis of the energy interventions in the agricultural sector because agricultural production in Uganda is predominantly based on small-scale farmers.

Another plausible energy intervention would be increased energy distribution. The gains in human development as a function of increased access to the electricity grid cannot be understated. Long-term national economic planning dictates that increased energy access is being prioritized, albeit at a pace that cannot be accurately forecasted at this moment. Improvements on the length and quality of grid lines can be significantly hindered by major economic and social events that divert attention from the focus of connection rural farmers and industries. This in effect justifies the need for private sector lead interventions to mitigate any potential upsets in long-term planning goals.

The importance of increased energy distribution and generation for rural farmers is important and arguments in favour of both interventions have been laid out above. However these are tried and tested interventions that do not represent a disturbance great enough to stimulate a major paradigm shift in the way in which energy and agriculture connect.

To achieve the highest possible optimization strategy for energy and agriculture, a number of key considerations must be first established:

1. What are the strategic reasons for energy investments?

- Economic Returns – Investor Perspective
- Increased electricity generation – Government/ Utility perspective
- Increased electricity access – Communities located in remote areas of the country

2. What are the key needs of the agricultural sector?

- Increased agricultural productivity
- Improvements in the livelihoods of farmers
- Improvements in value addition

[21] PLAN FOR MODERNISATION OF AGRICULTURE: ERADICATING POVERTY IN UGANDA. (GOVERNMENT STRATEGY AND OPERATIONAL FRAMEWORK)

An innovative way for the two needs to be meet is by directly involving small-scale farmers in the energy generation projects. Farmers typically are best positioned to provide or secure the land required for the project and manage any local barriers, which in East African renewable energy projects has proved to be a major challenge for project developers. In return for this support, the farmers could collectively participate into the project as minority shareholders or through other means of securing long-term, consistent and determined cash flows from the project (such as lease agreements or revenue share agreements).

Minority shareholding (or these other means of the farmers' participation in the project's cash flows) in energy projects by cooperative farmers allows these farmers to achieve the following benefits:

1. **Improved Access to electricity:** Renewable Energy Projects are often located in rural and remote areas. Developers are required to establish power lines into the said remote areas which are eventually managed by power distribution companies. These power lines create a platform that eases the opportunities for rural farmers and industries to tap into the newly erect lines. With electricity consumption per capita rates as low as they are in Uganda (75 kWh/person) wheeling arrangements can be established to power mini grids that would generate enough electricity to power thousands of homes and multiple factories. 25 kW of energy can power up to 2,000 homes and a further 50 – 250 kW can power multiple agro processing facilities.

2. **Diversification of Revenue Generation:** Small holder farmers face challenges in their income streams owing to immediate financial constraints such as their obligations to pay school fees, health bills and other immediate financial pressures. The period between harvest and plantation often places farmers in apposition where they need to seek short-term loans just to meet their day to day expenditures. Revenue generation from energy projects avails to small farmer cooperative schemes the option of creating funds that shore up enough liquidity to avail soft loans to their members pegged on the agricultural produce their bring to their respective societies. Micro finance and agriculture is already a proven successful model through which sustained economic and social benefits can be channelled to transform communities and economies as a whole[22]. By creating micro finance facilities financed initially by the energy generation yields from renewable projects in rural farmer communities the entire value chain of agriculture in these communities can be revolutionized. Some of the key interventions that a micro finance model of this nature would address itself to include:
    a. **Pre-harvest financial assistance:** Financial products available to farmers here would include risk weighted insurance on crops at the time of planting, soft loans to improve farmer access to farm inputs such as fertilizers and pesticides and soft loans to farmers post-harvest to mitigate the pressure on these farmers to dispose of their crops immediately after harvest.

[22] Microcredit and Agriculture: Challenges, Successes, and Prospects
By
Richard L. Meyer

b. **Post –Harvest assistance:** Transportation of harvested goods from farm gate to market represents a significant financial burden on farmers. By grouping farmers in cooperatives and availing financing to them to transport their goods together communally rather than individually creates economies of scale that reduce the overall transportation burden.
c. **Value addition and post-harvest management**: Cooperative loans to establish remote agro-processing and warehousing facilities for farmers increase the value of the product they take to market as well as increase the shelf life of products. This has a subsequent effect on the delivery timelines of product to market, which in effect allows farmers to dictate the price at which they can sell their produce.

Plausible scenarios for the implementation of this approach could evolve into a structure similar to that laid out below:

1. Donor Funded Intervention to guarantee small farmer cooperative shareholding in energy projects.

A developmental finance institution would meet the pre-construction costs of the proposed Renewable energy intervention. The valuation of the total works conducted to develop the project up-to Feasibility Study level would then determine the shareholding of the cooperative society.

2. Project Sponsor/ developer construction of the facility with cooperative society occupying minimum shareholding.

Shareholder agreements are set in place to guarantee long-term equity stake of the cooperative society.

3. Cooperative societies then establish micro-finance ties with existing MFIs which are guaranteed against the revenues from electricity generation restricted to the cooperatives equity stake in the power project.

ANNEX 9: ANALYSIS OF THE PRLA PROGRAM

The economic analysis of the PRLA report outlined a number of immediate interventions that are feasible for the agriculture sector in Uganda.

Our observations compliment rather than detract from the findings and recommendations in the report.

1. The report highlights the need to have more direct participation of farmers in the energy projects as grouped associations. The report also focusses on a specific need to increase direct access to electricity. It rightly identifies that there are more incentives toward electricity generation rather than distribution.

2. The report recommends the scaling up of power projects from the current 0.3 to 2 MW size. Whereas generic estimates around the economic incentives tied to economies of scale on larger transaction are certainly not in question and generally we agree with this assessment, it does need to be understood that there are project specific dynamics which may not always favor larger power projects. A prime example would be the capital spent in land acquisition for project development. In addition to the cost component of the and there is also the potential land conversion from agricultural productivity to energy generation. The objective of the program is to increase farmer access to power rather than to have farmers convert their economic activities from farming to energy generation. Scaling up is recommended, provided that there are no further/new constraints presented such as the identification of suitable feedstock streams for biomass projects or limitations on size. There are certainty economies of scale in the development and implementation phase for larger projects.

3. The sustainable development parameters concerning equal gender participation and use of electricity to meet the energy demands for agro processing and domestic energy consumption are in line with our proposed interventions.

In addition to the interventions proposed in the PRLA CBA we recommend:

1. Real time data collection. The FtF PRLA report examines farmer associations as block and identifies potential increments in productivity by direct energy access from RE projects. The data assumptions, as identified in the report, are generic and make assumptions on the nature of electricity demand. We propose a solution that does three things, sell electricity to the national grid, creates an equity position for farmer organizations and sells electricity to farmer associations for their commercial needs. To achieve this objective it imperative to accurately size existing loads, a 1.5 MW project for example can power more than 150,000 Ugandan homes at per capita consumption rates. This however is not true of many village stings which have different family size, appliances and subsequent energy needs. This dictates the need to conduct a baseline basement

of energy needs to accurately size systems that can meet demand and still generate enough power to sell to the grid to secure investor returns.

2. Focus on REA subsidies for grid connection. Mini grids for domestic consumption assume consistency in power consumption for households at baseline levels. In actual sense mini grid operators often find that households either increase their power consumption as they acquire more outlets to spend more power (typically via the acquisition of more appliances) or a complete abandonment of their electricity consumption. In either case the ultimate back drop should be for the PRLA program to generate electricity and have it mated by regional and or national grid operators to avoid the extraordinary pressures of managing what are often very erratic demand cycles. In this sense, power projects under the program would focus themselves on power exports to the grid and to centralized load points such as small factories and processing centers rather than in the farmer homes.

3. Diversification of farmer access to financial products. Whereas the PRLA report offers a very strong case for the improvement of farmer income levels via improved productivity, it fails to analyses the full extent of the other financial incentives accruable to farmers who invest in power projects collectively. As had been discussed in Section 8 of the report, this line of thought is indeed an effective approach but it fails to observe the complete set of benefits possible and as such fails maximize on the full chain of benefits that can be directly passed on two farmers.