

# SAMSET brief on Renewable Power Purchase Agreements

This briefing note has been designed for use by city officials and planners working in sub-Saharan Africa. It is a practical guide, which identifies easy to achieve energy interventions that will save money (for cities, businesses and households), promote local economic development, and enhance the sustainable profile of a city. This note is specifically aimed as a support tool to achieve the implementation of key interventions within municipalities across sub-Saharan Africa.

African municipalities need to be prepared to deal with an explosion in demand for services from burgeoning populations caused by two factors – high population growth in Africa as a whole, and rapid urbanisation. An interesting feature of population growth in sub-Saharan Africa is that it is expected to take place mostly in small and medium sized cities, rather than capitals (UN-Habitat, 2010). These changes are taking place at a time when many countries are devolving administrative powers to local governments, yet municipal authorities lack the skills and expertise to address challenges, to manage resources, and to implement and enforce policies.

Energy is only one of many services that municipalities need to address in the face of increasing urbanisation, but it is crucial to any form of urban development – planned or otherwise. People need energy as part of their every-day lives. The supply of energy is closely

linked to economic development, health and individual wellbeing, as well as to local and global environmental sustainability.

Recognising the emerging role of municipalities, with limited capacity, in addressing energy provision in urban centres, the “Supporting African Municipalities in Sustainable Energy Transitions” (SAMSET) project seeks to build capacity and develop a practical and effective knowledge exchange framework for supporting actors involved with municipal energy planning. This note is an output of the SAMSET project.

The purpose of the note is to give planners an idea of the range of energy interventions that it is possible for them to implement at the municipality level. It provides enough information to give a basic understanding of different energy technologies – enough to start making enquiries and engage in discussion. More detailed technical expertise will, however, be needed in order to design a bankable project.

Full guide can be found at [africancityenergy.org/uploads/resource\\_101.pdf](http://africancityenergy.org/uploads/resource_101.pdf)

More info can be found at [africancityenergy.org/](http://africancityenergy.org/)

More project info can be found at [samsetproject.net](http://samsetproject.net)

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## Overview

Power Purchase Agreements (PPAs, sometimes known as off-take agreements) can be used to make renewable energy more accessible to residential and commercial consumers. A PPA is a legal contract between a generator and a purchaser of electricity. These agreements are important in the financing of electricity generating infrastructure, particularly concerning renewable energies. The owner of the generating infrastructure is able to use the PPA to get financing, given clearly defined electricity outputs and the revenues associated with them. It is often private developers that seek to develop renewable energy projects, where the electricity generated is to be sold to electricity distributors. These distributors may be interested in purchasing renewable energy for a variety of reasons; for example, they may be mandated to source a given proportion of renewable electricity, or they may be able to provide premium tariffs by selling ‘green’ electricity to willing buyers (some would argue that renewable electricity should be sold at discounted rate

rather than a premium tariff, but that’s a different argument).

PPAs are used for power projects where:

The projected revenues of the project would otherwise be uncertain and so some guarantee as to quantities purchased and price paid are required to make the project viable.

There is a possibility of competition from cheaper or subsidised domestic or international competition (e.g. where a neigh-

bouring power plant is producing cheaper power) - the PPA provides some certainty of being protected from such competition.

There is just one or a few major customers that will be taking the bulk of the product. For example, a government utility may be purchasing the power generated by a power plant. The government will want to understand how much it will be paying for its power and that it has the first call on that power. The project com-



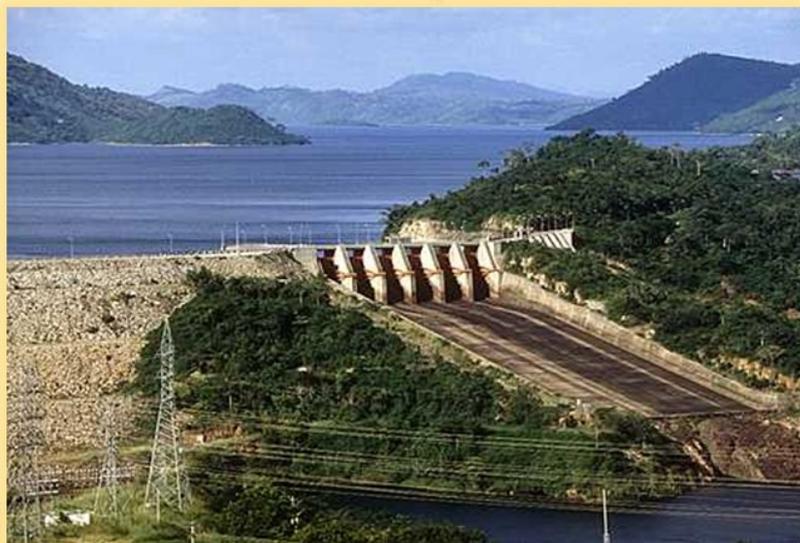
## Case study: Ghana 100 MW Hydro Power PPA

US based project developer Zoetic Global has executed a 20 year PPA with the Electricity Company of Ghana (ECG) for 100 MW of additional power generation from the Akosombo Dam, Lake Volta.

The project will involve an array of modular hydrokinetic turbines to be deployed in the post-dam wash of the Akosombo Dam. The In-Stream Auger Turbine (IAT) technology being used is designed for high efficiency power generation from flowing water and will leverage existing infrastructure at the dam site including grid connections, access roads, and on-site maintenance buildings.

Zoetic is actively negotiating PPAs in other nations in SSA as interest in renewables increases.

Image © Chances Hotel



pany will want certainty of revenue; the purchaser wishes to secure security of supply.

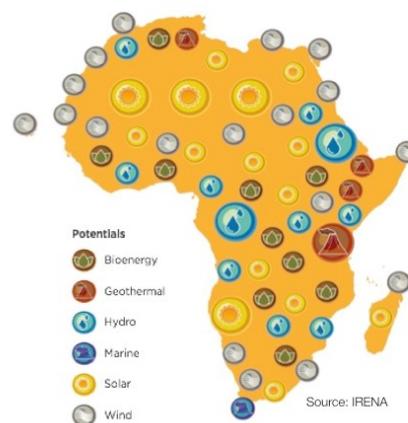
The 2011 Abu Dhabi communique on Renewable Energy for Accelerating Africa's Development was adopted by 46 Africa countries. A number of countries in sub-Saharan Africa now have targets for the proportion of electricity to be produced from renewable sources e.g. Ghana 10% by 2020, Nigeria 20% by 2030, Uganda 61% by 2017. Power Purchase Agreements are just one of the tools that need to be standardised in order to achieve smoother interconnection of regional power pools. At this level, PPAs are used to finance large scale plant e.g. 100's of MW of hydro-power plant. PPAs can also be set up between small scale power producers and utilities, or even between independent power producers and independent power consumers, such as mines or hospitals.

looking to the private sector to finance new generating capacity. PPAs are a part of the procedures involved in establishing these types of relationships. PPAs can be used as a mechanism to promote the development of renewable electricity generation. Agreements that commit a utility to buying electricity generated by an independent producer can be used to support both large scale installations (10s of MW), and small scale installations (a few kW).

'Green tariffs' offer a way for residential, commercial, or industrial consumers to support renewable power generation by buying electricity that has been bought by the utility from renewable power generators (through a PPA). Companies can reduce their carbon footprint, reduce their environmental impact, and demonstrate their commitment to a sustainable future by purchasing green electricity. However, it is not clear that these kinds of tariffs are currently available across Africa.

## Potential for Rollout

Africa's renewable energy power potential is substantially larger than the current and projected power consumption of the continent. The map below shows the distribution of identified renewable energy potential in Africa.



## Case study:

### Nigeria 100MW Solar Power Plant

Scatec Solar entered into an agreement with CDIL, a Canadian renewable energy development company focused on Africa, and BPS, a Nigerian strategic consulting firm, to develop a 100 MW solar power project in Jigawa State, Nigeria. A 20 year PPA was subsequently signed with the Nigerian Bulk Electricity Trading Plc (NBET) by the Nova Scotia project company in July 2016.

A long-term player with an installation track-record of close to 600 MW, Scatec Solar will develop, build, own and operate the solar power plant in Jigawa. The project is expected to reach financial close in 2017 and commercial operations 12 months thereafter.

## The Case

Fossil fuel based electricity production is one of the largest industrial sources of carbon dioxide, a primary greenhouse gas linked to climate change. It is also a major source of pollutants including nitrous oxide, sulphur dioxide, mercury and particulate matter. As of 2012, 18% of sub-Saharan Africa's energy was provided by oil, followed by 16% by gas, and the majority of electricity (60%) originating from hydropower. Sub-Saharan Africa's population is growing rapidly, its economies are developing, and more and more people need access to electricity, so substantial investment in expanding electricity generation capacity is required. Liberalisation of electricity markets means that utilities (and governments) are

PPAs for solar energy, for example, have a number of benefits:

### No or low upfront capital costs:

The developer handles the upfront costs of sizing, procuring and installing the solar PV system. Without any upfront investment, the host customer is able to adopt solar and begin saving money as soon as the system becomes operational.

### Reduced energy costs:

Solar PPAs provide a fixed, predictable cost of electricity for the duration of the agreement and are structured in one of two ways. Under the fixed escalator plan, the price the customer pays rises at a predetermined rate, typically between 2% - 5%. This is often lower than projected utility price increases. The fixed price plan, on the other hand, maintains a constant price throughout the term of the PPA, saving the customer more as utility prices rise over time.

### Limited risk:

The developer is responsible for system performance and operating risk.

Better leverage of available tax credits: developers are typically better positioned to utilize available tax credits to reduce system costs. For example, municipal hosts and other public entities in the USA with no taxable income would not otherwise be able to take advantage of the Section 48 Investment Tax Credit.

### Potential increase in property value:

A solar PV system has been shown to increase residential property values. The long term nature of these agreements allows PPAs to be transferred with the property and thus provides customers a means to invest in their home at little or no cost.

Across sub-Saharan Africa, the Levelised Cost of Electricity (LCOE) is declining for wind, solar PV, CSP and some biomass technologies, while sustainable hydropower produced at good sites remains the cheapest option to generate electricity. Across the spectrum, renewable energy technologies are becoming increasingly competitive with fossil fuel options. The key to unlocking these sources is the development of effective financial mechanisms to stimulate the growth of the renewable energy market.

Both Ghana and Uganda have Feed-in Tariffs, which ensure that renewable power producers are paid a rate for their energy that makes their investment feasible. Evidence from other countries that have followed this route shows a marked increase in renewable energy generation after a feed in tariff is implemented.

### Uganda FiT:

In 2013 Uganda implemented a Global Energy Transfer Feed-in Tariff (GET FiT) regime which sets fixed tariffs across technology types and priority treatment for renewable energy. This has then been enhanced by public sector development partners (including Germany, the United Kingdom and Norway) providing financial support by way of a Premium Payment Mechanism (PPM)

implemented by the German development bank KfW. The PPM is payable to the project company on top of the fixed tariff amount. The GET FiT creates an attractive investment environment as it effectively offers a guaranteed market for IPPs using solar, hydro, biomass and bagasse, and producing 1-20 MW.

### Ghana's PPAs

There is no standard form of PPA in the Ghanaian market. Nevertheless, the power sector is relatively small and the negotiation of new PPAs tends to be supervised from the government's perspective by staff who have been involved in earlier PPA development and negotiations. Some of the PPAs that have been entered into to date have provided developers with a robust risk allocation that is in line with project finance norms for emerging markets. Therefore developers should be able to achieve a bankable risk allocation.

The tariff structure under precedent PPAs in Ghana provides for the payment of capacity charges for dependable capacity and energy charges for electrical energy delivered.

### Barriers to Implementation

The following issues have been identified as barriers to the implementation of PPAs:

- Lengthy processes: Technical and legal complexities existing around institutional and contractual arrangements cause implementation to be a lengthy process. Drawn out Feasibility Assessments and Environmental Impact Assessments also hinder progress.
- Concern for payment delays under PPAs:
- Potential risk of corruption for project companies and their investors.

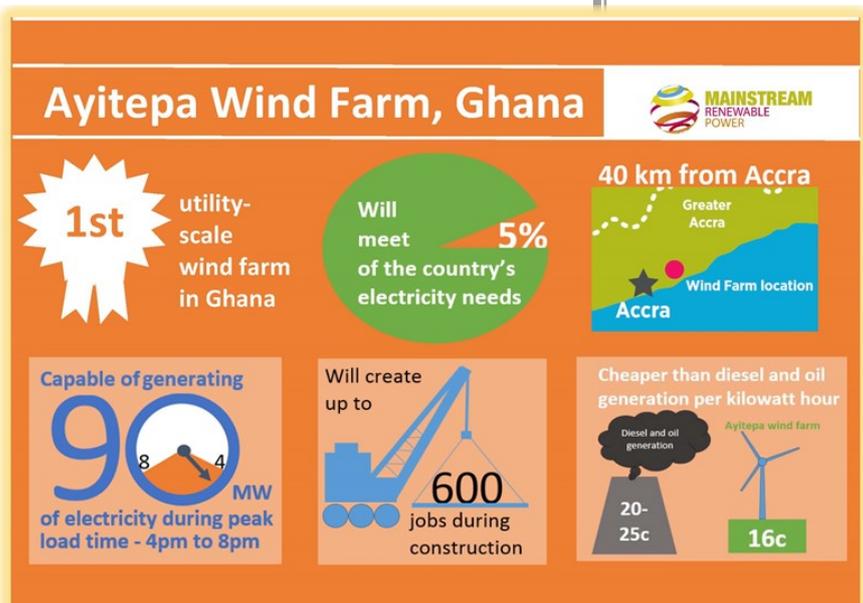
### Case Study: Ghana Ayitepa Wind Farm

In May 2016, the final Power Purchase Agreement for the 225 MW wind farm at Ayitepa was signed at the Headquarters of the Electricity Company of Ghana Ltd. (ECG) in Accra.

The Agreement has two phases and ensures the project company Upwind Ayitepa Ltd. the delivery of 150 MW of clean wind power in the first phase with the intentions to increase the project to 225 MW by phase 2. It is the first PPA signed in Ghana for a wind park demonstrating that the Government of Ghana is supporting the implementation of renewables in the future.

Clean power is expected to begin distribution in early 2017.

Image © Ayitepa wind farm



## Implementation

Alongside the implementation of REFITs across sub-Saharan Africa, a number of regulations and initiatives are in place to encourage the use of renewables and PPAs. These include:

### Maputo Declaration:

In February 2009, the African Union Assembly of Heads of State and Government decided in Addis Ababa to develop renewable energy resources in order to provide clean, reliable,

affordable and environmentally-friendly energy. African governments reaffirmed their political will in 2010, with the Maputo Declaration, which established the Conference of Energy Ministers of Africa (CEMA). In 2011, 46 African countries with the participation of 25 African energy ministers adopted the Abu Dhabi Communiqué on Renewable Energy for Accelerating Africa's Development, which called for the increased utilisation of Africa's renewable energy resources to accelerate development.

### Case Study: Tanzania Small Renewable Energy Projects

The Government of Tanzania adopted a new Electricity Act in 2008, which opened up the sector beyond the national utility, introducing standardised Power Purchase Agreements (PPA) and power purchase tariffs to reduce transaction costs. Under the standard PPA, the buyer is obliged to purchase a certain amount of power, in return for which the seller agrees to follow interconnection guidelines and bear interconnection costs. Both have a legal obligation to keep financiers informed of progress and the national utility coordinates the interconnection, production and payment process. Since the introduction of these standardised regulations in 2010, the national utility has undertaken standardised PPAs for 40 MW of small renewable energy power projects. These projects are now supplying the national grid with enough clean electricity to light 54,000 rural households.

Image © OPIC



### Case Study: Uganda Bujagali Hydro Power Project

Image © AKDN



### Programme for Infrastructure Development in Africa (PIDA):

Similarly, various subsidiary bodies of the African Union have committed to specific strategies and action plans for accelerating the deployment of renewable energy, such as the Programme for Infrastructure Development in Africa (PIDA). In 2012, African Heads of State endorsed the Programme for Infrastructure Development for Africa (PIDA) including a pipeline of 15 priority energy projects amounting to a total budget of USD 40.5 billion, to be implemented between 2012 and 2020.

### Power Africa Initiative:

In 2013 President Obama launched the Power Africa initiative. The goal is to address Africa's energy deficits by working with the private sector, partner governments, and international organizations to remove the obstacles that hinder the development of much needed power projects. A key aspect of power projects negotiations is power purchase agreements (PPA). Due to the complexity of these contracts, Power Africa released "Understanding Power Purchasing Agreements", a handbook which not only explains PPAs but creates a foundation that can help African countries standardize the process. The Power Africa Initiative focuses on large scale power projects, involving complex PPAs, which typically take 5-10 years to complete. It is hoped that increasing capacity to handle PPAs can reduce these timescales to 3-5 years.

Uganda's largest hydropower project is the 250MW Bujagali hydro power project which was commissioned in 2012, almost doubling the country's then installed capacity. A public private partnership between Government of Uganda (GoU), Blackstone Portfolio Company, Sithe Global Power, and the Aga Khan Fund for Economic Development, the project is a 'Build Own Operate Transfer' scheme under a 30 year PPA. The construction included a 100km 220kV high voltage transmission line.

This document is an output from a project co-funded by UK aid from the UK Department for International Development (DFID), the Engineering & Physical Science Research Council (EPSRC) and the Department for Energy & Climate Change (DECC), for the benefit of developing countries. The views expressed are not necessarily those of DFID, EPSRC or DECC, or any institution partner of the project.