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Fondazione Eni Enrico Mattei

Report

Public-Private Partnerships as Drivers for Energy Infrastructure and Socioeconomic Development in Ghana

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Abstract

This report presents an analysis of the potential of Public and Private Partnerships (PPPs) for the transformation and diversification of Ghana's energy market and infrastructure. Ghana, despite a recent slowdown, is one of the leading economies of West Africa, as well as one of the countries within the region with the highest electrification rate. On the other hand, huge dependency from biomass and oil, lack of access to electricity in the rural areas and slow development of renewables represent critical constraints to the creation of a sustainable and universally accessible energy system. If supported by adequate conditions PPPs are key instruments to ensure universal access to energy and transition to a low-carbon economy. In the following pages, a focus on the main actors, existing legal framework, on-going operations, main issues and good practices will try to assess the crucial contribution of PPPs to the socioeconomic development of this country.

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01 Executive Summary

The global call for a forward-looking approach on the development of policies stimulating energy access included in the 2030 Agenda for Sustainable Development - notably SDG 7 calling for universal access to affordable, reliable, sustainable and modern energy and SDG 16 calling for accountable and inclusive institutions at all levels – can be seen as the leverage to identify new and innovative solutions to fund and deliver effective projects on energy access in developing countries. In this context, Public and Private Partnerships (PPPs) appear to be one of the most successful and still unexplored instruments for green finance.

Within the African continent, West Africa is one of the regions with the greatest economic potential, as it is registering one of the highest growth rates (+6% in 2014) and one of the highest rates of electricity access (47% in 2012).

Ghana in particular is considered one of the driving countries of the region, with an 8.7% of real GDP growth expected for 2017 and 78% of the population with access to electricity (*Global Tracking Framework, 2017*), although Ghanaian economy faced a slowdown in terms of growth expectations during the latest years.

The overall positive economic trends are playing an important role to attract private investments able to scale up green finance for sustainable electric infrastructure in the region.

However, private actors tend to be reluctant to establish partnerships with the public sector without a coherent regulatory framework and public guarantees by sound and transparent institutions. The lack of these conditions represents a major obstacle for the flourishing of PPPs in Ghana, like in the whole SSA region.

In this context, Ghana is still far from being an attractive country for private investment (70th in the global ranking, *Corruption Perception Index, 2016*).

On the other hand, institutional efforts have been made in the country in order to improve the existing regulations on private investments, as well as to increase the share of renewable energy in the total energy consumption.

In fact, the Public Private Partnership Bill – drafted with the financial support and the expertise of the World Bank – is ready to become effective, and in its Intended Nationally Determined Contribution, Ghana intends to mobilize nearly USD 22.6 billion investment from both domestic and international public and private sources in the next ten years in order to – among other objectives - scale up renewable energy penetration by 10% by 2030.

Moreover, additional instruments for encouraging foreign private investments in the country have been adopted in the latest years, such as the Ghana Investment Promotion Centre (GIPC) and Ghana Free Zones Board (GFZB).

The GIPC – established in order to give evidence of the Ghanaian government's commitment to encouraging foreign investment in its economy – acts as the first port of call for investors, whereas GFZB helps with licensing and permitting required by certain industries to operate in Ghana, allowing a free zone company in Ghana to be 100% foreign owned, 100% Ghanaian owned or investors can come together to form a company or a joint venture between a Ghanaian and a foreigner.

PPPs represent an effective financial tool for investing on sustainable electric systems in developing countries, able to combine inadequate public budget with the needed private funding, allowing for risk sharing, a lower overall capital cost and blended return for investors. Moreover, the joint ownership with large international firms can help develop local private sector capabilities and boost its business associated with green energy transformation.

When it comes to green investments in developing countries, and especially on energy projects, obstacles are high due to various factors, among others the perception of sustainability policies as a trade-off for rapid economic growth, and the reluctance of private actors to invest on projects with long-term horizons, higher risks and lack of public guarantees by national institutions.

The report will analyse the main risks and benefits connected with the PPPs, for both private investors and public actors during the different phases of the partnership: political stability, governance, quality of regulatory framework, the role of multilateral institutions, commercial and development banks and sovereign funds, risk-sharing capacity, efficient management and mobilization of funds, knowledge transfer.

Ghana is today benefitting from projects funded by PPPs.

With this regard, the recent Kpone Independent Power Plant, a 340MW combined cycle dual-fired independent power producer project, located in the heavy industrialised area of Tema, is an excellent example of collaboration between private business, development finance institutions and commercial banks.

As far as the progress in terms of rural electrification is concerned, Ghana is currently following the general trend in many countries in Sub-Saharan Africa, developing mini-grid and off-grid solutions to guarantee access to populations in the rural areas. A particular focus is given to the exploitation of renewable sources of energy available in the country, and to their unexplored potential. In this framework, the Government of Ghana has recently launched national plans such as the Ghana Energy Development and Access Project (GEDAP), a multi-donor PPP project involving private actors and multilateral institutions with the objective of improving the operational efficiency of the power distribution system and increasing the population's access to electricity and help transition Ghana to a low carbon economy through the reduction of greenhouse gas emissions.

In a region like West Africa, with high growth rates but still important gaps in terms of energy access, Public and Private Partnerships are able to create win-win situations, generating profits for private investors, delivering

successful results for public institutions and enhancing life conditions of people in both urban and rural areas.

If supported by good governance and a sound legal and regulatory framework, Public and Private Partnerships (PPPs) represent the key instrument for the transition to a low-carbon energy system and to make the electricity sector more viable to provide universal access to all.

A well-designed Public and Private Partnership structure which reaps private sector advantages in terms of innovation and knowledge transfer, efficient management and mobilization of funds is a key factor in energy infrastructure investments and should play a central role in government strategies for achieving universal energy access goals and reliable power in order to foster economic development.

02 Introduction

The West Africa region's GDP grew at 6.4% between 2006 and 2010 (African Economic Outlook, 2015) and 6.1% in 2014. This growth was driven primarily by Nigeria, which accounts for nearly 70% of the region's GDP (Ghana and Cote d'Ivoire account for 6.9% and 8.1% respectively, and the remainder is shared between the other 11 countries). Compared with sub-Saharan Africa, which grew by 4.4% on average between 2010 and 2014, West Africa grew by 5.7% (World Bank, 2014). Between 2010 and 2014 the West African economy that grew most rapidly was that of Sierra Leone, with an average growth rate of 10%, followed by Ghana (8.5%), Niger (6.8%), Burkina Faso (5.8%) and Nigeria (5.7).

This growth was driven mainly by the service sector followed by the manufacturing and agriculture sector. Extractive industries were less important, which is a sign that the region – in particular Nigeria – is successfully diversifying its economy (African Economic Outlook 2014). Despite this, crude oil represented 96% and 55% of Nigeria and Ghana's exports in 2013 (AfDB, 2013). In general, the region's exports are largely limited to fuel and food products (AfDB, 2015). Growth in West Africa over the past two decades can be mainly attributed to: successful resolution of political instability; better macroeconomic management; strong global demand for West Africa's main export commodities especially crude oil and cash crops such as cocoa; and new mining exploitation.

Ghana is the most populated country in the Western Africa region after Nigeria, and its population is growing rapidly up to 36.87 million by 2030. Poverty rates are the highest in Liberia (83.8%) and Nigeria (62%), representing 110.7 million people, and Sierra Leone (56.6%) and Togo (52.5%). Ghana, Gambia and Senegal have the lowest poverty rates of 28.6%, 33.6%

and 34.1% respectively (UNDP-HDI, 2015).

According to an IEA modeling exercise, between 2014 and 2040 a strong shift in sub-Saharan Africa's electricity generation mix is based on three main features: i) a decrease of coal from 53% to 24% of the mix; ii) an increase of gas from 9% to 25%; iii) an increase of renewables (excluding hydro) from 2% to 16% (IEA, 2016). Electricity transmission and distribution losses remain very high in all sub-Saharan Africa (22% in Ghana) and in order to meet future electricity demand growth, the whole region's electricity network will thus have to be reinforced, modernized and expanded. This will have to happen at national level, but also at regional level by developing four regional power pools (i.e. Southern Africa, Western Africa, Central Africa and Eastern Africa) (Kambanda, 2013) that will be key to fully exploit vast untapped potential for both large-scale hydropower and gas (Irena, 2012).

Against this background, and considering that mix of policies and energy portfolios aimed at expanding access to energy involve different investment needs and innovative financial mechanisms, a regional approach at the sub-Saharan level, or even at sub-regional level (West Africa) is preferred to a single country approach.

The first challenge in the expansion of electricity infrastructure in sub-Saharan Africa and in the West African region lies in the difficulty to finance large-scale projects in risky and institutionally unstable environments that contribute to raise the cost of capital and makes it difficult for the project to be bankable.

A novel financial mechanism, or a combination of traditional financial instruments, that leverage greater investments from multiple investment sources (both public and private) and combining different de-risking instruments (including grants, guarantees and insurance) allows for a lower overall capital cost for energy infrastructure projects and blended return for investors (according to the blended capital structure).

In brief, Public-Private Partnerships (PPPs) and blending finance represent the most valuable instruments for energy projects financing in developing countries, where challenges for access to capital can be greater, given the higher investment risks. The concept of blending finance is very important because by combining grants with loans or equity from public and private financiers allows attracting needed private capital and engaging the local private sector.

Established in 2007 the EU-Africa Infrastructure Trust Fund (EU-AITF) aims to increase investment in infrastructure in Sub-Saharan Africa by blending long-term loans with grant resources to gain financial and qualitative leverage as well as project sustainability. One of the two financing envelopes of the EU-AITF, the SE4ALL envelope, is addressed to finance access to energy in Africa.

In September 2016 a new European External Investment Plan (EIP) (European Commission, 2016) to encourage investment in Africa and in the EU-Neighborhood, to strengthen partnerships and contribute to achieve the Sustainable Development Goals was announced. The EIP has been conceived with a dual objective to face EU migration challenges by developing stronger and more developed

societies beyond EU boarders and, at the same time, to facilitate EU private enterprises exporting their businesses outside the EU in countries with a more stable economic and political environment. The EIP will support the implementation of the new Partnership Framework and the achievement of 2030 Agenda in Africa.

While forecasts made by the African Development Bank (AfDB) in 2016 were claiming West Africa as the second fastest-growing sub-region within the African continent after East Africa, with an expected real GDP growth of 4.3% in 2016 and + 5.5% in 2017 (AfDB, OECD, UNDP 2016), most recent data show that last year's predictions were too optimistic: West Africa's GDP growth was only by 0.4% in 2016, the worst sub-region result in the African continent. GDP growth projections for 2017 scaled down to a +3.5% in West Africa, while a +5.5% is foreseen for 2018 (AfDB, OECD, UNDP 2017).

Projections for the region report that energy demand growth falls from more than 3% per year since 2000 to around 2% per year in the period 2015-2040. Nevertheless, due to other crucial factors other than growing population – i.e. economic expansion, increasing urbanization, industrialization and modernization – the demand for primary energy in West Africa is expected to grow to 355 million tonnes of oil equivalent (Mtoe) by 2040, while forecasts for electricity demand in the region foresee an increase to 417 TWh by the same year with a CAGR of 7.1% according to the IEA New Policies Scenario (IEA, 2014).

Ghana, with a 7.1% of real GDP growth expected for 2017 (AfDB, 2017) and a GDP per capita of 1,480 USD (WB, IEA, 2017) is one of the leading economies of Western Africa, able to attract the biggest share of Foreign Direct Investments (FDI) among West African countries: 2.5 billion USD in 2015 (AfDB, 2016). Electricity demand is growing annually by around 10% and is estimated to reach around 24,000 GWh by 2030 (IRENA, 2015) or to fall within 20,453 and 34,867 GWh by the year 2020 (Adom, P.K., Bekoe, W., 2012). A few studies state that in Ghana it exists a long-run equilibrium relationship between electricity consumption and economic growth, and that economic growth leads to electricity consumption. More in detail, the results show that 'the historical growth trends experienced in domestic electricity demand is explained by the positive income, structural changes, and urbanization effects which more than offset the negative efficiency effects' (Adom, P.K., Bekoe, W., 2012; Adom, P.K., 2011).

In Ghana 78% of the population has reached access to electricity in 2014 – the highest share in West Africa – with a 90.8% peak in urban areas, and the renewable energy share in the total final energy consumption stood at 45.22% in 2014 (WB, IEA, 2017), almost all out of hydropower generation (ECG, 2016)[1]. However, Ghana is characterized by inadequate electricity supply and frequent power outages (more than 600 hours per year according to IEA analysis) (IEA, 2014) that have both direct and indirect effects on utilities, companies and the whole economy as a whole. About half of Ghana's 161-kilovolt (kV) transmission

1 *In 2015 Ghana's electricity generation was 11,492 GWh, almost equally divided between hydro (5,845 GWh) and thermal generation (5,644 GWh). Energy Commission of Ghana, Ghana Energy Statistics 2006-2015 (2016)*

infrastructure, which has been operating since the 1960s, is long past its recommended retirement age. Ghana's transmission system needs a significant amount of investment to offset the underinvestment of the past decade.

According to the WEF Global Competitiveness Index, Ghana Infrastructure Score - being a component of the overall index and covering electricity, telephony and transport infrastructure, is as low 2.9 (over 7) and the quality of electricity supply being even worst at 2.2, positioning Ghana in a low ranking position (126 over 140). (WEF, 2016) Within this framework, huge capital investment is required to meet the energy infrastructure needs of a fast-growing population in Ghana (+2.4% per year in 2010-2015, UNDESA) expecting to reach 40 million in 2035 and with around 7 million people today not provided with access to electricity.

Important investment need is also required to comply with the Intended Nationally Determined Contribution (INDC) under the Paris Agreement. Ghana has committed to take actions focused to scale up renewable energy penetration by 10% by 2030 (through wind, solar, small-medium hydro and distributed generation) and to double energy efficiency improvement to 20% in power plants, with the aim of scaling up 120 MSCF (million standard cubic feet) natural gas replacement of light crude oil for electricity generation. This two actions combined imply a total investment need of almost 3,500 USD million by 2030, and the effects would likely generate a reduced consumption of fossil fuel for power generation, as well as an increased electricity access to rural communities and a significant contribution to realize energy security. Nonetheless, there would be an electricity demand saving of about 200MW (Government of Ghana's INDC, 2015).

If in the whole African continent a bigger participation of private business is widely beneficial and considered a decisive leverage for economic growth, Ghana makes no exception. The country is slightly increasing its attractiveness for private investors through the establishment of Public-Private Partnerships (PPPs) for infrastructure projects in the energy, telecommunication and transport sectors. Today in Ghana a total investment of 3,280 USD million has been spent in PPP energy infrastructure projects since 1990 (as of 2014), and the majority of them are greenfield projects.

03 Governance of energy transformation in Ghana

3.1 Strong institutions: key for infrastructure investment

Institutions comprise the network of laws, policies, regulations, organizations, cultural practices that play a critical role in attaining concrete results from national development efforts. Weak laws can foster red tape and corruption, diverting scarce resources from development to other uses and undermining socio- economic development. Lower level of corruption and more effective rule of law are associated with more Public Private Partnership projects (Hammami et al., 2016).

Other studies have been conducted, such as that by Araya et al. (2013) analyzing the relationship between country risk and private participation in infrastructure development and that by Mengistu (2013) analyzing the determinants of private participation in infrastructure (PPI) comparing Sub-Saharan Africa (SSA) with low- and middle-income countries (LMICs). The latter study finds that private participation in infrastructure investment in LMICs is determined by expected factors, whereas in SSA it appear to be sub-optimally allocated. In particular, when it comes to larger PPI investments the findings suggest that corrupt countries with inefficient governments seem to attract more PPI infrastructure.

Another study, Gasmi et al. (2010), assesses the extent to which the level of development of financial sector is a determinant of private investment in the power sector in 37 developing countries. The results suggest that investors tend to take countries' governance quality into account in their decisions to invest. The empirical results highlight that the development of the financial sector also plays a significant role in private investors' decisions to enter infrastructure sectors.

According to a specific study on Ghana (Asante, 2000), during the period 1970-1992 public investment lagged private investment, and the growth of real credit to the private sector are key determinants of private investment. However, the author finds that the growth rate of GDP negatively influences private investment and so does macroeconomic and political instability.

According to the WEF Global Competitiveness Index, in Ghana the strength of investor protection, one of the component of the pillar Institutions, is 5.7 where 10 is the best. Moreover, an Executive Opinion Survey conducted by WEF in 2016 highlighted the most problematic factors for doing business in Ghana. The first one being considered the access to financing, followed by corruption, tax rates, foreign currency regulations and only at the 7th place is the inadequate supply of infrastructure followed by policy instability (Figure 1).

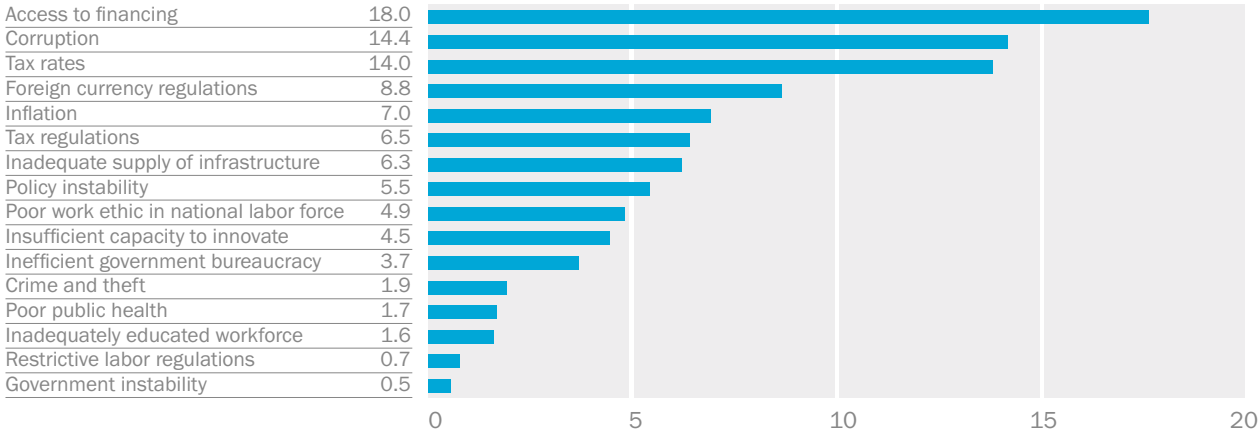


Figure 1: *Ghana's most problematic factors for doing business - Source: World Economic Forum, Executive Opinion Survey 2016*

If we take into consideration the 2030 Agenda and its SDG n. 16, calling for peace, justice and strong institutions, according to the most representative indicator, the Corruption Perception Index, Ghana is the second worst decliner in the 2016 Transparency International Corruption Perceptions Index in the African region.

Ghana declines to the 70th position in the 2016 index with a score of 43 compared to a score of 47 in the previous year index. (Figure 2). Ghana is however at the ninth position among Sub-Saharan African countries and in the third position in West Africa, after Senegal and Cape Verde.

2016 Rank	Country	2016 Score	2015 Score	2014 Score	2013 Score	2012 Score	Region
35	Botswana	60	63	63	64	65	Sub Saharan Africa
38	Cape Verde	59	55	57	58	60	Sub Saharan Africa
50	Mauritius	54	53	54	52	57	Sub Saharan Africa
50	Rwanda	54	54	49	53	53	Sub Saharan Africa
53	Namibia	52	53	49	48	48	Sub Saharan Africa
62	Sao Tome and Principe	46	42	42	42	42	Sub Saharan Africa
64	Senegal	45	44	43	41	36	Sub Saharan Africa
64	South Africa	45	44	44	42	43	Sub Saharan Africa
70	Ghana	43	47	48	46	45	Sub Saharan Africa
72	Burkina Faso	42	38	38	38	38	Sub Saharan Africa
83	Lesotho	39	44	49	49	45	Sub Saharan Africa
87	Zambia	38	38	38	38	37	Sub Saharan Africa
90	Liberia	37	37	37	38	41	Sub Saharan Africa
95	Benin	36	37	39	36	36	Sub Saharan Africa

Figure 2. *Corruption Perception Index Ranking 2016 in Sub-Saharan Africa - Source: Transparency International, Corruption Perceptions Index 2016 (2016)*

3.2 The institutional energy actors

3.2.1. The Ministry of Power

The Ministry of Power is responsible for formulating, monitoring and evaluating policies, programmes and projects in the energy sector. It is also in charge with the implementation of the National Electrification Scheme (NES), which seeks to extend the reach of electricity to all communities in the long term.

3.2.2. Regulators

The Energy Commission (EC) is responsible for setting and regulating standards of technical operations and the issuance of licenses for operations. It also advises the Minister of Power on matters relating to energy planning and policy. The EC has prepared a Distribution Code that is considered the technical standards, which will apply to both grid connected renewable energy (RE) technologies and mini-grid systems.

The Public Utility Regulatory Commission (PURC) is an independent multi-sector economic regulator responsible for setting and regulating electricity tariffs. PURC was established by the Public Utilities and Regulatory Commission Act in 1997 (Act 538) that requires the Energy Commission to publish guidelines on the tariff approval process. Under the 2011 Renewable Energy Law, the PURC is also in charge of setting feed-in tariffs (FiTs) for renewable energy generation.

3.2.3. Utilities

As part of power sector reforms implemented in 2005, the Volta River Authority's (VRA) mandate was restricted to electricity generation and the electricity transmission functions of VRA have been transferred to the Ghana Grid Company (GridCo). As for distribution, the Northern Electricity Distribution Company (NEDCo) is the electricity distribution utility company in Ghana. NEDCo is responsible for supply power to all the three Northern Regions of Ghana, namely Northern Region, Upper East Region and Upper West Region and part of the Asante and Volta Regions, while Electricity Company of Ghana (ECG) supplies power to the other regions. The ECG is a limited liability company wholly owned by the Government of Ghana and operating under the Ministry of Power.

3.3. Public Private Partnerships

3.3.1. Legal and Institutional PPP Framework in Ghana

In Ghana the leadership on PPPs is very fragmented and the large number of stakeholders involved slows down infrastructure project development. PPPs capacity within the Government is limited, restricting the ability to progress the pipelines of projects that are potentially bankable. The Public Investment Division in the Ministry of Finance and Economic Planning is responsible for PPPs regulation in Ghana. This Division includes the Project and Financial Analysis Unit and the PPP Advisory Unit.

Ghana has growing PPP experience PPPs but lacks a comprehensive legal framework. The country does not have a standalone PPP Law (a draft PPP bill is currently under review) and procuring PPPs is allowed under the National Policy on Public Private Partnerships adopted in June 2011 (the "PPP Policy"). The PPP Policy sets out some guidelines for the interim regulation of PPPs pending the enactment of the Ghana Public-Private Partnerships Bill. However, the "PPP Policy" is not an act of

Parliament and therefore it is not binding and enforceable although it is the policy that guides PPPs in Ghana.

The World Bank is supporting the Government to prepare the legal framework and administrative and management systems for the implementation of PPPs. The Bank has provided Ghana an amount of USD 30 million interest free credit over a four-year period (2012-2016) for capacity building at various levels so that a more comprehensive programme could be put in place to fully implement PPP projects from 2017 (WB 2015). However, the World Bank International Development Association (IDA) credit has failed to hire the necessary sector experts and its progress towards the achievement of its objectives is considered unsatisfactory. (Cambridge Economic policy Associates Ltd. 2015)

The program put in place by the Public – Private Infrastructure Advisory Facility (PPIAF)[2] has the objective to help the Government of Ghana facilitate long-term financing for infrastructure by establishing a well-structured Infrastructure Investment Fund that creates access to long-term financing by crowding-in private sector sources to support infrastructure and PPP projects. In 2014 the Ghana Infrastructure Investment Fund Act (the Act 877) is passed establishing the Fund which is wholly owned by the Government of Ghana.

The "PPP Policy" acknowledges several benefits of PPPs: i. Increased international and domestic investment; ii. Accelerated delivery of needed infrastructure and public services on time and within budget; iii. Encouraging the private sector to provide innovative design, technology and financing structures; iv. Risk sharing by government with private sector partners; v. Ensuring good quality public services and their wider availability; vi. Real financial benefits reflected in reduction in the initial public capital spending and a better allocation of public funds; vii. Improved O&M of public infrastructure.

The "PPP Policy" is structured to encourage the provision of a wide variety of quality and timely public infrastructure and services, until a PPPs bill will be passed. This will be achieved through faster project implementation, maximum leveraging of public funds, enhanced accountability and a shift to infrastructure management by the private sector. The 2013 draft bill is in line with international standards and consistent in terms of PPP binding processes, although it is less advanced in post-contract enforcement and does not foresee any dispute resolution settlement. However, the absence of an effective legal framework for PPPs has been of major concern to investors in Ghana.

An additional challenge for PPPs infrastructure investment in Ghana concerns the imbalance at the institutional level between the Public Investment Division of the Ministry of Finance, which centralizes skills and the broader public stakeholders and contracting authorities. This is shown in Figure 4 where Ghana is at the 9th

2 *The Public – Private Infrastructure Advisory Facility (PPIAF) is a multi-donor technical assistance facility that is financed by 11 multilateral and bilateral donors. Established in 1999 as a joint initiative of the governments of Japan and the United Kingdom, working closely with and housed inside the World Bank Group, PPIAF is a catalyst for increasing private sector participation in emerging markets.*

position in the institutional framework category of the PPP Framework Index elaborated by the Economist Intelligent Unit. The latter is a score created to assess the capacity of countries to carry out sustainable PPPs in infrastructure in Africa (Figure 3).

MATURE (80-100)	DEVELOPED (60-79.9)	EMERGING (30-59.9)	NASCENT (0-29.9)

	Rank		Score
	1	South Africa	70.7
	2	Morocco	51.8
	3	Kenya	51.4
	4	Egypt	51.0
	5	Tanzania	48.6
	6	Côte d'Ivoire	45.5
	7	Tunisia	45.4
	8	Uganda	45.1
	9	Rwanda	43.5
	10	Ghana	43.0
	11	Cameroon	38.2
	12	Nigeria	36.8
	13	Zambia	34.2
	14	Angola	31.4
	15	Democratic Republic of the Congo	20.6

Figure 3. *Overall PPP Framework Index in Africa*

	Score	Rank
OVERALL SCORE	43.0	10
1) REGULATORY FRAMEWORK	50.0	=6
2) INSTITUTIONAL FRAMEWORK	41.7	9
3) OPERATIONAL MATURITY	34.4	=9
4) INVESTMENT CLIMATE	58.1	=5
5) FINANCIAL FACILITIES	38.9	=6
6) SUBNATIONAL ADJUSTMENT	25.0	=8

Figure 4. *Ghana's score across all considered indicators - Source Figure 3 and 4: EIU (2015).*

3.3.2. Private sector participation in the energy sector

In 2011, a Renewable Energy Act (Act 832) was adopted to provide fiscal incentives and regulatory framework to encourage private sector investment. The provisions of the Renewable Energy Law includes: Feed-in Tariffs (FiT), Renewable Energy Purchase Obligations (RPO), Net Metering (distributed generation), Off-grid Electrification for Isolated Communities, Renewable Energy Fund (RE Fund), and the establishment of a Renewable Energy Authority (REA). Of these provisions the RE Fund is yet to be operationalized and the REA is yet to be established. As part of efforts to further stimulate private investment in the renewable energy sector, the Ghana Investment Promotion Centre Act was passed in 1994. It provides for import duty exemptions on renewable energy technologies given that most of this technology and equipment is imported.

Ghana has reached 78% electricity access rate, leaving only a relatively small proportion of communities and households still needing to be connected. On the off-grid side, the main objective of mini-grid development in Ghana is that people in remote communities should gain access to electricity. They need private entrepreneurs to be prepared to provide electricity to their communities, and the operators are far more likely to be willing to make the big effort and take significant risks in supplying remote communities if they do not have to adhere to onerous regulatory requirements. The experience of other countries, notably Tanzania, has shown that a light-handed approach to mini-grid regulation is adequate for protecting the interests of customers, particularly in terms of their safety, their reliability of supply, and the affordability of their tariffs.

Heavy-handed regulation could put off the private sector altogether. However, it is important to note that the light-handed regulatory approach does not only make sense for attracting private investors, but also from the viewpoint of the scope of the work of national agencies. For instance, a detailed regulatory oversight of hundreds of small mini-grids would be time consuming and costly, and might also distract from the primary focus that EC and PURC have on national-scale entities in the electricity sector.

On October 2010, Ghana has achieved compliance with the Extractive Industries Transparency Initiative (EITI), the global standard for improved transparency in the oil, gas and mining sectors. Ghana EITI will in the coming year be working together with stakeholders on the practical issues related to collecting and disclosing the names and other details of companies' real owners. The objective for disclosing this information in Ghana is to improve the governance of the oil, gas and mining sectors. On a legislative standpoint, the "Company Act" of 1963 was amended in August 2016, paving the way for implementation of a beneficial ownership disclosure regime in Ghana.

The Energy Commission is mandated under the "EC Act" for granting licences to public utilities for the transmission, wholesale supply, distribution and sale of electricity and natural gas in Ghana. As for distribution, the EC is responsible to designate the zone or area covered by the distribution licences. The EC may exercise such discretion in favor of the private supplier.

3.3.3 Additional instruments: the Ghana Investment Promotion Centre (GIPC) and the Ghana Free Zone Board (GFZB)

It is important to note that commitment by Ghanaian institutions on the increasing participation of private sector with the aim of improving the national energy infrastructure has never fallen, and even if obstacles (lacks on legal framework and existing corruption, just to name two of them earlier analyzed) still put at risk the success of existing and future potential operations, additional efforts have been made in the latest years in several directions, regardless of the political orientation of the succeeding governments and members of institutions, but maintaining and strengthening, on the contrary, the willingness to facilitate conditions for the penetration of private business in the country. This represents a crucial element for stability and for ensuring existing private interests in the country and attracting greater private foreign capital.

In this framework, in the latest years additional instruments have been adopted by the Government of Ghana, including tax holidays, locational incentives and investment guarantees. Two of the most interesting measures are represented by the Ghana Investment Promotion Centre (GIPC) and the Ghana Free Zone Board (GFZB).

The Ghana Investment Promotion Centre (GIPC) is a government agency governed by the 2013 Ghana Investment Promotion Centre Act 865, designed to attract and retain investors that dovetail with the development agenda of Ghana. The GIPC works as a one-stop agency that aims to facilitate and support local and foreign investors. The centre is focused on enhancing the Ghanaian investment climate, promoting investments in and outside Ghana and advising on investment opportunities and joint-venture projects. The GIPC currently plays a central role to all business in Ghana and works with the government, claiming to ensure that the benefit of any investment is felt by the local population, as well as those investing.

The Ghana Free Zone Board (GFZB), although its establishment dates back to 1995, it is considered a viable and up-to-date instrument for helping with licensing and permitting required by certain industries to operate in Ghana. The board was set up after the Free Zone's Act 504 and allows a free zone company in Ghana to be 100% foreign owned, 100% Ghanaian owned or investors can come together to form a company or a joint venture between a Ghanaian and a foreigner.

3.4 Electricity tariffs and incentives scheme

If the average power tariff in Africa is USD 0.12 per KWh, in 2012 the average end-user electricity tariffs in Ghana were among the lowest in Africa at USD 0.012 per KWh (PURC 2011). In 2013, PURC approved a tariff increase of 78.9% (Figure 5). Until 1998, the generation of electricity in Ghana was exclusively from relatively cheap hydroelectric sources. Ghana's traditional reliance on old hydroelectric plants has led to consumers, regulators and politicians becoming used to very low electricity prices. The addition of new thermal units has pushed prices up, as reflected by the composite Bulk Generation Charge (BGC), although not enough to cover all costs. The current Transmission Service Charge (TSC) is also considered insufficient to allow the national Transmission System Operator -

GRIDCo to recover its fixed and variable costs and provide a return to investment.[3]

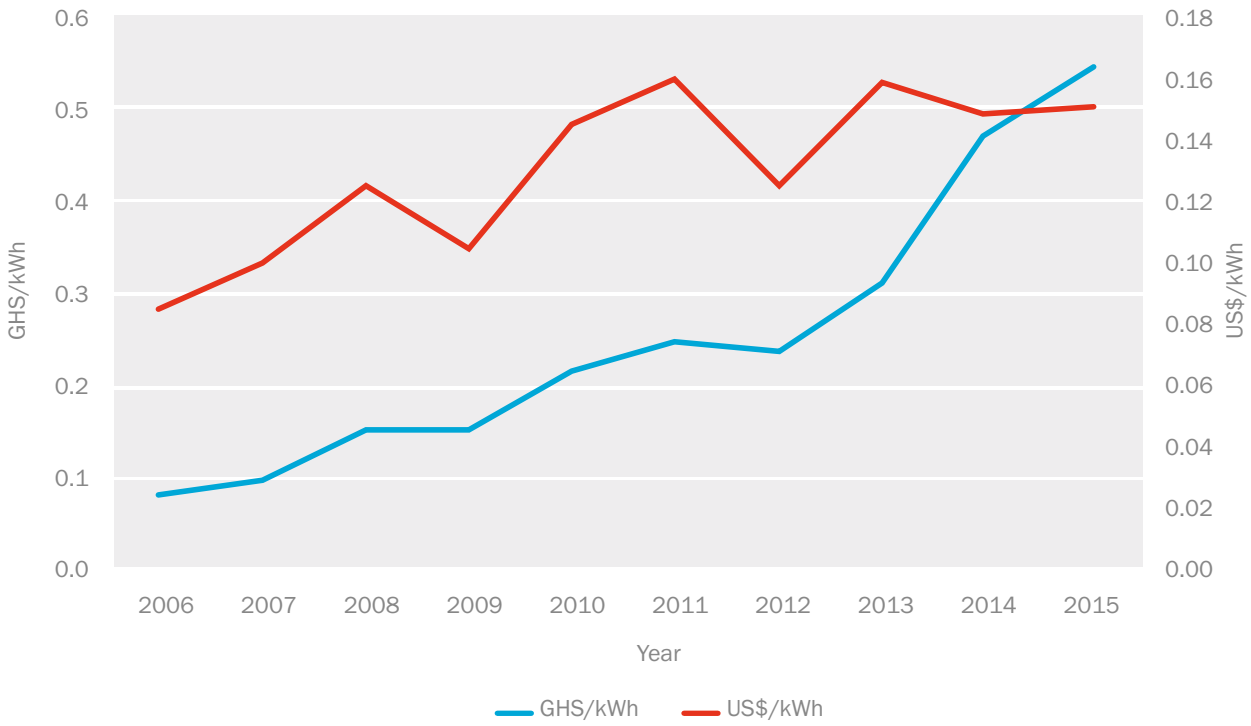


Figure 5. *Trend in Ghana average electricity end-user tariff (2006 – 2015) - Source: ECG, National Energy Statistics 2006 – 2015*

At the end of 2015, PURC increased further tariffs for electricity by 59.2% to service the debt of the state-owned enterprises in the energy sector and in a renewed bid to attract competitive private investment. The increase in electricity tariffs makes investment in renewable energy more attractive.

There are two tariff categories: residential and non-residential. PURC has set a progressive tariff scheme where residential consumers pay less than non-residential ones and those with lower consumption pay less per kWh than more energy-intensive consumers. Under the scheme, there is effectively a cross-subsidy from non-residential consumers and from the wealthier residential consumers to the poorer residential consumers.

The Feed-in Tariff scheme, introduced by the Renewable Energy Act, consists of a renewable energy purchase obligation, a FiT rate and a connection to transmission and distribution systems. FiTs for renewable generation were first published by the PURC in October 2013, and then reviewed and considerably increased in the Ghana Gazette in October 2014 (Table 1), and further reviewed in the Ghana Gazette in August 2016 (Table 2).

3 *Tariffs are composed of three parts: the Bulk Generation Charge (BGC) paid to generators, the Transmission Service Charge (TSC) paid to the transmission system operator GRIDCo, and the Distribution Service Charge (DSC) paid to distribution companies – Electricity Company of Ghana Limited and Northern Electricity Distribution Company Limited (NEDCo).*

However, Ghanaian FiT scheme is not able to ensure financial viability of renewable energy projects, other than hydro. This is due to important constraints: First the fact that tariffs are expressed in the local currency in order not to overburden the national budget in case of devaluation; Second, in the two first FiTs schemes (2013 and 2014) incentives are guaranteed for a limited period of ten years; Third, the second FiT publication also includes caps to total and per plant solar PV and wind capacity without grid stability systems. According to this, only 300MW of total wind capacity and 150MW of solar PV without grid stability systems would be allowed to the Ghanaian system. The maximum capacity of individual solar PV plants would be 10MWp when connected to the distribution system and 20MWp when connected to the transmission system. What is positive for investors is that if inflation grows faster than anticipated the schedule allows for an adjustment formula to ensure that they obtain a fair risk-adjusted return on their investment. FiTs for all renewable energy technologies are at least twice as high as the 23.74Gp/kWh composite Bulk Generation Charge (BCG) (Table 1).

	Gp/kWh	US$/kWh Sept 2014 rate	US$/kWh 2015 av. rate
Wind with grid stability systems	55.7	0.17	0.15
Wind without grid stability systems	51.4	0.16	0.14
Solar PV with grid stability/storage	64.4	0.20	0.17
Solar PV without grid stability/storage	58.4	0.18	0.15
Hydro <= 10MW	53.64	0.17	0.14
Hydro <100MW>10MW	53.9	0.17	0.14
Biomass	56	0.18	0.15
Biomass (Enhanced technology)	59	0.19	0.16
Biomass (Plantation as feed stock)	63.3	0.20	0.17

Table 1. *Feed in Tariff in Ghana (as of October 2014) - Source: PURC (2014)*

However, further increases in the BGC are expected as current tariffs are insufficient to cover the cost of planned fossil fuel-based thermal plants. The Ghanaian regulator is expected to introduce the Automatic Adjustment Formula law of setting utility tariffs that aims to adjust electricity tariffs automatically to reflect the economic cost of production over time (PURC, 2015).

If we compare Ghanaian and Kenyan FiTs, we observe that FiTs are higher than those set in Kenya, but are subject to a higher foreign exchange risk. Indeed, the FiT in Ghana is payable only in local currency at the above exchange rate. The Ghanaian scheme offers cheaper and more predictable tariffs for consumers than the Kenyan scheme. However, the Kenyan system allows generators to recover their costs and insures them against fuel cost and exchange rate fluctuations, which are automatically passed through to consumers. Very high inflation rates and strong devaluation of the Ghanaian cedi against the US dollar

introduce a significant risk for generators in Ghana. Investors in renewable energy in Ghana are not protected against further currency devaluation by the existing FiT scheme and there are concerns about the creditworthiness of the off-taker.

Figure 6 compares the FiT levels in Kenya and Ghana converted to USD. Because Ghanaian FiTs are set in the local currency, we show both the levels using the 2014 exchange rate - when the tariffs were approved, and the average 2015 exchange rate. On approval, the Ghanaian fees were significantly higher than those set in Kenya, but currency devaluation has brought them closer to Kenyan levels.

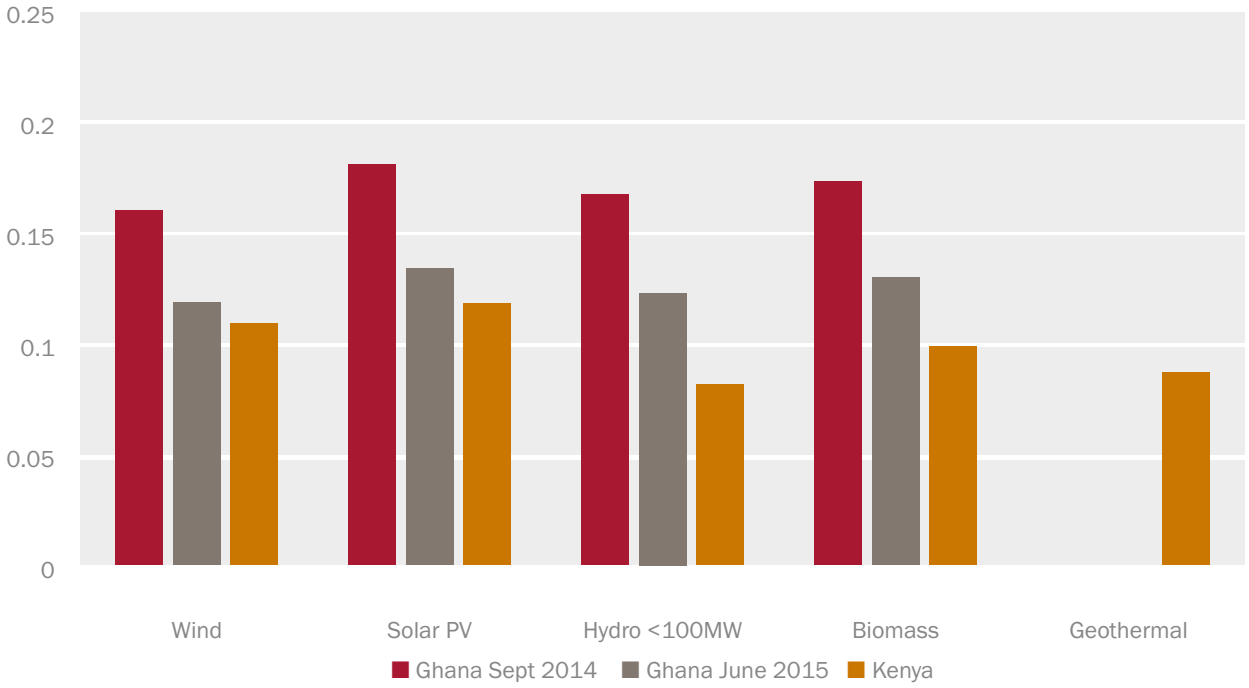


Figure 6. *Feed-in Tariffs in USD/kWh in Ghana and Kenya (2014) - Source: Pueyo A, Bawakyillenuo S, Osiolo H (2016*

As observed, an additional obstacle for the Ghanaian FiT scheme is represented by the short incentive periods. Many developers had raised concerns and asked for a 20-year period for the FiTs instead of the previous 10 years. In August 2016, PURC has update its feed-in-tariff scheme with payment contracts which last for 20 years as opposed to the 10-year length (Table 2).

In brief, despite FiT scheme in Ghana has raised investor interest, such as in Kenya, this has not been the main driver for final project investment in renewable energy.

TYPE OF TECHNOLOGY	(1 - 10 years) Guaranteed FIT	20 years Indicative FIT
	USCents per Kwh	USCents / Kwh
Wind	16.6	14.5
Solar PV	15.1	13.0
Hydro <= 10MW	13.4	11.6
Hydro (>10 MW and <=100 MW)	14.3	12.3
Tidal Wave (Ocean Wave)	13.4	11.6
Run off River	13.4	11.6
Biomass	17.5	15.1
Biomass (Enhanced Technology)	18.5	15.9
Biomass (Plantation as Feed Stock)	19.8	17.0
Landfill Gas	17.5	15.1
Sewage Gas	17.5	15.1
Geoplutonic (Geothermal)	11.8	10.2

Table 2. *Third Ghanaian RE-Feed-in-Tariff - Source: Ghana Gazette, October 2016*

3.5 Is RE investment affordable in Ghana?

Hydropower currently offers the most economical solution for large-scale renewable electricity generation in Africa, although since the technology is mature there are limited options for cost reductions. It is less expensive than most technologies of any type for power production – costs in Africa can be as low as USD 0.03/kWh, and the average is approximately USD 0.10/kWh. The weighted average installed cost for large-scale hydro in Africa is USD 1 400/kW (IRENA, 2015).

Small hydro plants represents a cost-effective off-grid solution for rural areas. Capacity factors are high and generation costs can be relatively low, with an average LCOE of about USD 0.05/kWh. The weighted average installation costs for small-scale hydro in Africa is USD 3 800/kW (IRENA, 2015).

A study conducted by the UK Institute of Development Studies shows that in Ghana renewable electricity from hydropower would be the only one affordable if priced at the level of the LCOE. However, profitability of this source is put in danger by decreasing water resources available, and due to some hydropower plants operating at 20% of their capacity.

Another way of assessing affordability of RE sources for the country would consist of comparing their cost to fossil fuel alternatives, which should add operating expenses. To ensure reliability of supply, for example the Kenyan system operator relies on a combination of owned and leased diesel power generation at a cost in the range of 26 and 42 US cents per kWh (Rose et al. 2016).

Another estimate of the cost of fossil fuel-based peak load technologies values them at 15.1 to 30.2 US cents per kWh (Ondraczek 2014). The Ghanaian system operator has announced new thermal plants which will provide electricity at a cost between 13 US cents per kWh for gas plants, and 19 US cents per kWh for oil plants.

If these are taken as the costs of alternative generation sources, renewable electricity is affordable in Ghana, with the exception of solar PV. On a preliminary consideration, low operating costs makes it cheaper to run diesel generators, which in Ghana, as in all SSA, makes a very high share of the final cost, but on the other it makes planned investments in oil and gas extraction in Ghana unattractive. (Pueyo A, Bawakyillenuo S, Osiolo H. 2016)

Drivers for investing in RE in Ghana would be: the capitalization of the Ghana Renewable Energy Fund (RE Fund) to mobilize financial resources through financial incentives, capital subsidies, production subsidies and equity participation for renewable energy power generation; local private sector should be stimulated for financing off-grid solutions which being small in size are unattractive to foreign investors; to design of currency risk mitigation instruments that would help increase investor confidence in RE projects; finally, to simplify regulatory framework through the establishment of a Renewable Energy Authority.

The high cost of finance is an important factor for lowering the financial viability of renewable energy projects in Ghana. National commercial bank lending is short term (Central Bank of Ghana, December 2015) so investors are obliged to address to concessional finance from MDBs or to international commercial finance.

04 Drivers for PPPs in energy infrastructure

Despite significant global attention on private investment in infrastructure, the bulk of infrastructure investment and planning comes from the public sector. Indeed, in Africa, only 18% of all infrastructure spending comes from private investors, with a large majority of this investment going into the telecommunications and energy sectors.

On the other hand, Africa's largest source of public finance is represented by the Official Development Assistance (ODA), in the form of grants and concessional loans that remain important drivers of infrastructure and capital projects on the continent. ODA to Africa was worth USD 56 bn in 2015 and is expected to increase to USD 58 bn by the end of 2016. (Deloitte 2016)

The 2016 "Deloitte African Construction Trends" report shows that infrastructure investment in West Africa represented more than a third (37% or USD 120 billion) of total investment in the African continent. In West Africa, Development Finance Institutions (DFIs) have become less prominent (7.6%), while African DFIs are funding 9.8% of projects. Private domestic firms are funding more projects than previously (8.7% in 2016, compared to 4% in 2015), indicating that Public Private Partnership (PPP) projects are gaining importance.

Within this background, and considering the lack of sufficient public finance, the private sector needs guarantees if it is to commit large investment to long-term projects that have considerable financial, political and regulatory risk. In LMICs contexts, such as in Ghana - where a portion of the proceeds from their debt issues has been used to re-finance existing public debt - the impact of these risks on private finance may be more important and long-term financing is normally not available due to the unpreparedness of domestic banks holding only short-term deposits. In Sub-Saharan Africa the longest available loan tenor is five years or even less, and where longer loan terms are available, commercial interest rates are higher (Irving and Manroth, 2009).

Therefore, for a PPP to represent an economically viable solution in SSA, development finance may represent the prerequisite condition, in particular where poor sovereign credit ratings or fiscal constraints prevent the provision of public budget into infrastructure investment. Ghana is characterized in 2016 by a 73% debt-to-GDP ratio (with a 2017 target of 71%), thus has limited budgetary allocation to capital expenditures (-7.2% projected in 2017 from previous year) falling in line with government's strategy to partner with the private sector for infrastructure investment. With the aim to restore debt sustainability and macroeconomic stability and improve investor confidence, the IMF Extended Credit Facility (ECF) programme has been extended to December 2018. A total amount corresponding to USD 918 million will be given to Ghana as balance of payments support over the 3-year period.

"The PPP model may in some cases serve to lower the cost of producing new infrastructure if bundling and risk-transfer lead to lower costs or higher quality output" (Hellowell, 2015). In Sub-Saharan Africa risks in energy infrastructure investment are mostly associated with weak governance because infrastructure and services are mainly nationalized. However, in Ghana the electricity sector is almost completely unbundled.

With regard to the financing of energy infrastructure projects, where challenges for access to capital can be greater, given the large up-front investment required, and risk can be higher due to the long-term investment horizon of each investment decision, PPPs looks like the best financing mechanism. Risk sharing is the fundamental characteristic of a PPP agreement because it facilitates the commitment of the public actors and at the same time the attractiveness of investment for the private actors (Alloisio, Carraro, 2015).

4.1 De-risking is key to lower the cost of capital

Implementing risk mitigation instruments is pivotal in order to lower the cost of capital in energy infrastructure investment. In the energy sector, regulatory and technology risks add to financing and liquidity risks (the variation of the cost of capital and lack of funding). On top of that there is also a country risk, especially in developing countries, where the perception of risk is higher than in developed countries, and financing and currency risks are also higher because of immature financial institutions and markets and higher volatility.

Assuming that the higher the perceived risk, the higher the internal rate of return (IRR) will be,

three elements determine financing costs: the debt to equity ratio, the cost of equity and the cost of debt. The cost of debt depends on the interest rate, maturity and grace period of the loans provided. Equity investors usually require rates of return of at least twice the cost of debt, as they assume a higher risk. Projects with high equity shares therefore bear higher financing costs. Smaller and riskier projects typically require higher equity shares as they struggle to be attractive for debt investors.

In any case, data collected for Ghana shows a debt–equity ratio of 70:30, which is similar to that observed in developed countries with lower perceived risks. Project developers in Ghana can access both commercial and concessional finance. Commercial finance is faster to obtain but it charges highest rates and typically offers lower maturities. Concessional finance offers better terms but usually involves larger transaction costs and a slow turnaround.

Given the high cost of local finance and the often inefficient local capital markets, access to international finance is key for the viability of energy infrastructure projects. However, DFIs remain relatively risk averse in the Ghanaian market. This may be explained by the currency risk, since DFIs are restricted by currency financing and are more inclined to projects that have foreign exchange cash flow. Indeed, borrowing in foreign currencies has often led to repayment problems and even bankruptcies since the revenues from infrastructure services are mostly in local currency (Rothballer, Gerbert, 2015).

Average debt rates for international finance, with some concessional finance, are 7.5 %. Fully commercial debt would require 12 to 16 % interest rates. Domestic lending rates are significantly higher, at 21 to 37 %. Loan maturities are in the range from 9 to 15 years. Rates of return (IRR) required by equity investors can be as high as 30 % (GCP 2015).

As already observed, one of the most important challenges for infrastructure investment in Ghana is the lack of a credible off-taker where the potential off-takers of power are ECG, NEDCo, the mining companies, and other licensed bulk customers. The private sector needs guarantees to face the policy and the financing risks entailed by the time gap between a project's planning phase and its actual implementation. In Ghana risk mitigation instruments appear mainly to address political risk rather than policy risk. The Ministry of Power is more inclined not being involved with guarantees for renewable energy projects, but rather use those guarantees mechanisms put in place by the World Bank (WB).

The Multilateral Investment Guarantee Agency (MIGA) of the WB offers political risk insurance instruments to investors, and also partially covers the impact of policy change, e.g., a feed-in-tariff reduction for the equity and debt provider. Another guarantee instrument implemented by the World Bank is the partial risk guarantee that was introduced in 1994 to support debt financing in the first phase of infrastructure projects in developing countries. It covers policy risks such as changes in law and retroactive measures, expropriation of the site, and payment default by the national power company under the Power Purchase Agreement (PPA). To give an example, MIGA has been requested to provide guarantees up to approximately USD 360 million for both equity investments and loans to Amandi Energy

Limited, a power company incorporated in Ghana to construct and operate a new 190 MW dual-fuel combined cycle gas turbine power plant.

The World Bank approved in 2015 a record investment of USD 700 million in guarantees for Ghana's Sankofa Gas Project - a transformational project that will help address the country's serious energy shortages by developing new sources of clean and affordable natural gas for domestic power generation. This is a unique combination of two guarantees for the Project – an International Development Association (IDA)[4] Payment guarantee of USD 500 million that supports timely payments for gas purchases by Ghana National Petroleum Corporation and an International Bank for Reconstruction and Development (IBRD) Enclave Loan guarantee of USD 200 million that enables the project to secure financing from its private sponsors. Together, the guarantees are expected to mobilize USD 7.9 billion in new private investment for offshore natural gas, representing one of the biggest FDI in Ghana's history.

However, it appears that even with this constraint for investors that would be less inclined to take on the payment risk of the off-takers, the Ghanaian Government continues to provide Government Consent and Support Agreements (GCSP) that play the same role of a quasi-guarantee (UK CEPA, 2017). This kind of guarantee has been applied to the West African Gas Pipeline project by the Government of Ghana. (Matsukawa and Habeck 2007)

4.2 The role of Multilateral Development Banks (MDBs)

Other than the role of guarantee to private investors, MDBs can play a transformational role in infrastructure investment for two main reasons: one is financial and the other one concerns human capital. On finance, the MDBs enjoy a significant natural leveraging effect of public capital. For instance, the WB can mobilize USD 28 from international markets for each dollar put in as paid capital. A recent analysis by S&P has shown that the MDBs could lend an additional USD 1 trillion without losing their credit rating. Furthermore, the MDBs have the skills needed to structure complicated public-private investments in infrastructure. This skillset is instead in short supply in national governments, commercial and investment banks and private equity firms.

Traditional MDBs such as the World Bank, and the regional MDBs such as the African Development Bank (AfDB) and the European Investment Bank (EIB) thus remain important funders of Africa's infrastructure. Under the New Deal on Energy for Africa strategy, the AfDB's goal is to help achieve universal access to electricity by 2025 by developing a platform for public-private partnerships for innovative financing in Africa's energy sector. The Bank alone has committed to spend USD 12 bn to enhance electricity access in Africa (2016-2020) and to leverage between USD 45-50 bn in co-financing (from the private sector) for energy projects in Africa during that period.

4 *IDA guarantee covers only debt and not equity investments.*

The World Bank's portfolio in Ghana consists of 31 IDA-financed projects with a net commitment of approximately USD 2,000 billion (as of 2012).

4.3 The role of Development Finance Institutions (DFIs)

Other than MDBs, also international Development Finance Institutions (DFIs) and Sovereign Wealth Funds (SWFs) play a crucial role in development finance in Africa. International DFIs and Chinese lenders each funded a relatively equal proportion (13.1% and 13.4% respectively) of projects in Africa. (Deloitte 2016)

Africa remains heavily reliant on the Chinese economy. Today, China's DFIs such as China Development Bank and the export credit agency China Export-Import Bank have a larger global asset base than all of the MDBs combined. Moreover, the performance of African private equity funds, as measured by internal rates of return (IRR), shows some link to the rise and fall of the Chinese economy, as measured by GDP growth. In 2007, when China's annual GDP growth exceeded 50%, the 5 years rolling IRR of African funds was more than 30%. By 2015, as China's GDP growth fell to 7%, the 5 year-IRR slumped to around 1%.

Although China led greenfield investment in Africa for 2015-16 (USD 38.4 billion), investment by other economies is on the rise. The leading investors after China in terms of value of announced greenfield investment were the United Arab Emirates (UAE) (USD 14.9 billion), followed by Italy (USD 11.6 billion) and the United States (USD 10.4 billion). Eni SpA became the third largest investor following its decision to build the Zohr gas processing plant in Egypt (Figure 7).

Investing company	Capital investment (USD billion)	Number of projects	Jobs created
China Fortune Land Development (CFLD)	20.0	1	3000
Al Habtoor Group	8.5	1	3000
Eni Spa (Eni)	8.1	5	2984
China Petroleum Pipeline Bureau (CPP)	6.0	2	6000
Office Cherifien des Phosphates (OCP)	4.2	4	947
Sisban Holding	3.6	1	3000
Terra Sola	3.5	1	776
China State Construction Engineering Corporation	3.3	1	3000
Indorama	3.1	3	3002
Bionas Agropolitan Technology Corridor	2.5	1	1520
Total E&P Angola	2.2	1	214
Taaleritehdas	2.2	7	5150
Enel Green Power	2.2	11	516
Korea Electric Power	2.1	1	210

Figure 7. *Top investing companies in Africa by capital investment, 2015-16 (cumulative) - Source: Elaboration from FDI Markets (2017).*

An additional factor to take into account is the emergence of China as a non-traditional financier in the region. China is now the largest financier of power projects in Africa (Eberhard and Shkaratan 2012). A quarter of investments in energy in Africa come from China, and those investments are mainly focused on large hydro projects. However, Chinese investment has also led to the first privately owned solar PV IPP in Ghana, a 20MW plant financed by BXC Beijing China, at an estimated cost of more than USD 30 million.

Other countries such as Germany with DEG, the Development Finance Institution of Germany with focus on the private sector in developing countries, is keen on increasing its investments in IPPs with renewable energy sources in the West African sub-region with Ghana as a key prospective market. The private sector financing institution is currently finalizing arrangements with some independent power producers (IPP) to build a biomass power plant and a couple of other plants to generate power from renewable sources. Out of the EUR 1 billion portfolio DEG has in Africa, a third is in West Africa, amounting to about EUR 300 million. With a standing portfolio of about USD 270 million in Ghana, DEG has made investments of about USD 40 million in 2012, and were expected to repeat that feat in 2013 (Ghana Daily Graphic, 2012; 13 November Issue).

The Japan International Cooperation Agency has partnered with the Government of Ghana and invested USD 16.4 million for the construction of two primary substations for the Northern Electricity Distribution Company (NEDCO).

The Ghana Power Compact is the largest U.S. Government transaction to date under Power Africa, and will serve as an anchor for increased American engagement in Ghana. The US Millennium Challenge Corporation will invest up to $498.2 million to transform Ghana's power sector and stimulate private investment. The aim of the five-year Ghana Power Compact is to create a financially viable power sector to meet the current and future needs of households and businesses, and to help fight poverty across the country. The Government of Ghana has committed to implementing the reforms needed to transform its power sector and put it on a path to profitability and sustainability, creating the financial environment to attract private investment. The government has pledged to invest at least $37.4 million of its own money. The compact is expected to catalyze at least $4.6 billion in private energy investment and activity from American firms in the coming years.

4.4 The renewed Africa-EU strategic partnership

On 22 November 2016, the EU presented its response to the 2030 Agenda and the SDGs and adopted a sustainable development package consisting in: a Communication on next steps for a sustainable European future (EC, 2016a); a new common vision for development policy for the EU and its Member States (EC, 2016b).

In addition, the European Parliament resolution of 1 December 2016 on access to energy in developing countries acknowledges Africa as the continent with the greatest potential for renewable energy and at the same time as "the one lagging further behind in terms of

electrification"(EP, 2016).

The priorities proposed within the Africa-EU Strategic Partnership are to focus on unleashing economic opportunities, achieving strong institutions and good governance and ensuring access to affordable and reliable energy sources. The renewed partnership with African countries will be realized on the basis laid down in the Joint Africa-EU Strategy, the Agenda 2030, the Paris Agreement and around the idea launched in Davos by the President of the European Investment Bank (EIB), Werner Hoyer, to consider Africa in terms of economic perspectives and opportunities and not just as a recipient of donations.

The EIB, through its *ad hoc* investment fund for Africa, namely the EU-Africa Infrastructure Trust Fund (EU-AITF), allocated funds to increase access of national power systems in West Africa and Ghana. One of the most significant investments in the region on energy infrastructure is the € 27.25 m contribution for the construction of the CLSG Interconnector, a project aiming to put in place a 1 357 km transmission line allowing power exports initially from Cote d'Ivoire to Liberia, Sierra Leone, and Guinea. The EU-AITF supported the project in form of technical assistance and providing interest rate subsidies and investment grants.

In Ghana, the EU-AITF in 2009 granted € 1.75 m to the West African Power Pool (WAPP) to finance pre-investment studies for a 330 kV transmission link from Riviera in Côte d'Ivoire to Prestea in Ghana. The project enhanced regional integration by supporting the interconnection of Côte d'Ivoire and Ghana and more broadly strengthen the Coastal Backbone, which also connects Benin, Togo and Nigeria.

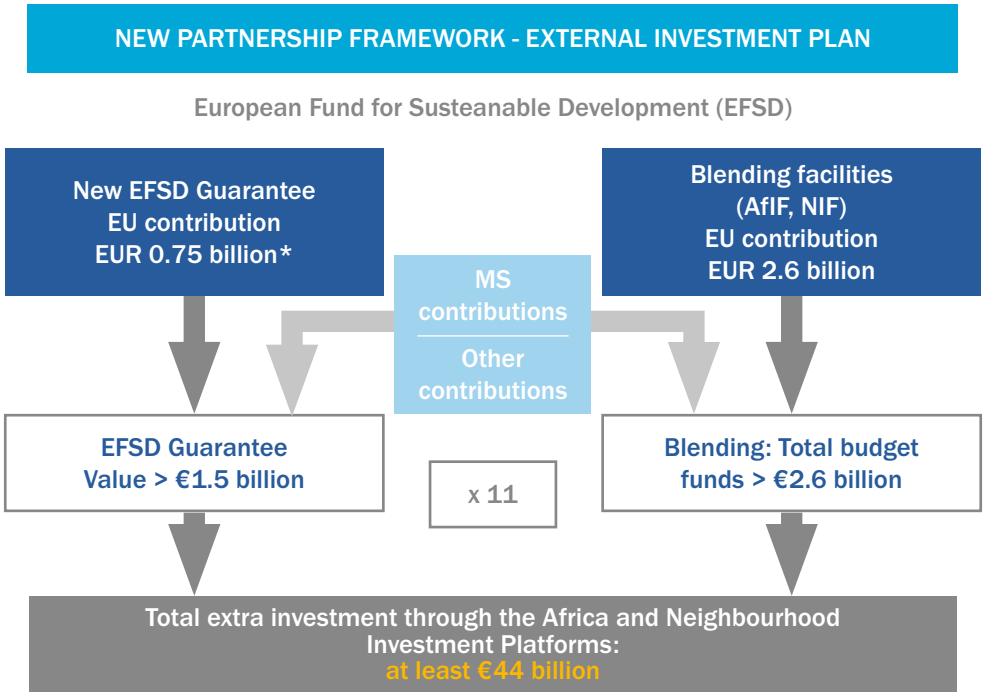
4.4.1 The EU-Africa Infrastructure Trust Fund

Sub-Saharan Africa was identified among the regions the most in need for development cooperation and financial contribution by the EU. Established in 2007 the EU-Africa Infrastructure Trust Fund (EU-AITF) aims to increase investment in infrastructure in Sub-Saharan Africa by blending long-term loans with grant resources to gain financial and qualitative leverage as well as project sustainability. One of the two financing envelopes of the EU-AITF, the SE4ALL envelope, is addressed to finance access to energy in Africa.

Against this background, in September 2016 a new European External Investment Plan (EIP) (EC, 2016d) to encourage investment in Africa and in the EU-Neighborhood, to strengthen partnerships and contribute to achieve the SDGs was announced. The EIP has been conceived with the objective to facilitate EU private enterprises exporting their businesses outside the EU in countries favoring a more stable economic and political environment.

The core objective of the EIP is the creation of a new European Fund for Sustainable Development (EFSD) (EC, 2016e) composed by regional investment platforms, which will combine financing from existing blending facilities and the EFSD Guarantee from resources stemming from the EU budget and the 11th European Development Fund. The EFSD is expected to trigger additional public and private investment volumes, mobilizing total investments of up to EUR 44 billion (based on EUR 3.35 billion contribution from the EU budget and the European Development Fund) and up to EUR 88 billion should Member

States also contribute to the blending financing mechanism. In shirt, the EIP will support the implementation of the new Partnership Framework and the achievement of Agenda 2030 in Africa.



*Plus a EUR 0.75 billion contingent liability.

Figure 8. *The European Fund for Sustainable Development - Source: EU (2016)*

05

Best practice example of PPPs in Ghana: Kpone Independent Power Plant project

The ambitious Kpone Independent Power Plant project is a landmark USD 900 million energy project which aims to transform electricity generation across West Africa.

The plant is situated in the heavy industrialised area of Tema, a coastal town 24km to the east of Accra and it aims to provide 340MW of power, contributing approximately 10% of Ghana's total installed capacity and approximately 20% of its available thermal general capacity, supplying power to over one million homes.

The development of the project has been commissioned in late 2014 to Cenpower Generation Company Ltd, a special-purpose vehicle aiming to become Ghana's leading private sector power company which was created with the purpose of developing the

Combined Cycle Gas Turbine (CCGT).

The project finance comprises two components: a USD 650 million debt tranche and a USD 250 million equity tranche. The debt is being funded under export credit cover by a consortium of South African commercial banks and international DFIs. Rand Merchant Bank (RMB) acted as the global lead bank and mandated lead arranger for the commercial banking tranche. Other South African banks involved in the transaction were Nedbank and Standard Bank. The Export Credit Insurance Corporation ('ECIC') of South Africa, provided the export credit cover for the South African commercial tranche.

On the other hand, FMO, the Dutch Development Bank, acted as the mandated arranger for the DFI tranche.

Via the equity raising, three leading investment groups joined the equity consortium: Sumitomo Corporation of Japan (first ever thermal IPP investment in Africa), African Infrastructure Investment Fund II and its co-investors (via an investment vehicle called Mercury Power) and FMO. Post financial close, the equity holders in Cenpower now are AFC Equity Investments Limited (a wholly owned subsidiary of the Africa Finance Corporation (AFC) (31.85%), Sumitomo Corporation (28%), Cenpower Holdings Limited (21%), Mercury Power (15%) and FMO (4.15%).

The project will be a Combined Cycle Gas Turbine ('CCGT') plant with a planned capacity of 350MW. It is planned to operate using crude oil initially before switching to gas when supply becomes available. The facilities will also include a 161kV collector substation for power transmission and an on-site liquid fuel storage tanks with a capacity of 18,000 cubic metres.

Construction took 32 months and the construction company is claiming that the plant is due to start operating later this year.

The plant represents the biggest licensed IPP in Ghana in terms of financing, as well as the first project finance deal in Ghana to take fuel supply risk. In fact, the USD 93 million Fuel Finance Facility – provided by the DFIs involved in the project – was specifically designed to address the significant constraints facing the Ghana Power Sector, including fuel supply challenges due to natural gas shortage, liquid fuel price variability and issues with availability of liquid fuel (Light Crude Oil and Distillate) storage and treatment infrastructure.

Furthermore, this is the first IPP in Ghana to be developed on a Build Operate Transfer (BOT) basis – the plant will be returned to the Ghanaian government after 20 years of operation. It has enough potential to act as a pioneering energy project not only for Ghana but for the whole West African region. In fact, it represents a truly African solution to the continent huge power shortage problem, as the founding shareholders are Ghanaian, the construction company is African, the biggest share of equity is held by African companies and the majority of senior debt is issued by African lenders. In other words, Kpone Independent Power Plant project can be considered a leverage for further African investment in African infrastructure.

Country	Ghana	**Capacity**	340 MW
Technology	Combined Cycle Gas Turbine (CCGT)	**Development Stage**	Financial closure
Type of PPI	Greenfield project	**Subtype of PPI**	Build, own, and operate
Contract period	N/A	**Commissioning year**	2014
Main revenue source	PPA	**Contract award method**	License scheme
PPP Project	Yes	**PPP part of public project**	Yes
Sponsors	Africa Finance Corporation; Sumitomo Corporation; Cenpower Holdings Limited; Mercury Power; FMO (Dutch Development Bank)	**Equity share**	Africa Finance Corporation (AFC) (31.85%) $79.6 m, Sumitomo Corporation (28%) $70 m, Cenpower Holdings Limited (21%) $52,5 m, Mercury Power (15%) $37.5 m, FMO (4.15%) $10.4 m
Concessional loans (Bilateral/Multilateral)	Development Bank of Southern Africa (DBSA) $74.33 m EAIF (Emerging Africa Infrastructure Fund) $74.33 m FMO(Dutch Development Bank) $74.33 m IDC (Industrial Development Corporation) $74.33 m DEG (Deutsche Investitions-und Entwicklungsgesellschaft mbH) $74.33 m OFID (OPEC Fund for Infrastructure Development) $74.33 m	**Grants (FMO)**	$10m
Concessional loans (Commercial) (under a guarantee by 'ECIC')	HSBC $40 m Nedbank $54.66 m RMB (South Africa) $54.67 m Standard Bank $54.66 m	**Public: Private leverage achieved**	N/A
Public and private debt funding	$640 m	**Private equity funding**	$250 m
Total financing mobilized	$900	**Debt/Equity grant ratio**	70/30

Table 3. *Case-study of PPP Combined Cycle Gas Turbine Power Plant in Ghana - Source: based on PPIAF data, Cenpower*

STRENGTHS	WEAKNESSES
- Largest private financed IPP in sub-Saharan Africa in the last 10 years - 67% of equity is held by African companies - 83% of senior debt is issued by African lenders - Payment guarantees by the government - Fuel supply risk covered by Fuel finance Facility	- Exchange currency rate for foreign investors - Depreciation of the cedi by 4.6% against the dollar (Nov 2016) - Lack of a legal framework for Public-Private Partnerships
OPPORTUNITIES	**THREATS**
- Best practice for next infrastructure projects - Deficit in power generation as an opportunity for potential investors - Return on investment due to the positive nexus electricity consumption – economic growth - Parliamentary approval of PPP Bill can enable additional private participation on infrastructure projects	- Political instability can affect government's commitment on payments - Current constitutional requirement for all international transactions to be ratified by Parliament can slow down investment flows - Uncertainty on Ghana's GDP growth projections

Table 4. *SWOT Analysis - Kpone Independent Power Plant project*

06 Rural electrification

Sub-Saharan Africa, although having improved the overall access to electricity for households, industries and private business in the latest years, still suffers from inadequate rates of electrification, with 600 million people estimated lacking access to any source of electricity.

According to a 2015 IEG evaluation, low-access countries received about 3.6 billion USD per year at global level into the electricity sector from all sources over 2000 – 2014. The bulk of these funds has gone into extension of the traditional electricity grid. The IEG report also states that to achieve universal grid access in current low-access countries by 2030 will require over 17 billion USD per year, including about 12 billion USD per year for new transmission and distribution capacity. An additional 20 billion USD per year will be needed to address current supply inadequacies and expand generation capacity to meet growing demand. The largest share of this investment would be in Sub-Saharan Africa, given the size of the population without access and the challenges of making effective infrastructure investments there (Foster and Briceño-Garmendia, 2010).

Ghana, one of the countries within the region with the highest rate of electrification (78%), since the slowdown of its economy in the last few years has suffered by an energy crisis dubbed 'DUMSOR', meaning 'off and on', with reference to the erratic nature of the electricity supply due to drops in production from hydroelectric resources, failing infrastructure and low tariffs that do not cover costs. The

resultant power outages, normally 12-24 hours in duration, have led to high profile protests, and a situation where many Ghanaians who once had full energy services are newly off-grid.

The greatest challenge for the whole subcontinent is certainly represented by the poor or none electrification provided in the vast rural areas, where the grids do not reach abundant shares of population. This is a major constraint to the economic transformation required for achieving a decent standard of living for rural populations in Sub-Saharan Africa.

Ghana makes no exception in this framework, as around 40% of rural population - mainly concentrated in the Northern, Upperwest, islands and lakeside areas of the country - lack access to electricity, whereas the main grids provide electricity to the coastal belt and the central area until the Volta river basin.

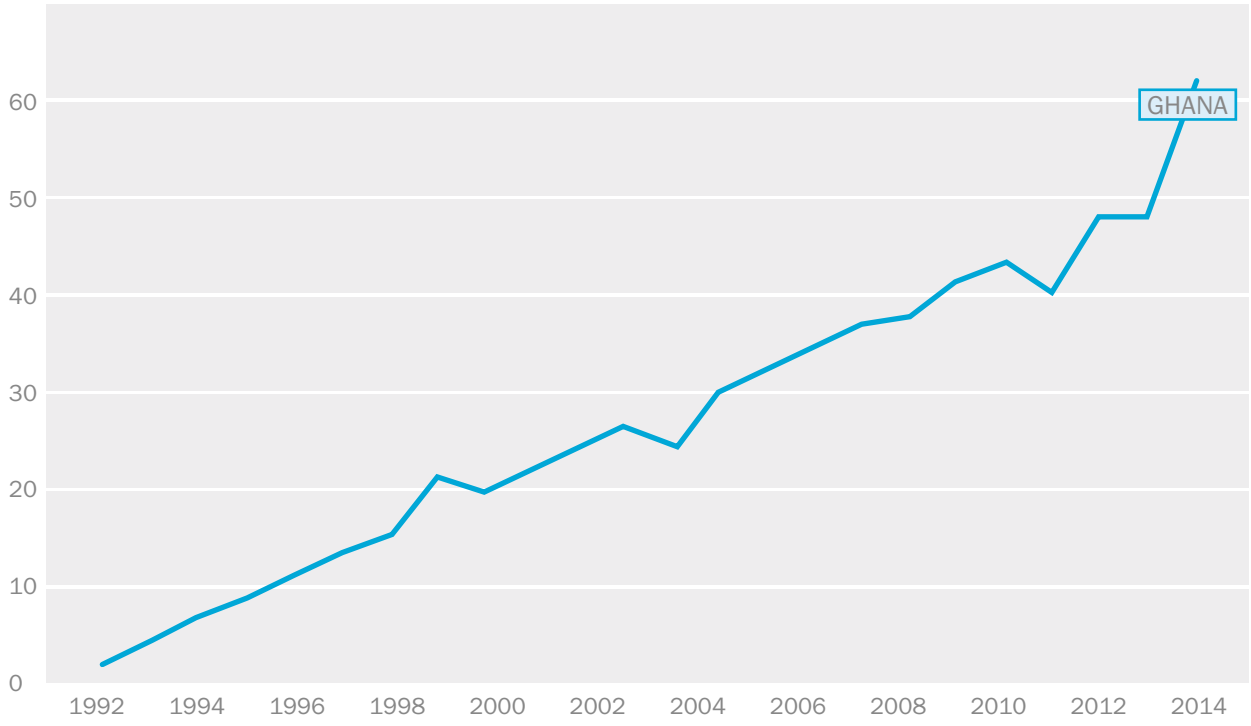


Figure 9. *Access to electricity, rural population in Ghana - Source: World Bank Data*

Ghana's energy sector is primarily dependent on biomass and oil, which account for about 90% of the country's primary energy supply. As well as oil and gas, hydropower is a major resource for generation of electricity. Generation capacity is currently about 3,000 MW of which 54% is hydropower, the remainder being mainly thermal generation and little contribution from renewable energy. The demand for electricity has been growing at about 10% per annum and it is estimated that the generation capacity will need to increase to about 4,200 MW by 2026 to keep up with the demand (MoP, 2016).

As previously mentioned, about 78% of the

population of Ghana has access to electricity. A considerable proportion of the remaining 22% of population are in communities, which are remote and often inaccessible, including islands and lakeside communities. For most of these communities, extension of the grid network would be challenging due to geographical and financial constraints, and off-grid and mini-grid options can represent a relevant choice for meeting their electricity needs.

The vision of Ghana's energy sector is a developed "energy economy" with reliable high quality energy services. In order to achieve this vision, the national energy policy goals are (MoP, 2015):

- Universal access to electricity by 2020 (though access in rural areas is only 40%);
- 5,000 MW of generation capacity by 2020 (recently moved forward to 2016);
- 10% contribution of renewable energy (excluding hydro with capacity of 100 MW or larger) in the electricity generation mix by 2020; and
- Access to liquefied petroleum gas (LPG) by 2020 for 50% of the population.

Renewable energy has great potential to contribute towards meeting the ambitious national policy goals of Ghana's energy sector in a sustainable way and a mixed transmission and distribution, developing on the one hand the existing grid infrastructure (while evaluating financial viability for the construction of brand new ones) and promoting mini- and off-grid solutions benefitting by the country's unexplored potential for renewables on the other hand, represents the most viable solution for electricity demand in the short- and medium-term.

6.1 Renewable energy potential for rural electrification in Ghana

In Ghana, renewable energy resources that have been explored include Bio Energy (Biomass including waste-to-energy and Bio fuel), Tidal and Wave power, Solar Energy (Photo-Voltaic and Thermal), Wind Power, and Hydropower (small and large). While some have been constructed and have been added to the energy mix of the country, others have valid provisional wholesale supply licenses for the production of energy.

As previously mentioned, the Renewable Energy Act is the policy measure adopted in 2011 to develop the renewable energy market in Ghana. Other major national initiatives that have been pursued in Ghana to promote the development and deployment of renewable energy in Ghana include:

- Ghana Energy Development and Access Project;
- Scaling-up Renewable Energy Program (SREP) in Ghana Investment Plan; and
- Technical support for the implementation of the Renewable Energy Act.

6.1.1 Ghana Energy Development and Access Project (GEDAP)

Currently, communities in remote areas of Ghana, including island and lakeside communities constitute a significant proportion

of the population with no access to electricity. For most of these communities, decentralized renewable energy technologies appear to be the most competitive electrification option. To ensure the energy sector policy objectives are on course especially those related to rural electricity access and intensification, the Government is implementing the Ghana Energy Development and Access Project (GEDAP).

GEDAP is a multi-donor funded PPP Project involving the World Bank-International Development Agency (IDA), Global Environment Facility (GEF), African Development Bank (AfDB), Global Partnership on Output-based Aid (GPOBA), Africa Catalytic Growth Fund (ACGF) and the Swiss State Secretariat for Economic A airs (SECO) The development objective of the project is to improve the operational efficiency of the power distribution system and increase the population's access to electricity and help transition Ghana to a low carbon economy through the reduction of greenhouse gas emissions. The main components of GEDAP include:

- **Limited impact of subsidies:** GEDAP provided a subsidy set as a fixed percentage of the value of lanterns and solar home systems of various sizes. The subsidy was initially meant to increase the affordability of solar lanterns and systems to consumers. However, this subsidy rather turned out serving as an incentive (in the form of transport-cost subsidy) to the dealers of solar systems to actually engage in remote, rural areas. Consequently, the subsidy failed to drive down the cost of solar systems, increase their affordability and successfully accelerate their penetration in the market.
- **Willingness-to-pay for solar home systems:** The willingness-to-pay for energy services from solar home systems in remote, rural areas of Ghana are high. Sales of these large solar home systems exceeded all targets and expectations established at the beginning of the project.
- **Financing packages for solar PV suppliers:** Suppliers of solar systems faced challenges to obtain sustainable financing for their business operations. It was found necessary, therefore, to provide support to those suppliers to obtain trade financing and working capital. This was to enable them to purchase solar PV systems in bulk and to build up their capacity and retail networks up-country.

6.1.2 Scaling-up Renewable Energy Program (SREP) in Ghana Investment Plan (GIP)

In 2015, the Ministry of Power developed a Scaling-up Renewable Energy Program in Ghana Investment Plan (SREP-Ghana IP) to facilitate the Government's strategy to unlock financing opportunities to accelerate the development of a sustainable renewable energy sub-sector. The SREP-Ghana IP will focus on the following three investment projects (Ministry of Power, Ghana, 2015):

Project 1: Renewable energy mini-grids and stand-alone solar PV systems: The objective of this project is to encourage sustainable public and private financing for scaling-up renewable energy mini-grids and stand-alone solar PV systems to achieve the Government of Ghana's universal access policy by electrifying lakeside and island communities in Ghana, with a special focus on gender. Specifically, the project will result in public sector investment

in 55 renewable mini-grids and private sector investment in stand-alone solar PV systems to benefit 33,000 households, 1,350 schools, 500 health centers and 400 communities. There will be associated technical assistance and implementation support. The African Development Bank will be the lead multilateral development bank for the implementation, along with the Ministry of Power on behalf of the Government of Ghana.

Project 2: Solar PV based net metering with battery storage: The objective of this project is to develop a comprehensive net metering program and the deployment of at least 15,000 units of roof-mounted solar PV systems to reduce the economic cost of power on small and medium-sized enterprises (SMEs) and households and increase renewable energy contributions in the electricity generation mix by 25-30 MW. There will be associated technical assistance and implementation support. The African Development Bank will be the lead multilateral development bank for the implementation, along with the Energy Commission on behalf of the Government of Ghana.

Project 3: Utility-scale solar PV/wind power generation: The objective of this project is to assist the Government of Ghana overcome key barriers that prevent the growth and expansion of the utility-scale solar PV and wind market in Ghana by catalyzing the first project financed utility-scale renewable energy plants, demonstrating the Ghanaian renewable energy sub-sector potential to financiers and helping attract further investment in the future. The International Finance Corporation will be the lead multilateral development bank for the implementation. This project is expected to leverage additional sources of co-financing from the private sector and from the African Development Bank's private sector window.

Many studies have attested that renewable energy sources are more than enough to meet the current energy demand worldwide, although the estimates of such potential vary in the literature.

Aside their enormous potential, renewable energy sources offer further advantages in that, they enhance diversity in energy supply markets, secure long term sustainable energy supplies and reduce local and atmospheric emissions. Additionally, under certain conditions such as in developing countries and rural areas, renewable energy sources are more cost-effective sources of energy for the provision of energy services while creating new employment opportunities and possibilities for local manufacturing.

6.2 Solar PV

As of 2014, only 0.1% of Ghana's electricity generation came from solar power, though the country benefits by an average solar irradiation ranging from 4.5-6.0 kWh/m2/day, with the highest levels mostly in the north of the country, and the amount of sunshine ranges from 1,800-3,000 hours annually. A total of 8 MW of grid-connected installations were operational at the end of 2014, and so far only one utility-scale solar PV facility (20 MW) is under construction, but the Energy Commission has issued provisional licenses for more than 1.8 GW of generating capacity.

By observing figure 10, it is interesting to note that the regions with the higher irradiation

within the country correspond with the regions where electricity grids are less developed or non-existing.

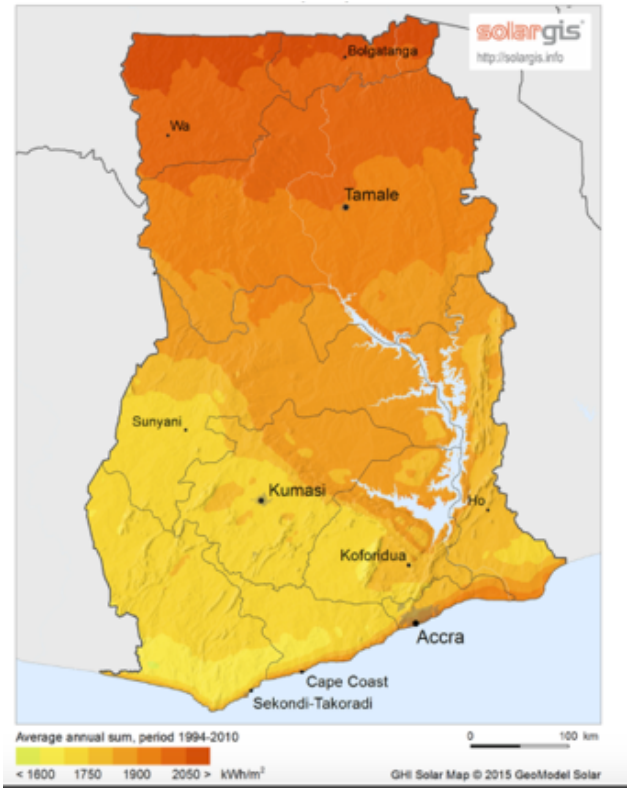


Figure 10. *Global Horizontal Irradiation, Ghana - Source: Solargis*

More in general, there is wide consensus on the development of off- and mini-grid solar PV systems as the currently most viable solution for the issue of rural electrification.

According to Ghana Energy Commission, over 38,200 off-grid solar systems including lanterns and 25 grid-connected solar systems with a total installed capacity of 8 MW have been installed in 120 communities. In addition, 100,000 off-grid solar system installation contract has been awarded to Azuri Technologies, in order to increase access to clean energy in rural Ghana. All over the country, diffuse radiation constitutes over 30% of the total solar radiation and this is not a good indicator for concentrating collectors used in solar thermal power plants. Solar thermal power plants use the direct (beam) component of the solar radiation. The direct (beam) solar radiation is highest in the small parts of the Upper West region. Flat plate solar collectors and PV modules are not affected by the diffuse fraction, and thus may be used effectively anywhere in the country.

Several constraints, however, still affect the development of such technology in Ghana. An impact assessment study on the isolated solar home systems (SHs) installed via Ghana Energy Development and Access Project (GEDAP) regarding the livelihoods of rural households in the Upper West Region put in evidence that in terms of energy preference, the majority of rural solar users (50%) preferred grid-tied electricity, although they were not connected to the grid yet as compared to 35% who preferred both grid-tied and off-grid forms of electrification while 15% preferred off-grid solar technology. This may suggest that although off-grid SHSs represent a viable alternative energy generation option, they may not necessarily 'be a panacea for the energy poverty situation in rural Ghana due to setbacks. For off-grid solar electrification to achieve parity with conventional energy sources, a combination of increased system capacity, additional investment and political will is needed to make SHSs more competitive and deliver sustained quality energy services for deprived rural communities where such place-based energy services are needed most for sustainable rural development'.

07 Conclusions

As seen, the development of effective interventions for the improvement and transformation of the energy system in West Africa, as well as in Ghana, is viable and largely at reach. In this scenario, PPPs can play a crucial role for the acceleration of a process that implies a growing private business participation, accompanied by a facilitation in terms of legal constrictions and risk sharing by local public authorities. In this context, Ghana's public authorities have taken important steps (Ghana Public-Private Partnerships Bill, see section 2.3.1) but efforts are still needed in order to set a turning point and enable the total potential of the resources of the country.

In fact, Ghana – as evidenced earlier in this document – still needs to face major issues before claiming itself as a properly attractive country for the establishment of PPPs: corruption, low accountability of institutions, lack or incompleteness of legal regulations just to name some of the main constraints. As highlighted, improvements in energy sector governance, regional co-operation, and capacity building are pivotal to bring in new energy investors.

Moreover, in order to increase substantially the share of renewable energy in the national energy mix (Target 7.2 of the UN 2030 Agenda), further evaluations are required on the structure and flexibility of the national Feed-in-Tariffs scheme, in particular regarding the risks represented by currency devaluation for foreign private investors, as well as on the creditworthiness of the off-taker. Policymakers should target these key constraints to affordability and profitability to support a higher penetration of renewables in the country.

Another important aspect to take into consideration in the pursuit of an accountable and stable energy market is the importance of diversification, as "almost half of Africa's economies are dependent on a single resource export for more than three quarters of their export revenues. African governments need to structurally change and diversify away from being resource-driven and towards more value-added and services-orientated economies in order to thrive despite commodity price slumps."

On the other hand, positive signals for an increasing importance for PPPs projects in Ghana are tangible: the growing competitiveness of the market, availability of resources (in particular renewable energy sources) and the growing amount of investment flows on infrastructure represent crucial elements to justify optimism.

As a more general consideration, I reckon it is crucial to keep in mind that PPPs should represent in the first place interventions able to contribute primarily to the quality of local people's life conditions. With particular regard to rural areas of Ghana – where electrification level still stands at 23% - PPPs must play as an

enabler instrument for development and not merely stand as viable tool for private actors to expand their business with the complicity of local institutions, a *leitmotiv* for Africa which, in this particular case, might transform a potential outstanding financial tools into the latest Trojan horse for exploitation.

It appears clear at this point the centrality of private investors' role for achieving results, even at social level. Companies can improve energy access by working with governments and local communities to determine how to best align their investments in a project with the country and community's needs.

Local development cannot be represented by a growing electrification rate *per se*. Interventions in this area need to be framed in a broader plan, able to empower local populations in terms of possibilities, poverty eradication, education, growing employment, skills. In this framework, a more integrated power infrastructure is a great opportunity, but facts state that it might not be enough to represent a leverage for change. If it is true, as already mentioned, that there is a univocal link between economic growth and electric consumption (Adom, P.K., Bekoe, W., 2012), it is also undeniable that a multilevel approach – as the UN 2030 Agenda suggests – is no longer just a possibility, rather a *sine qua non* condition for fulfilling the global objectives represented by the SDGs.

For this purpose, Public-Private Partnerships can represent a viable instrument to create win-win situations also for the local development of the areas and the populations involved in major projects concerning energy infrastructure. In fact, a direct consequence of these operations is the need to empower locals in terms of skills and capacities to operate in the projects at implementation and maintenance level of the plants. Multilateral institutions and agencies in the UN system are playing an active role in this sense, promoting and setting training programmes at local level for enhancing skills of workers with the dual support of national institutions and private actors who are investing and exporting their businesses in that specific area: in other words proper PPPs for skills development.

The good practices on this matter are several, and the results achieved in terms of lowering unemployment rates, local industrial development and upgrading skills of local workforce are outstanding (UNIDO, 2014).

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The main contributors to this report are Isabella Alloisio and Gianluca Crisci - former researchers of FEEM's *Social Innovation and Sustainability* research program - with the scientific supervision of FEEM's *Society and Sustainability (SAS)* research program Coordinator, Stefano Pareglio, and of Fabio Moliterni, junior researcher of the *Society and Sustainability* research program.

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