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# SUSTAINABLE INDEPENDENT POWER PRODUCTION IN MIDDLE-INCOME AFRICAN COUNTRIES

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**-Abstract -**

The energy sector in many African countries faces challenges such as supplying electricity to the public in a sustainable manner, demand and supply challenges, institutional and governance challenges, private investment obstacles, unequal supply of energy, rolling blackouts, and grid maintenance and infrastructure challenges. These challenges are coupled with and linked to other social and basic service delivery challenges in a developmental context. New renewable delivery modes through independent power production (IPP) present a window of opportunity for massive investments in Africa. The aim of this paper is to determine the potential for IPP, as well as the barriers for the sustainable management thereof in selected upper middle-income countries in Africa. A cross-case study method is used. Content analysis was used to analyse 13 middle-income African countries. Country case studies were conducted on upper middle-income African economies. Country profiles comprise Angola, Botswana, Gabon, Ghana, Kenya, Lesotho, Mozambique, Namibia, Nigeria, Rwanda, Tanzania, Uganda, and Zambia. The following criteria were used to identify barriers: energy technology, investment, socioeconomic development risk, sovereign risk, policy drivers, policy content, legislative basis for IPP, management of stakeholders, and governance risk. Barriers include economic, political, and sovereign risk, as well as maintenance and grid expansion challenges. The need to help the environment, as a driver, is not strong. The strongest current drivers are pricing, cost, and market incentives. The benefits of managing natural resources and facilitating sustainable development exist but are implicit.

**Keywords:** Independent power production, renewable energy investment, sustainable development

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## 1. INTRODUCTION

The United Nations' (UN) Sustainable Development Goal (SDG) number seven calls for ensuring universal access to affordable, reliable, and modern energy services by 2030. However, transitioning to renewable energy (RE) generation in Africa remains challenging. According to the World Bank Group's Public-Private Infrastructure Advisory Facility (PPIAF) (2017), access to electricity in Africa is the lowest globally, with only 35% of people in Africa having access to electricity. The global experience shows that independent power production (IPP) benefits outweigh the costs (PPIAF, 2017). Furthermore, the PPIAF (2017) emphasises that Africa's experience with private sector participation in the transmission sector has been negligible and has not achieved significant investment in transmission. Numerous studies exist in the international scientific literature related to the benefits of employing renewable energy (RE) across different regions globally (Ferroukhi, Ghazal-Aswad, Androulaki, Hawila & Mezher, 2013). This article aims to consider the potential for RE IPP attraction based on key criteria, and existing RE IPP.

## 2. RESEARCH METHODOLOGY

The article's framework entailed a description of the key issues that were mapped, and energy profiles of thirteen case study countries. Each case study provides information according to criteria derived from the key issues, analysed at the macro level. Secondary data was used for the analysis in this article. Unobtrusive techniques including conceptual and comparative analysis was used to analyse secondary data. A desktop study entailed gathering documents online from databases, with sources ranging from the World Bank, the African Development Bank, the International Renewable Energy Agency

(IRENA) database, Renewable Energy Policy Network for the 21st century (REN21), the Renewable Energy and Energy Efficiency Partnership (REEEP) databases, and ESI Africa (power news website). Human development data were obtained from the United Nations Development Programme's (UNDP) composite sustainable development dashboard; which include statistics regarding environmental, social, and economic sustainability. Additional website sources include the government websites of the respective countries profiled in this study. The following key criteria were developed to guide the content analysis: energy technology (RE mix); the nature of the investment in RE technology; socioeconomic development risk. In identifying this for each country, the following indicators were noted: sovereign risk, policy drivers, legislative basis, management and governance. Policy drivers relate to issue(s) that drive/push the creation of a policy designed to rectify respective issues. In other words, the problems that the RE IPP policies are aimed at solving. Key drivers include energy security, economic development, as well as $CO_2$ impacts and environmental benefits. Policy content entails the policy context (strategic plans at various levels and across key agencies and departments; not to be confused with the legislative basis). The legislative basis entails the governing frameworks that enable/facilitate the IPPs, e.g. direct purchase, competitive bidding, energy auctions, Power Purchase Agreements (PPAs). These criteria provide positive conditions for increased private investment in RE IPPPs at the macro and micro levels of a country. The criteria were identified based on an explorative approach to desktop research.

## 3. LITERATURE REVIEW

Renewable energy is vital to achieve the SDG-2030 agenda (Obeng-Darko, 2018:12). Fossil fuel-generated electricity "present a danger to the world, because of the $CO_2$ they emit" (Sachs, 2015:200). Electricity supply in Africa is highly centralised, inefficient, and unequal. Bottlenecks in energy supply result in 2-4% of the gross domestic product (GDP) annually, undermining sustainable economic

and social development (Africa Progress Panel, 2017a:21). Private sector participation in the transmission of electricity in South Africa has also been negligible. According to the Africa Progress Panel (2017a:28), "climate change demands that we rethink the relationship between energy and development". Developing countries face a multitude in attracting private investment in the energy sector (Pueyo, 2018:85). Over 600 million Africans still lack access to electricity, and the number is increasing. Reliable and affordable electricity access affects all areas of life, from employment creation, economic activities, access to education and health, and providing access to food security and safety. However, all these efforts to meet current energy needs are at risk of colliding with planetary boundaries (Africa Progress Panel, 2017a:28). According to Sachs (2015:214), the process of "a deep decarbonization of the energy system, meaning a way to produce and use energy with far lower emissions of $CO_2$ than now" must take place throughout the globe, on all continents. However, there is a lack of coherent public policies and government drivers for low-carbon technology development in developing nations (Thiam, 2012:465-466). Electricity remains a contentious issue due to a number of reasons; one of these being the desire for local control over energy production and energy security (Brown, 2015:5). Electricity utilities and ministries are often staffed by corrupt officials and are designed to serve mainly the urban rich (Africa Progress Panel, 2017a:28).

According to the Africa Progress Panel (2017a:29), "energy is the golden thread connecting growth, equity and sustainability". There is a nexus between poverty and development. Africa frequently faces food insecurity. Without electricity, food cannot be refrigerated, meaning that one-third of all food goes to waste. Africa is home to 31 inefficient utilities and faulty grid networks (Africa Progress Panel, 2017a:28). Adams (2010:243) argues that there is "no lack of energy sources in Africa – especially fossil fuels"; however, investment in RE in Africa still remains low. Rural communities in Africa can benefit from RE as Africa has an abundance of sun, wind, and water. Communities can use off-grid and mini-grid solutions to avoid

challenges offered by grid-extension projects offered by central utility monopolies. Off-grid and mini-grid solutions could be the answer (Africa Progress Panel, 2017a:29). According to Thiam (2012:465) the promotion of renewable technologies presents a number of benefits. Firstly, it encourages the diversification of energy supply by reducing carbon emissions, which supports a lower carbon pathway and climate change mitigation. Secondly, important economic impacts as electricity generated does not require fossil fuels for its operation, fuel variations therefore do not impact on the quantity of electricity produced, or the performance of the energy system (Thiam, 2012:465).

Africa possesses vast natural resources for renewable energy generation (Aliyu, Modu and Tan, 2018:2502). The speed at which new plants can be built is far faster than competing technology. Lessons can be learned from the extraordinary advances in wind and solar technology to deliver clean, constant, and cheap electricity to Africa. With it comes a new life for the millions of people who live off-grid and literally struggle in darkness to provide for their families and their neighbours. However, the following risks must first be addressed: policy risk, bureaucratic risk, regulatory risk, cultural risk, land risk, and currency risk (O'Connor, 2016). The power sector has been a great beneficiary of private investment in the developed world. Private investment through IPPs provides a way to fund generation and transmission infrastructure without relying solely on public balance sheets (Delmon, 2009:457). Investment in Africa has, however, been low; "an increase in annual investment for generation, distribution, and transmission from 2015 to 2040 range from US$33.4 billion to US$63.00" (PPIAF, 2017).

An IPP is defined as "an entity that owns, operates and maintains a power generation facility" (Kessler, 2015). According to the World Bank (2017), a "PPA secures the payment stream for a Build-Own Transfer (BOT) or concession project for an IPP. It is between the purchaser 'offtaker' (often a state-owned electricity utility) and a privately owned power producer". Furthermore, "where a government agency enters into an arrangement for a private power company to

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establish a power plant and sell on the power to the government agency, the public agency typically enters into a PPA" (World Bank, 2017).

## 4. FINDINGS AND DISCUSSION

Country profiles were developed to determine the level of IPP engagement in selected African countries. The findings are presented in Table 1. The findings in the table are a summary based on the country profiles.

### 4.1 Angola

Angola is already a net contributor to the Sustainable Energy 4 All (SE4ALL) goal of doubling RE generation in the global energy mix. The Angola Energy 2025 vision aims to achieve total RE. Industrialisation is the major drivers of energy consumption and power availability. Secondary drivers include evolution of demand, expansion of the electricity network, and rural electrification. Private sector involvement in generation include hydro power plant, biomass, diesel-based rental generation units, and large hydrothermal projects (Republic of Angola Ministry of Energy and Water, 2015).

### 4.2 Botswana

Botswana's mix is solar, wind and bioenergy (biofuels and biomass waste). Botswana does not have a dedicated RE policy; there is, however, a Biomass Energy Strategy that specifies the biomass-related projects that can be implemented in the country to augment the power sector. The RE goal is to promote the growth of a sustainable solar PV and solar water heater (SWH) market through the creation of financing schemes and integrating grid and non-grid electrification. Botswana's investment promotion programmes are characterised by favourable exchange control for potential investors, low corporate tax and relaxed labour laws to bring in skilled personnel. Renewable Energy Feed-in Tariff (REFIT) schemes are considered an important instrument to incentivise investment and the uptake of RE in the country and it also allows various small- and

large-scale players to participate, although large projects can be promoted on negotiated tariffs. IPP participation is encouraged, no license is required for electricity producers below 25 kW. Independent distributors and off-grid IPPs are not catered for. Simplified regulations will be required for small-scale producers (UNDP, 2015a).

### 4.3 Gabon

The government's ambition is to increase the energy production capacity to 1200 MW by 2020 by prioritising hydroelectric power to meet the forecasted demand of 1039 MW (REEEP, 2012a). Société d'Electricité et d'Eaux du Gabon (SEEG) is state owned and vertically integrated. The SEEG handles investments to extend coverage and lower the costs of public utilities. A small number of IPPs sell electricity to the SEEG for resale to the public (Globserver, n.d.).

### 4.4 Ghana

Ghana's mix is biofuel, hydropower and thermal power. The power sector has been unbundled to create an environment for private sector investment. The Volta River Authority (VRA) has the monopoly over power generation but IPPs are allowed to operate within the system (REEEP, 2014a). There is a national energy policy aimed at providing affordable access to electricity to all communities by 2020 and becoming a net exporter of electricity by 2025. Investors must be registered under Ghanaian law (Kozlovski & Bawah, 2015).

### 4.5 Kenya

Kenya Electricity Generating Company's (KenGen) electricity output has a mix of hydropower and geothermal plants (Reegle, 2014a). The government announced in 2014 that it would suspend issuing new licences for solar and wind projects until 2017 (Jacobs, 2014). PPAs are negotiated with the Kenya Power and Lighting Company (KPLC) on a project-by-project basis, and active IPPs contribute 30% of generating capacity (Reegle, 2014a).

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### 4.6 Lesotho

Lesotho has hydropower, wind generation, and solar power as potential RE sources (REEEP, 2012b). Lesotho's hydro-generation potential is estimated at approximately 450 MW (Klunne, 2014). The Lesotho government is exploring long-term solutions to increase supply. According to Lesotho's Energy Policy 2015-2025, potential IPPs have since 2008 been consistently approached by the government for development of power generation through application of renewable sources of energy. The lack of defined frameworks has, however, constrained the participation of IPPs (Lesotho Electricity and Water Authority, n.d.).

### 4.7 Mozambique

The use of coal and gas is marginal and accounts for about 1% of the total primary energy supply (TPES) and although Mozambique is a producer of natural gas, production is also exported to South Africa. The largest generator in Mozambique is the hydroelectric plant run by an IPP, namely, Hidroelectrica de Cahora Bassa (HCB) (IRENA, 2012).

### 4.8 Namibia

Namibia's relies on electricity imports from the Southern African Power Pool (SAPP) (REEEP, 2014b). The Namibian Electricity Control Board (ECB) and the Minister of Mines and Energy are working on a bill to encourage IPPs to apply for licences. The interim REFIT plan was initiated in 2014 allow for 27 IPPs, comprising solar PV, concentrated solar power, biomass, and wind, to be invited to tender for a combined 70-MW RE to be added to the national grid. The capacity allocated to each IPP under the programme was limited to 5 MW, and NamPower will be the off-taker under PPAs (ESI Africa, 2015).

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### 4.9 Nigeria

The development of RE technologies in Nigeria has been slow. New measures are aimed to boost growth in the RE sector (legislative framework, licensing arrangements for private-sector operators, feed-in tariffs [FiTs], and clarifying market rules for RE services and products). Rural electrification programmes must take RE sources into full account. The establishment of off-grid generation/distribution plants is encouraged. As of 2012, three large-scale IPPs produce approximately 25% of Nigeria's electric power, with the balance provided by the Power Holding Company of Nigeria (PHCN) and government, viz. about 1 000 MW (IPPs) and 3 000 MW (non-IPP) respectively. The introduction of IPPs has been gradual with a number of IPPs operational (Reegle, 2014b).

### 4.10 Rwanda

Rwanda's primary energy use is dominated by biomass, which accounts for 85%. As of 2009, the available energy capacity was 54.6 MW, with 11.5% being hydropower imported from the Democratic Republic of the Congo and 15% from rented thermal generators (UNDP, 2015b). Potential exists for between 170 and 320 MW of geothermal power generation. Hydropower potential is estimated to be 500 MW, with only 72 MW being exploited. The Ministry of Infrastructure is financing 11 hydropower plants with installed capacities from 100 kW to 9.5 MW (REEEP, 2012c).

### 4.11 Tanzania

In 2014, 90% of Tanzania's energy consumption was attributed to biomass fuel, with the remainder being petroleum and hydroelectricity. In 2008, the Energy Development and Access Expansion Project (an International Development Association Credit and Global Environment Facility grant) was approved by the World Bank. This project's focus is on the improvement of the Tanzania Electric Supply Company Limited's (TANESCO) transmission and distribution grid (REEEP, 2014c).

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### 4.12 Uganda

Uganda's energy sector is predominantly dependent on wood fuel, with other sources of energy from are petroleum products and hydroelectricity (Tumwesigye, Twebaze, Makuregye & Muyambi, 2011). IPP investments in Uganda have taken two forms. Firstly, purely private sector-led projects. Secondly, PPPs: Bujagali Hydroelectric Power Plant (HPP) (250 MW), Kabalega HPP (9 MW), Bugoye HPP (13 MW), Kakira Cogeneration from bagasse (52 MW), and the entire Global Energy Transfer Feed-in Tariff (GET FiT) portfolio. A noteworthy PPP is Nyagak 1 (3.5 MW) (Republic of Uganda, 2015).

### 4.13 Zambia

The energy sector as a whole is dominated by biomass, electricity is predominantly supplied from large hydropower plants, which provides 99% of the country's electricity, with the remainder from mini-hydro and diesel plants (IRENA, 2013). Zambia has put in place an energy regulator and developed a domestic Electricity Act and Energy Regulation Act. The country has developed a draft Zambia Grid Code that includes necessary provisions for the integration of variable power (large and small scale) in the grid network. Energy investment has mainly come from the government through Zambia Electricity Supply Corporation Limited (now simply known as ZESCO) and by IPPs (namely the Copperbelt Energy Corporation [CEC], Lunsemfwa Hydropower Company, and Northwestern Energy Corporation). However, in recent years, the sector has attracted investment from private foreign investors and development partners and institutions (IRENA, 2013).

Table 1 provides a summary of the exposure of IPP attraction in the above countries. The following findings were identified using content analysis. The findings are based on the country profiles. A number of barriers were identified that prevent IPP development, including economic, political and sovereign risk, and maintenance and grid expansion challenges. Inherent benefits of managing natural resources

and facilitating sustainable development exist. The weakest driver of transitioning to RE is the need to help the environment, whereas the strongest drivers include pricing, cost, and market incentives. The strongest driver which exist in a number of African countries, include REFIT (COMESA, 2017). Research on North African countries reveals similar results to the results presented in table 1, that "IPPs are mostly allowed, but unbundling and other measures still await implementation" (Beneking, Ellenbeck & Battaglini, 2016). Policymakers need to focus on decentralising electricity supply in order to decrease electricity inequities. An increase in RE will assist in addressing significant environmental, social, and economic challenges (Ghaffarianhoeseini, Tookey, Naismith & Rotimi, 2016). Governments should provide a conducive environment for RE entrepreneurs to participate in transitioning towards a clean energy system. Entrepreneurs in developing and emerging countries such as African countries face multifaceted challenges in attempting to invest in and develop clean energy infrastructure (Park, 2016).

Comparatively, countries have inconsistent levels of information regarding the state of their RE contexts, let alone the contexts regarding RE IPPs. Countries such as Nigeria and Kenya have vast amounts of data, compared to countries such as Gabon, whose data are comparatively scant. Similarly, comparing countries within sub-Saharan Africa poses many challenges. Although the continent can be broken up into geographical regions, the pace of development within states regionally is not always easily comparable. An example is the Southern African Development Community (SADC), where Zambia could not be easily compared with Angola, given their different colonial backgrounds, languages, GDP output, and respective energy profiles. What can be considered is what such countries have in common, as well as areas where they may be able to share expertise and energy infrastructure. The goal of providing these profiles according to the derived criteria is that more areas of opportunity and shared risk can be identified, with a view to strengthening RE IPP across the continent.

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## Table 1: Criteria for IPP attraction

| Country | Human development | Legislation | Policy drivers | Investment | Management |
|---|---|---|---|---|---|
| **Angola** | Low | Yes | Industrialisation | Private; public: hydro; biomass | Centralised |
| **Botswana** | Medium | Yes | REFIT | Public & private: Solar, wind, and bioenergy sources | Centralised |
| **Gabon** | Medium | No | Reduction of greenhouse gases | Public; IPPs: hydro | Centralised |
| **Ghana** | Medium | Yes | Production and export | Private & public: hydro; thermal | Centralised |
| **Kenya** | Medium | Yes | REFIT; Affordability | Private: hydro; geothermal | Centralised |
| **Lesotho** | Low | Yes | Private investment | Private: hydro; solar | Centralised |

| | | | | | |
|---|---|---|---|---|---|
| **Mozambique** | Low | Yes | Private investment | Private: hydro; biomass; gas | Centralised |
| **Namibia** | Medium | Yes | REFIT | Private: Solar; wind Public: Hydro | Centralised |
| **Nigeria** | Low | Yes | Private investment | Private: Solar; wind; hydro | Centralised |
| **Rwanda** | Low | No | Public investment; REFIT | Public: Biomass | Centralised |
| **Tanzania** | Low | Yes | Growth and poverty reduction | Public; IPP: hydro; biomass, solar | Centralised |
| **Uganda** | Low | Yes | REFIT; International collaboration | PPPs | Centralised |
| **Zambia** | Medium | Yes | REFIT; International collaboration | Private; public: hydro; biomass | Centralised |

## 5. CONCLUSION

Many countries have opted for a REFIT scheme. A few have a FiT for pricing of electricity generated from RE, accompanied by PPAs. The RE mix is context specific. For instance, there is predominantly hydro in Nigeria, geothermal in Kenya, and shared hydro between Angola and Namibia. Risk is high across most countries. Kenya is strong in developing and managing PPAs. Angola and Gabon lag behind in legislation and financial instruments. Nigeria, similar to Kenya, has a relatively strong framework. The managerial implications of this research is that future actions should focus on addressing the barriers identified in this article, including providing a conducive legislative context for IPPs, policy drivers should focus on attracting investment in the renewable energy sector, and decreasing political risk. Future research should identify the specific implementation context for IPP programmes for the respective countries; the implementation context should be 'fit for purpose' as no 'one size fits all' approach is conducive for the African context, due to the diverse nature of each country.

## 6. REFERENCES

Adams, J. (2010). Energy investments and development in Africa. *World Journal of Science, Technology and Sustainable Development,* 7(3), 215-247.

Africa Progress Panel (2017a). *Making Progress Towards Attaining the Sustainable Development Goals in Africa.* http://www.africaprogresspanel.org/wpcontent/uploads/2017/12/APP_2017_Making_Progress-_Towards_SDGs_Africa_WEB.pdf. Accessed 12 December 2017.

Aliyu, A. K., Modu, B. & Tan, C. W. (2018). A review of renewable energy development in Africa: A focus in South Africa, Egypt and Nigeria. *Renewable & Sustainable Energy Reviews.* (81), 2502-2518.

Beneking, A., Ellenbeck, S. & Battaglini, A. (2016). Renewable energy cooperation between the EU and North Africa: Findings of a

SWOT analysis. *International Journal of Energy Sector Management*, 10(3), 312-336.

Brown, L.R. (2015). *The great transition: Shifting from fossil fuels to solar and wind energy.* New York: W.W. Norton & Company.

Coleman, M. & Wass, D. (2016). What makes an EPC bankable for an African renewables energy project? In Clean Energy Pipeline, *Clean Energy Africa Finance Guide* (pp. 5-68). London: Clean Energy Pipeline.

COMESA (2017). Feed-in-tariffs guidelines. USAID. http://www.comesa.int/wp-content/uploads/2017/12/FIT-Guidelines.pdf. Accessed 22 June 2018.

Delmon, J. (2009). *Private Sector Investment in Infrastructure: Project Finance, PPP Projects and Risk.* 2nd ed. New York, USA: Kluwer Law International.

ESI Africa (2015). *Namibia Power Authorities Draft Bill to Encourage IPPs.* https://www.esi-africa.com/news/namibia-power-authorities-draft-bill-to-encourage-ipps/. Accessed 12 August 2017.

Ferroukhi, R., Ghazal-Aswad, N., Androulaki, S., Hawila, D. & Mezher, T. (2013). Renewable energy in the GCC: Status and challenges. *International Journal of Energy Sector Management Challenges*, 7(1), 84-112.

Ghaffarianhoseini, A., Tookey, J., Naismith, N. & Rotimi, J.O.B. (2016). Integrating alternative technologies to improve built environment sustainability in Africa: Nexus of energy and water. *Smart and Built Environment*, 5(1), 193-211.

Globserver (n.d.). *Gabon Energy Profile.* http://globserver.cn/en/gabon/energy. Accessed 12 August 2017.

International Renewable Energy Agency (IRENA) (2012). Mozambique Renewable Readiness Assessment 2012. www.irena.org/publications/2013/Jan/Mozambique-Renewables-Readdiness-Assessment-2012. Accessed 5 August 2017.

International Renewable Energy Agency (IRENA) (2013). *Zambia Renewable Readiness Assessment 2013.* http://www.irena.org/documentdownloads/publications/rra_zambia.pdf. Accessed 12 August 2017.

Jacobs, S. (2014). Electrifying Kenya: How one African country is approaching renewable energy development. *Renewable Energy World*, 8 October. http://www.renewableenergyworld.com/articles/print/volume-17/issue-5/solar-energy/electrifying-keyna-how-one-african-country-is-approaching-renewable-energy-development.html. Accessed 6 August 2017.

Kessler, J. (2015). *The Retail Energy Value Chain Explained.* https://www.energymanagertoday.com/the-retail-energy-value-chain-explained-0112312/. Accessed 14 March 2018.

Klunne, W.J. (2013). Small hydropower in Southern Africa – An overview of five countries in the region. *Journal of Energy in Southern Africa*, 24(3),14-25. http://www.scielo.org.za/pdf/jesa/v24n3/03.pdf. Accessed 2 August 2017.

Kozlovski, E. & Bawah, U. 2015. A financial decision support framework for the appraisal of renewable energy infrastructures in developing economies. *International Journal of Energy Sector Management*, 9(2), 176-203.

Lesotho Electricity and Water Authority (n.d.). *Lesotho Energy Policy 2015-2025.* http://www.lewa.org.ls/legislation/Policy/ENERGY%20POLICY%20.pdf. Accessed 20 August 2017.

Nel, D. (2017). Sustainable management of independent power production in South Africa. *Administratio Publica*, 25(1), 26-41.

O'Connor, E. (2016). *A Marshall Plan for Africa.* http://mainstreamrp.com/a-marshall-plan-for-africa-eddie-oconnor-at-the-africa-energy-forum-2016-aef2016/. Accessed 4 December 2017.

Obeng-Darko, N. A. (2018). Policy Trends on Renewable Energy for Decentralised Electrification as a Catalyst for Achieving Goal Seven of the Sustainable Development Goals in sub-Saharan Africa. The Case of Ghana. *Renewable Energy Law & Policy Review*, 8(4), 12-24.

Park, J. (2016). Clean energy entrepreneurship in sub-Saharan Africa. In T.M. Devinney, G. Markman, T. Pedersen & L. Tihanyi (Eds.) *Global Entrepreneurship: Past, Present & Future* (pp. 257-277). West Yorkshire, UK: Emerald Group Publishing. https://doi.org/10.1108/ S1571-502720160000029015. Accessed 12 June 2017.

Public-Private Infrastructure Advisory Facility (PPIAF) of the World Bank Group (2017). *Linking Up: Public Private Partnerships in Power Transmissions in Africa*. Washington, D.C., USA: World Bank. https://openknowledge.worldbank.org/handle/10986/26842?show=full. Accessed 12 February 2018.

Pueyo, A. (2018). What constrains renewable energy investment in Sub-Saharan Africa? A comparison of Kenya and Ghana. *World Development*. (109), 85-100.

Reegle (2014a). *Kenya*. http://www.reegle.info/policy-and-regulatory-overviews/KE. Accessed 2 August 2017.

Reegle (2014b). *Nigeria*. http://www.reegle.info/policy-and-regulatory-overviews/ng. Accessed 2 August 2017.

Renewable Energy and Energy Efficiency Partnership (REEEP) (2012a). *Gabon.* https://www.reeep.org/gabon-2012. Accessed 6 August 2017.

Renewable Energy and Energy Efficiency Partnership (REEEP) (2012b). *Lesotho*. https://www.reeep.org/lesotho-2012. Accessed 6 August 2017.

Renewable Energy and Energy Efficiency Partnership (REEEP) (2012c). *Rwanda*. https://www.reeep.org/rwanda-2012. Accessed 6 August 2016.

Renewable Energy and Energy Efficiency Partnership (REEEP) (2014a). *Ghana*. https://www.reeep.org/ghana-2014. Accessed 6 August 2017.

Renewable Energy and Energy Efficiency Partnership (REEEP) (2014b). *Namibia*. https://www.reeep.org/namibia-2014. Accessed 2 August 2017.

Renewable Energy and Energy Efficiency Partnership (REEEP) (2014c). *Tanzania*. https://www.reeep.org/tanzania-2014. Accessed 6 August 2017.

Republic of Angola Ministry of Energy and Water (2015). *Sustainable Energy for All. Rapid Assessment and Gap Analysis: Angola.* http://www.se4all.org/sites/default/files/Angola_RAGA_EN_Rel.pdf. Accessed 10 August 2017.

Republic of Uganda (2015). *Scaling-up renewable energy program investment plan.* http://www.energyandminerals.go.ug/downloads/SREPInvestmentPlanforUganda.pdf. Accessed 25 March 2018.

Sachs, J. 2015. *The Age of Sustainable Development*. New York, USA: Colombia University Press.

Thiam, D.R. (2012). Policy instruments for a market penetration of low carbon technology in developing nations. *International Journal of Energy Sector Management*, 6(4), 465-487.

Tumwesigye, R., Twebaze, P., Makuregye, N. & Muyambi, E. (2011). *Key issues in Uganda's Energy Sector.* London, UK: International Institute for Environment and Development (IEED). http://pubs.iied.org/pdfs/16030IIED.pdf. Accessed 12 August 2017.

United Nations Development Programme (UNDP) (2015a). *Sustainable Energy for All. Rapid Assessment and Gap Analysis: Botswana.* http://www.se4all.org/sites/default/files/l/2015/05/Botswana_RAGA.pdf. Accessed 10 August 2016.

United Nations Development Programme (UNDP) (2015b). *Sustainable Energy for All. Rapid Assessment and Gap Analysis: Rwanda.* http://www.se4all.org/sites/default/files/Rwanda_RAGA_EN_Released.pdf. Accessed 10 August 2016.

World Bank (2017). *Power Purchase Agreements (PPAs) and Energy Purchase Agreements (EPAs)*. https://ppp.worldbank.org/public-private-partnership/sector/energy/energy-power-agreements/power-purchase-agreements. Accessed 22 June 2018.