FINANCING SUSTAINABLE ENERGY PROJECTS IN AGRICULTURE

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ABSTRACT

Agriculture remains the source of livelihood in Africa. However, this sector is plagued by high level of wastage in food chain. In Kenya it is estimated that close to 50% of Kenya’s agricultural produce, be it crop, fish or even livestock is lost in post-harvest maneuvers. This is largely due to poor post-harvest processing and storage. These are energy intensive which compound the situation. Energy challenge is multi-faceted ranging from technology to financing and accessibility. This paper looks at energy financing and analyses the various options available for the agricultural sector in Kenya. The paper further compares financing approach in the developed countries and the lessons learnt and opportunities. The results of this study show that project finance is the preferred model of financing among REP financiers, while REP developers mainly prefer corporate finance. Based on the cost of implementation, project finance is mostly only a viable option for financing large-scale REPs, which as the results of this study show, delivers minimal benefits for sustainable economic development. This is mainly because large SEPs are mostly grid-connected. It is recommended that in developing countries, public institutions and legal systems should consider having the stability, ability, and reliability over the medium to long term to put in place and enforce laws and private sector regulation in general, as well as supportive incentives for renewable energy in particular.

Keywords: Energy, Post-Harvest, Financing, Sustainable

INTRODUCTION

Access to clean and stable energy is a major challenge for many developing African countries. This is more so for agricultural related activities. Policy and financing aspects play the greatest role in availability and accessibility of sustainable energy more so in East Africa. A mix of traditional and innovative methods is used by financiers, as they see fit, in specific financing situations. Additionally, for investment firms, the perception of financial risks associated with financing SEPs in semi-urban and rural areas is higher than that for SEPs in urban areas. Also, for larger firms financing SEPs, the safety of the environment or impact on local economic development are not prioritized goals. However, for smaller localized firms, contributing to a sustainable economic development is an important consideration when financing SEPs and improving the capacity of renewable energy technologies (RETs). I propose the promotion of a sustainable energy model as an efficient financial vehicle for increasing sustainable economic development through the production of reliable and stable electricity in semi-urban and rural communities of East Africa (Ojai, Soumonnib, & Ojahb, 2016).

Renewable energy can put an end to the reliance of many countries on expensive and volatile imports of fossil fuels such as oil and can be an avenue for Africa to better exploit the economic opportunities offered by international carbon
markets. This article questions why the up-front investment needed, particularly from the private sector, to seize these opportunities and to accelerate the renewable energy deployment that has to date not materialized in a region where it is much needed (Fischer, Lopez, & Suh, 2011). This paper aims at investigating ways in which financing sustainable energy projects (SEPs) can help to address the above problem.

An analysis of the drivers and barriers to renewable electricity expansion, including the cost and profitability of renewable energy, the structure and design of the local energy sector and the risk landscape in Africa, shows that to secure private investment, the public commitment needs to be demonstrated at the local level. However, understanding is also needed, both locally and internationally, of how private investment works and how it can be effectively promoted and mobilized through smart public intervention.

Lack of access to energy presents a formidable challenge to development in Africa. Energy poverty afflicts nearly 620 million people in Africa, limiting economic opportunities and creating health risks through the use of low-cost, alternative energy sources, such as wood fuel (IEA 2014). Without access to secure, reliable sources of electricity, households, businesses, schools, and hospitals cannot operate effectively, reducing the quality of life and restricting human capital. As acknowledged in the global sustainable development agenda, addressing these energy needs is fundamental to achieving economic and human development objectives. African governments and their partners in the private sector and international development community have taken this to heart as can be seen by the growing policy attention and resources they are allocating to the continent’s energy sector.

Financing to address Africa’s energy infrastructure needs was estimated to have reached $8 billion in 2013 (APP, 2015). Domestic public financing comprised nearly half of these investments while external financing—including private participation in infrastructure (PPI), official development finance (ODF), and Chinese investments—accounted for the rest. Still, the estimated cost of contending with Africa’s energy infrastructure needs is staggering, amounting to approximately $63 billion in 2013 alone. The above still left a financing gap of approximately $55 billion unresolved (APP, 2015).

Yet, aggregate figures like these obscure understanding of which actors are financing energy infrastructure, how, and where across the continent. This paper analyses the trends, strengths, and weaknesses of various sources of energy infrastructure financing in East Africa—including domestic public domestic investment, PPI, ODF, and Chinese financing. Furthermore, it contends that although lack of both capital and bankable projects poses a significant obstacle for expanding infrastructure financing in the continent, particularly for renewable energy projects, a solution involving a greater participation of development banks in the earlier stage of projects and leaving private funds to finance the less risky, latter stages of projects should be explored.

Studies conducted suggest that renewable energy has been advocated as a strategic option for increasing access to energy and promoting energy security for countries to realize their true economic potential. This is more so considering the impact energy has in post-harvest processing and storage of agricultural produce. Considering the challenges of connecting dispersed communities to the national grid, decentralized renewable energy plants help to address the energy access challenges in rural areas, while meeting the goal of environmental sustainability. Renewable energy contributes to sustainable economic development by providing employment and can contribute to increasing access to energy in remote areas (Gujba, Thorne, Mulugetta, Rai & Sokona, 2012 and Agbemabiese, Nkomo & Sokona 2012). Various models and mechanisms have been developed to alleviate the challenge of financing SEPs to increase adoption and spur economic development. Scholars suggest that the stability of capital markets in developed countries provides easier access to finance for SEPs.
2.0 EXPERIENCES IN DEVELOPED AND NEWLY DEVELOPED COUNTRIES

As identified by Justice (2009) and Olmos et al. (2012) in most countries, traditional financing methods – debt or equity (mezzanine finance, senior debt, project finance, venture capital and dedicated funds) are the main financing instruments. Studies have shown that in Africa, RET promotion is largely a strategic option implemented by governments to foster economic development. In this case, the apparent need for innovative financing models and mechanisms to impact end-users of RETs in order to foster anticipated development is even more important.

Experts suggest that the focus of investment in REPs should be on end-user finance for individual households, business finance for micro to small and medium enterprises and small-scale project finance for aggregated community development. They propose that financial mechanisms for RE development in developing countries should be adapted to the characteristics of decentralized systems of energy production. They also suggest that this would increase the viability of financial mechanisms and make RETs more affordable. Microfinance institutions (MFIs) could be instrumental in providing capital to finance the purchase of RETs in the rural areas of most African countries. MFIs operate to promote development through establishing inclusive financial. Community development finance institutions (CDFIs) can also operate as mechanisms to overcome financial exclusion, which in part, accounts for the inability to purchase RETs in rural communities (Justice, 2009 and Olmos, Ruester, Liong, 2012).

3.0 FINANCING TRENDS IN DEVELOPING COUNTRIES’ ENERGY STRUCTURE

Financing sources for developed countries and developing countries in African energy infrastructure include domestic financing by African governments and external financing in the form of ODF from multilateral institutions (such as the African Development Bank and the World Bank, as well as most of the OECD-DAC donors), Private participation in infrastructure (PPI), and Chinese financing (Bhattacharyya, 2013, Ruppel & Althusmann, 2016 and Sy & Copley, 2017). In terms of the breadth of its financing sources, the energy sector is comparable to the transportation sector in the sense that it relies on a combination of financing from governments, ODF, China, and PPI (Table 1). Other sectors, such as the telecommunications (telecom) sector depend predominantly on a reduced number of financing sources—in this case, private sector investments. A closer look at the transportation sector suggests, however, that some subsectors rely on fewer financing options than others. This trend also appears to be the case in the energy sector where the private sector is mostly interested in the generation subsector, leaving investment in the transmission and distribution (T&D) subsectors to other financiers such as African governments and China (Sy & Copley, 2017).

External finance

The three main sources of external financing for African infrastructure include ODF, PPI, and official Chinese financing, which account for 97 percents of all such external investments. Emerging markets such as Brazil, India, and Arab states currently play a minor role in African infrastructure financing that they could expand upon in the future. Overall, external financing for infrastructure in Africa across the three major external sources has tripled between 2004 and 2012 (Figure 1).
Clearly, the multilateral funding agencies also ignored the energy access until recently and have focused on large projects, bigger markets instead of poorer economies and smaller countries (Bhattacharyya, 2013, Ruppel & Althusmann, 2016 and Sy & Copley, 2017). During this period, ODF levels increased especially from the World Bank and the African Development Bank (AfDB) but, notably, the dominance of ODF in infrastructure financing declined as private investment surged to over 50 percent of external financing and China became a major bilateral source (Figure 1).

![Figure 1: External financing: Energy expanding, telecom maturing (in USD millions, current)](image1)

![Figure 2: Private sector grows in share of external financing (in USD millions, current)](image2)
Official development finance (ODF)

From the above figure, it is evident that Official development finance (ODF) served as the main source of external financing throughout the 1990s. Since then, its share of external financing has declined slightly, representing nearly 35 percent of external financing to African infrastructure. Still, ODF continues to play an important role, especially in the sectors and countries that tend not to attract the same levels of investments from the private sector. While ODF’s support has consistently focused on transport as well as water and sanitation projects, its investments in the energy sector have increased substantially from $540 million annually in 2006 to $3.5 billion in 2012, representing nearly 35 percent of all ODF investments that year (Figure 3 below).

Domestic finance

Domestic public investment (mostly through government budget allocation) constitutes the largest source of the continent’s infrastructure financing, reaching $59.4 billion or 72.9 percent of the total African infrastructure financing in 2012 (IMF 2014). Encouragingly, African governments have, on average, increased their investments in infrastructure, and specifically in energy infrastructure, in recent years. As their infrastructure budgets grew by 8 percent per year from 2011-2013 so too did their allocations to the energy sector, which grew by 5 percent over the period, according to the Infrastructure Consortium for Africa (ICA 2014a).

Private participation in infrastructure

PPI has served as the largest and most stable share of external financing for African infrastructure projects since 1999, constituting over 50 percent of all external investments. In contrast to ODF, its financing has concentrated on the lucrative telecom sector with almost two-thirds of total PPI in East Africa from 2005-2013 going to telecom. The transport and energy sectors accounted for most of the remaining financing over the same period, and the electricity sub-sector alone made up 18.6 percent of PPI during this time. Growth in PPI to the energy sector is accelerating faster than other sectors, driven by investments in electricity; however, these investments largely target electricity generation rather than distribution, leaving distribution financing to alternative funding sources. In 2015, sub-Saharan Africa closed on 23 infrastructure projects, amounting to $6.3 billion, with 18 of the 23 deals (accounting for $4 billion) in renewable energy. South Africa’s REIPPP program drove the growth in energy sector investments (up from $2.6 billion in 2014) with 16 of the region’s 23 projects (Sy & Copley, 2017).
China

China’s official financing has grown precipitously from less than $313 million in 2000 to $4.4 billion in 2012—nearly 20 percent of the external financing for African infrastructure projects (Figure 4). Its investments have primarily targeted the transport sector, especially railways and roads, in which it can compete for contracts through multilateral financing (Figure 5). In recent years, it’s financing to the energy sector has increased to nearly half of all infrastructure investments, focusing mainly on hydropower projects. During the 2000s, China targeted its financing to mostly resource-rich countries; however, since 2010 it has interestingly broadened its focus to non-resource-rich countries that do not receive significant ODF or private sector investments, effectively complementing other external financing sources in the region. For example, currently the largest recipients of Chinese infrastructure financing are Ghana and Ethiopia, which do not have vast natural resource bases, and Cameroon and Zambia receive proportionately large amounts of Chinese infrastructure financing for being relatively small economies (Sy & Copley, 2017 and Ruppel & Althusmann, 2016).

The financing for these projects comes in the form of public lending from the Export-Import Bank of China (Exim Bank). Chinese support helped provide integrated solutions in power generation capacity and transmission and distribution (T&D), including cross-border transmission lines between Ethiopia and Kenya and local urban and rural distribution networks in Angola and Equatorial Guinea.

China’s engagement in financing African infrastructure projects has elicited criticism, namely, for not consistently applying World Bank social and environmental safeguards and omitting considerations of institutional and operational importance. Yet, it is worth noting that China has also reached out to bilateral and multilateral donors regarding its role in founding the BRICS’ New Development Bank and has partnered with the African Development Bank on the Africa Growing Together Fund—showing its willingness to collaborate with international donors and African partners (Sy & Copley, 2017 and Ruppel & Althusmann, 2016).

4.0 CHALLENGES IN FINANCING SUSTAINABLE ENERGY PROJECTS IN AGRICULTURE

From the above discussion, it is clear that at the country level public investment in energy infrastructure varies widely, as each country selects its development priorities according to its national context (ICA 2014a). It is also evident that some countries have greater resources to allocate toward energy infrastructure based on the robustness of their domestic tax revenue mobilization efforts. Barriers to financing sustainable and renewable energy projects by organizing them under three main heads: level-playing field, easy market access, and political and regulatory investment risks (Schwerhoff & Sy, 2016 and Ganda & Ngwakwe, 2014).

Governments with smaller tax-to-GDP ratios need to boost their fiscal revenues in order to provide more resources to fill their infrastructure financing needs. Yet, increasing tax revenues alone may not be sufficient to augment spending on infrastructure, and spending reforms, which reduce earmarks on taxes and account for great allocations to infrastructure, may also be required (Ram 2006).

Policies to raise more fiscal revenues and spend it more efficiently must go hand in hand. The IMF (2015) estimates that about 40 percent of the potential value of public investment in low-income countries is lost to inefficiencies in the investment process due to time delays, cost overruns, and inadequate maintenance (Ganda & Ngwakwe, 2014). Those inefficiencies are often the result of undertrained officials, inadequate processes...
for assessing needs, and preparing for and evaluating bids and corruption.

In addition, to complement tax revenues and diversify their sources of domestic financing, some countries are accessing international capital markets through international sovereign bond issuances e.g. Eurobond issuances. However, the question of whether international sovereign bonds are reliable sources of infrastructure financing is being raised, especially as global financial conditions tighten, borrowing costs rise, investor interest dwindles, and oil prices fall, complicating efforts to service and refinance loans.

Domestic capital markets could also expand their role in infrastructure financing although they are currently dominated in most countries by commercial banks that prioritize short-term financing. Other relatively untapped financing mechanisms include diaspora bonds and Islamic financial instruments (such as Sukuk). A prudent and sustainable way to finance infrastructure would be to increase the participation of domestic institutional investors, which typically have a long-term horizon, such as local pension funds. This said, pension funds’ objective to provide income security in old age should not be compromised by investing in infrastructure, and a strong governance structure is a precondition for such investments (Sy & Copley, 2017 and Ruppel & Althusmann, 2016).

Figure 4: Chinese financing growing significantly (in USD millions, current)
It is also more capable of engaging in sectors and projects that require additional institutional and policy expertise, such as transport (roads and railways), and water and sanitation projects, which PPI sources tend to engage in less. Conversely, critiques of ODF include the appropriateness of its binary, concessional/non-concessional lending for countries, rather than offering a range of concessionality, as Chinese financing sources can do (Sy & Copley, 2017).

Another challenge is optimizing ODF’s evolving role relative to PPI, especially in the energy sector. For instance, ODF is increasingly being used to leverage PPI for energy projects. Continuing to innovate and maximize the potential of these partnerships will be crucial to fulfilling Africa’s infrastructure financing gap. While China’s involvement in the power sector in Africa is advancing at a robust pace, more transparency, including on the financing terms of these projects, would be welcome (Sy & Copley, 2017).

To continue the expansion of PPI beyond the telecom sector, certain challenges to African infrastructure financing must be addressed. According to a recent survey of private sector investors (ICA 2013), the biggest obstacles to investing in African infrastructure are (i) project feasibility; (ii) country/political risk; (iii) profitability; (iv) legal/regulatory environment. Addressing these concerns will require multi-stakeholder approaches. A number of initiatives already exist to further harmonize these efforts such as the Project Preparation Facilities Network (PPFN) (Fischer, Lopez, & Suh, 2011).

5.0 OPPORTUNITIES IN FINANCING SUSTAINABLE ENERGY PROJECTS IN AGRICULTURE

Renewable, low-carbon technologies have the potential to rapidly expand energy access throughout the continent. Africa has a rich renewable energy asset base, especially in solar and wind power, and prices of low-carbon technologies are falling rapidly. However, a number of challenges within the sector and along the entire power value chain need to be addressed in order for a renewable revolution to occur.

First, on the demand side, low-income consumers often lack the initial capital to adopt off-grid renewable solutions despite the savings they would accrue over the course of its operation. Innovative business models, however, can prove useful in overcoming these barriers, as evidenced by the array of credit and payment options that many businesses now offer (Ganda & Ngwakwe, 2014 and Sy & Copley, 2017).
On the supply side, the initial capital costs of setting up such large-scale renewable solutions are usually higher than the capital costs for carbon-intensive energy projects (and face their own financing challenges). Most countries cannot afford to use domestic public finance to support the establishment of large-scale renewable projects and also lack the appropriate enabling environment for promoting PPI in renewable energy solutions. For instance, PPI in the energy sector requires “predictable tariff regimes, simplified licensing procedures, standardized ‘technology-based’ power purchase agreements or realistic energy planning tools,” which many countries still need to address, according to Antony Karembu, Policy and Public-Private Partnerships Advisor for the AfDB’s Sustainable Energy Fund for Africa (SEFA). The creditworthiness of state utilities and aging grid networks also deter investors from supporting renewable energy generation projects (Ganda & Ngwakwe, 2014).

In terms of prioritizing energy projects—grid or off-grid, renewable or carbon-intensive—the discussion is still on-going, and the tradeoffs are daunting. “Sustainable Energy for All” estimates that to reach universal access globally, grid connection will need to be extended to all new urban connections and 30 percent of rural populations. The remaining 70 percent of rural populations would gain access through decentralized systems, with 65 percent accessing mini-grids (Sy & Copley, 2017). A good example is as discussed in the Africa Progress Panel 2015 report, the M-KOPA model in Kenya for solar off-grid systems allows households to pay a small deposit for the solar system and then pay back the remaining balance of the system on a pay-as-you-use basis until the entire cost is covered.

6.0 POSSIBLE SOLUTIONS TO THE CHALLENGES

Infrastructure projects have high upfront construction costs although operating costs may be lower over the project’s lifetime, the initial capital costs could overwhelm the eventual gains from operations. African governments often cannot cover the upfront costs of construction, and private sector investors are deterred from investing in the project’s early stages due to contractual or regulatory uncertainty. Risky and expensive developer equity is often the only private financing option in these cases. Addressing the cost of financing for the initial phase of infrastructure projects is therefore crucial to enabling more private sector investment in these projects (Ruppel & Althusmann, 2016).

The financing challenges above and the scale of the investment needed are compounded in the case of regional projects. One option that merits further exploration would be to scale-up the investment of development banks. Development banks such as the World Bank, which have both the flexibility and expertise in infrastructure projects, should help finance riskier phases of large projects. Given the scale of infrastructure projects, development banks could attract co-financing from bilateral and multilateral partners as well as dedicated private investors. Once the construction phase is passed and cash flows are generated, development banks should disengage and offload their debts to pave the way for a viable engagement of long term-investors such as sovereign wealth funds and other long-term investors (Sy & Copley, 2017, Ruppel & Althusmann, 2016 and Schwerhoff & Sy, 2016).

7.0 IMPACT OF THE SOLUTIONS IN FINANCING SUSTAINABLE ENERGY PROJECTS IN AGRICULTURE

The above solution would help solve a number of factors that constrain African infrastructure projects, especially in the case of sustainable infrastructure. As a result, East African countries would face relatively low financing costs, reflecting investor’s perceptions of the high risk involved in holding assets, particularly in infrastructure, in the continent. Infrastructure is considered risky since it is illiquid, long-term, and can be vulnerable to changes in countries’ policy and regulatory environments. Sustainable infrastructure investment in renewables is even riskier since it may depend on subsidies or feed-in-tariffs to be economically feasible. Implementing the above-mentioned solution would make these risk factors compound to make
debt and equity for infrastructure projects in African countries less expensive than before.

Figure 6: Financial instruments for off-grid electrification by Bhattacharyya (2013)

8.0 CONCLUSIONS

The results of this study show that project finance is the preferred model of financing among REP financiers, while REP developers mainly prefer corporate finance. Based on the cost of implementation, project finance is mostly only a viable option for financing large-scale REPs, which as the results of this study show, delivers minimal benefits for sustainable economic development. This is mainly because large SEPs are mostly grid-connected.

Hence, while large REPs may bring about an increase in electricity production, this may not translate to an increase in energy access within the country. However, if financing and investment barriers such as the lack of appropriate credit reporting systems and project scalability are properly addressed, project finance, developed as a method of aggregation funding for smaller REPs within dispersed African communities can help to address the challenge of sustainable energy access and contribute to local economic development.

9.0 RECOMMENDATIONS

In developing countries, public institutions and legal systems should consider having the stability, ability, and reliability over the medium to long term to put in place and enforce laws and private sector regulation in general, as well as supportive incentives for renewable energy in particular.

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