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The landscape of energy initiatives in sub-Saharan Africa:

Going for systemic change or reinforcing the status quo?

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Highlights

- Main actors are investing substantively in energy initiatives in sub-Saharan Africa
- Initiatives conceptualize the energy problem in economic and technological terms
- Recent initiatives thus largely promote the status quo, instead of systemic change
- Future initiatives must address energy problem using a socio-technical approach

Abstract

This article examines recent interventions by major players in sub-Saharan Africa's energy sector and asks whether they acknowledge or seek to address energy as a complex problem and energy systems as socio-technical systems. Several scholars have begun advocating the socio-technical approach to energy by noting that the mainstream conceptualization of energy challenges in strictly technological or economic terms does not capture the complexity and inertia inherent to energy systems. Moreover, the article also seeks to examine how well have recent interventions integrated pro-poor and low-carbon concerns, two of the major tenets of UN's Sustainable Development Goal 7. Findings suggest that initiatives studied take only partial consideration of key aspects of a socio-technical approach to the energy problem. Nonetheless, the initiatives have taken on board pro-poor and low-carbon concerns to a certain extent. Two main policy implications are drawn from this study: a continued focus on status quo approaches has the potential to generate investment inefficiencies; and an effective low-carbon transition will require a broader discussions about the types of lifestyles people in sub-Saharan Africa aspire to.

Keywords

Energy transitions

Sub-Saharan Africa

Electricity access

Renewable energy

Socio-technical approach

1. Introduction

Limited access to modern energy services in sub-Saharan Africa is now widely recognized as one of the key hurdles to the economic and social development of its population (Africa Progress Panel, 2015; Brew-Hammond and Kemausuor, 2009; Karekezi, 2002). According to the latest estimates of the International Energy Agency, 65% of the population of sub-Saharan Africa lacks access to electricity and 81% uses harmful and inefficient traditional forms of energy (e.g. biomass) for cooking and heating (IEA, 2016). In other words, the co-existence of traditional and modern energy systems and practices remains largely the norm in many sub-Saharan African countries (Sokona et al., 2012). Development actors have stepped up their support for improved access to modern energy services in the sub-continent since the UN declared 2012 the International Year of Sustainable Energy for All (SE4ALL). Official development assistance (ODA) is expected to continue to grow after the launch in 2015 of the UN Sustainable Development Goal 7, the commitments on climate change made at the COP21, and the aims outlined in paragraph 49 of the Addis Ababa Action Agenda to finance energy infrastructure.

The expected rise in initiatives to deliver universal access to efficient and sustainable modern energy services in the sub-continent faces two broad challenges, however. First, the cost of meeting the target of universal access by 2030 is high compared to the ability of most countries to finance the required energy projects. The Africa Progress Panel (2015) estimated an annual spend of USD\$55bn was needed to that end. National governments alone cannot afford it and so development actors will play a crucial part in many initiatives (Eberhard and Shkaratan, 2012; Quitzow et al., 2016a). Private sector involvement is also becoming a staple in Africa's energy development future, as private actors search for new sectors and markets around the globe (Quitzow et al., 2016b; Eberhard et al., 2017). While some view private sector involvement not just as inevitable but also necessary (UNEP

Finance Initiative, 2012), others seem to find evidence that it leads to the ‘financialization’ of energy projects, with a concomitant loss of focus on issues around energy poverty, equality, and sustainability (Baker, 2015).

The second challenge is that of governance. Here the issues are diverse and variable from country to country, but a few trends are noticeable: the absence of appropriate regulatory regimes, be it for the regulation of energy markets, investment and finance, contractual arrangements, or the governance of corporate activity; distortions introduced by national government interventions in the energy sector (e.g. artificially low electricity tariffs, subsidies to national utilities); or the lack of adequate technical capacity to manage energy resources and infrastructures (Bazilian et al., 2014). With a growing variety of actors involved in energy initiatives in sub-Saharan Africa, various authors suggest this is leading to diffuse, fragmented and uncoordinated action with limited effectiveness (Bazilian et al., 2014; Cherp et al., 2011; Florini and Dubash, 2011; Florini and Sovacool, 2009).

A recent exercise mapping major ODA programs and initiatives in Africa by Quitzow et al. (2016a) confirmed the proliferation of investment initiatives and actors. It noted various governance challenges, particularly as connected to achieving improved coordination and knowledge sharing across initiatives (Ibid.). The authors also highlighted some concerning tendencies across the initiatives (Quitzow et al., 2016a): a considerable neglect of Central Africa across initiatives, which raises concerns over asymmetrical energy development for the continent; a continued preference for engaging national actors, even though local actors are deemed fundamental to developing new low-carbon energy pathways (Bulkeley et al., 2011; Dubash and Florini, 2011); a lack of attention to clean cooking solutions, despite its impact on the environment and households health and income (Sovacool, 2012); or a tendency for technical assistance to miss out on much needed skills development in

recipient countries (Eberhard and Shkaratan, 2012). While providing an overview of high-level ODA initiatives alone, this mapping exercise is rather helpful in capturing the current dynamics of interventions in the energy sector in sub-Saharan Africa.

However, this mapping exercise leaves unanswered a pressing question: will these efforts effectively contribute to a systemic change of Africa's energy sector? More prosaically, is investment being used to treat the symptoms (e.g. energy poverty) or the problem? This is a legitimate concern, since mounting evidence seems to suggest that, so far, energy sector reforms have defined the problem in too narrow terms. For instance, Dubash (2003) questioned long ago whether electricity reforms conducted in the 1990s, which typically focused in technical and economic reforms, were missing the social and environmental dimensions of the energy problem (see also Turkson and Wohlgemuth, 2001). As a result, the push for market liberalization and utility unbundling did not materialize as policymakers expected, neither did legal, regulatory and institutional obstacles to investment disappear (Eberhard and Shkaratan, 2012; Gujba et al. 2012). Some authors have argued that these failures are a consequence of limited attention to the political economy of the energy sector in Africa and its dynamics at various scales – global, regional, national, or local (Bazilian et al., 2014; Sovacool, 2012; Verrastro et al., 2010). Initiatives tend to overlook the importance the energy sector plays in the control of political power, elite formation, or economic gate-keeping so characteristic of African economies dependent on mineral-based exports (Africa Progress Panel, 2015; Auriol and Blanc, 2009; Cooper, 2002). The diversification of ODA actors mentioned above may exacerbate this lack of attention to the local politics of energy, since ODA actors may steer projects to serve their own interests and agendas at the expense of improving recipient countries' institutional environment (Barnett and Finnemore, 1999; Gibson et al., 2005; Mosse, 2005; Roodman, 2009). Overall, what recent energy initiatives seem to continue to miss is that

energy is a complex problem and energy systems are not just technical in nature; they are instead socio-technical systems deeply embedded in local, national, regional and global institutions, practices and politics (Silver and Marvin, 2017). As such, there is a risk that current initiatives may contribute to reinforce the status quo instead of promoting the systemic change needed.

This article examines recent interventions by major players in sub-Saharan Africa's energy sector and asks whether they acknowledge or seek to address energy as a complex problem and energy systems as socio-technical systems. Several scholars have begun advocating the socio-technical approach to energy by noting that the mainstream conceptualization of energy challenges as strictly technological or economic matters does not capture the complexity and inertia inherent to energy systems (Geels, 2004; Goldthau, 2014; Goldthau and Sovacool, 2012). Despite their various approaches, there is now a collective understanding among these scholars that a move towards sustainable energy transitions that addresses both energy poverty and climate change (i.e. pro-poor and low-carbon) requires systemic change that challenges status quo solutions focusing largely on technological fixes and energy markets. If recent and upcoming initiatives by major players continue to miss the underlying dynamics of sustainable energy transitions, then we may be investing in reinforcing existing inertia and path-dependencies, instead of chartering new sustainable energy futures.

The article is organized as follows. Section 2 introduces the socio-technical approach, outlining some of the key aspects to take into account when analyzing energy initiatives that seek to promote systemic change towards sustainable energy futures. Section 3 outlines the methodology underlying the selection and analysis of major actors and their initiatives. Section 4 presents and discusses the results. The main finding is that a socio-

technical conceptualization of the energy problem is largely absent, with some initiatives showing concerns with developing pro-poor and low-carbon solutions, but with only limited consideration of a broader low-carbon socio-technical transition. Section 5 concludes with a discussion of the policy implications for future energy initiatives in sub-Saharan Africa and elsewhere in the global South.

2. Literature review and analytical framework

Providing access to sustainable energy for all in sub-Saharan Africa will require significant innovation, not just through technological solutions or the right economic incentives and investments, but also through social, institutional, and geographical innovation (Goldthau, 2014). Several scholars concerned with sustainable energy transitions advocate this socio-technical approach to the problem of energy, in Africa and elsewhere, as the best approach to capture the challenges ahead (e.g. Bulkeley et al., 2011; Byrne et al., 2011; Geels, 2004; Goldthau, 2014; Rutherford and Coutard, 2014; Turnheim et al., 2015). A detailed review of this now extensive literature on the socio-technical approach is beyond the scope of this article. However, for the current purpose, there are two broad concerns of a socio-technical approach to sustainable energy transitions to consider: how the actors proposing an initiative conceptualize the energy problem they intend to address; and what is the underlying agenda they seek to promote with their energy initiative.

As for the first concern, a socio-technical approach conceptualizes the problem of energy as a complex one, involving multiple actors, scales, geographical locations and timeframes (Goldthau and Sovacool, 2012; Turnheim et al., 2015; Urry, 2014). Energy is a global public good that influences various spheres of social and economic life in various places across the globe (Florini and Sovacool, 2009; Turnheim et al., 2015). Its infrastructure is physically embedded in concrete places making space and geography a critical dimension of energy

systems (Bridge et al., 2013). For these reasons, energy systems are rather context-specific, path-dependent, with specific lock-ins, and resistant to change (i.e. system inertia); they have stabilized over time as the result of the historical co-evolution of social, technical, institutional and ecological systems (Goldthau and Sovacool, 2012; Turnheim et al., 2015). Resistance to change can be widespread and system-wide: it can come from the most powerful key players within the energy industry or from the most common individuals and their set habits of energy consumption. Attention to the historical dimensions of path-dependency and inertia is crucial, yet seldom addressed by energy initiatives (Baptista, In press). Moreover, energy production and consumption systems raise complex problems of externalities, the most obvious of which are now climate change and energy security (Goldthau and Sovacool, 2012). As such, energy is governed by different technical and bureaucratic silos that cut across various jurisdictions, not just within one country, but also across countries (Florini and Sovacool, 2009). The number of actors involved is diverse and widespread, making global governance of energy a complex affair. In sum, a socio-technical approach to the energy problem draws our attention to at least three key aspects: (a) the complexity of the energy problem; (b) path-dependency in energy systems; and (c) inertia in energy systems.

A fourth specific aspect of a socio-technical approach regarding the problem of energy that is particularly relevant to sub-Saharan Africa is the extent to which the latest initiatives take into account the urban scale. There is a growing acknowledgement that cities and regions are fundamental to addressing the problems of energy, climate change and poverty (Rutherford and Coutard, 2014; Rutherford and Jaglin, 2015). While there are ongoing debates about how and how fast Africa, and sub-Saharan Africa in particular, is urbanizing (Fox, 2012; Potts, 2009, 2013), there is an acknowledgement that the continent is undergoing an 'urban revolution' (Parnell and Pieterse, 2014). A perception that Africa's

middle class is growing, that they will be located in urban areas and will espouse high-energy consumption lifestyles, makes a focus on the urban scale even more relevant (AfDB, 2011; Resnick, 2015). However, as various authors have noted, much of policy focus continues to be centered on national-level interventions and little attention has been placed on what a focus on the urban scale means for interventions in Africa's energy sector (Rutherford and Jaglin, 2015; Silver and Marvin, 2017). Acknowledging these four aspects is of essence if an energy initiative is to espouse a socio-technical approach that conceptualizes energy as a complex problem.

Alongside this first concern (i.e. energy as a complex problem), scholars working with the socio-technical approach share a second concern with regards to the extent to which energy initiatives foster pro-poor and low-carbon agendas. As noted earlier, these issues are particularly germane to the sub-Saharan African context (see Bazilian et al., 2014). Taking this concern into account requires paying attention to four particular aspects: (1) Access to energy to satisfy a diversity of needs and energy services (e.g. lighting, cooking, heating/refrigeration, powering ICT devices, entertainment, etc.), potentially using a diversity of technologies and/or types of fuel (e.g. renewable/non-renewable; on-grid/off-grid); (2) Affordability of energy fuel, whether through pricing mechanisms, financing opportunities, or other means; (3) Quality of service, whether in terms of adequacy, reliability or safety of energy use; and (4) Environmental sustainability, especially associated with energy production and consumption (Brew-Hammond and Kemausuor, 2009; Hogarth and Granoff, 2015; Scott, 2012; Sovacool, 2012). A socio-technical approach to these aspects takes into account that, for instance, access to modern energy services or technology transfer is not just about balancing costs and benefits between fuel types or technologies (Lutzenhiser, 1993). It is also, and most importantly, imbued with social values of status, comfort and convenience that shape users access options (Shove, 2003,

2010) or the availability of communities of practice to carry forward new technologies (Byrne et al., 2011).

This article draws on these two concerns and their specific aspects to devise an analytical framework to analyze whether recent energy initiatives seek to promote systemic change towards sustainable energy futures (Table 1).

Table 1

Analytical framework for a socio-technical approach to energy initiatives.

Concerns/Key Aspects	
1. Energy problem	Initiative's conceptualization of energy problem
1.1. Complexity (Diversity of)	<ul style="list-style-type: none"> • Actors • Scales • Geographic locations • Timeframes
1.2. Path-dependency (Historical co-evolution of)	<ul style="list-style-type: none"> • Social systems • Technical systems • Institutional systems • Ecological systems
1.3. Inertia (Against transition)	<ul style="list-style-type: none"> • Social interests • Political interests • Economic interests
1.4. Urban scale	Consideration of urban scale
2. Agenda	Initiative's aims and concerns
2.1. Pro-poor	<ul style="list-style-type: none"> • Access by the poor • Affordability • Quality of energy services provided to the poor
2.2. Low-carbon	Degree of engagement with renewable solutions: <ul style="list-style-type: none"> • High • Medium • Low

Source: authors.

3. Methodology and Data Used

The unit of analysis considered in this research is individual major actors and their flagship energy initiatives for sub-Saharan Africa (unit of analysis and unit of observation coinciding

in this case). Our method of data collection consisted of a desk review of initiatives' reports available online. We analyzed data through content analysis, following a qualitative approach as outlined in Berg (2004). Specifically, we coded each report with a view to capture the essence of the account provided about the initiative, both in terms of its manifest and latent content (Berg, 2004). We used the analytical framework outlined in Table 1 as the basis for devising coding categories. Categories were systematized along two main axes: (1) the conceptualization of the energy problem, and (2) the agenda (i.e. main aims and concerns). Each main category was then broken down into subcategories. The sub-categories under the conceptualization of energy problem included: (1.1) Complexity (whether initiatives considered diverse actors, scales, geographical locations and timeframes); (1.2) Path-dependency (whether initiatives addressed the historical co-evolution of social, technical, institutional, and ecological systems); (1.3) Inertia (whether initiatives addressed the various social, political and economic interests that stand behind the status quo and in the way of an energy transition); and (1.4) Urban scale (whether the initiatives' activities were aimed at the urban scale or not). The sub-categories for the initiatives' agenda (i.e. aims and concerns) included: (2.1) A pro-poor agenda (whether initiatives focused on improving access, affordability and quality of energy services to the poor); and (2.2) A low-carbon agenda (the degree of engagement with renewable solutions and carbon-intensive solutions). We used these categories to code how each initiative portrayed each of the items on the table and developed interpretations from that coding. For example, we interpreted how each initiative conceptualized the energy problem they sought to address by drawing on manifest/latent statements (e.g. address generation, consumer behavior or market inefficiencies) and on absences of different ways of conceptualizing the energy problem (e.g. no mention of lifestyles). Our findings are reported in section 4 and systematized in Table 4.

This approach presented several limitations. Given the wealth and diversity of energy initiatives currently underway the world over, we began by identifying a number of actors with the funds and technical capacity to shape sub-Saharan Africa's future energy pathways (Table 2). We drew initially on the types of major actors identified by Florini and Sovacool (2009) and Bazilian et al. (2014), and organized actors in the following categories: intergovernmental organizations; multi-lateral development banks; bilateral organizations; the private sector; and summit processes. The first three categories are fairly standard ODA actors, and there is a wide diversity of actors to choose from. However, given that our method of data collection was limited to a desk review of online resources, information available for some of the actors initially considered was very poor (e.g. China Development Bank). Unfortunately, quality of data available on progress of programs and projects is a widespread issue identified by others looking at energy initiatives in Africa (AEEP, 2014; Quitzow et al., 2016a). This narrowed the field of initiatives under examination and the opportunity to find initiatives that may take into account a socio-technical approach. We sought to minimize this effect by selecting the major global players and initiatives in each category for which we have the best information available (Table 3).

Table 2
Types of organizations and examples of major actors.

Type of Organisation	Lead Actor (outside Africa)
Intergovernmental organizations	European Union United Nations/SE4All initiative United Nations Environmental Programme
Multi-lateral development banks	African Development Bank China Development Bank The World Bank
Bilateral organizations	China-Africa Development Fund USAID
Private sector consultancies	Deloitte KPMG McKinsey & Company
Summit processes	The Global African Investment Summit (DMG Events Global Energy, Daily Mail and General Trust plc) African Energy Forum (EnergyNet Ltd., Clarion Events)

Source: authors, adapted from Florini and Sovacool (2009) and Bazilian et al. (2014).

Table 3
Actors and initiatives studied.

Type of Organisation	Lead Actor (outside Africa)	Initiative	Sources
Intergovernmental organizations	European Union	Africa-EU Energy Partnership	AEEP (2011, 2012, 2014, 2016a, b) http://www.euei-pdf.org/en/aecp
Multi-lateral development banks	World Bank Group	Lighting Africa	Lighting Africa (2009, 2010, 2011, 2012, 2014, 2015) https://www.lightingafrica.org/
Bilateral organizations	USAID	Power Africa	USAID (2014, 2015, 2016a, b) https://www.usaid.gov/powerafrica
Private sector consultancies	McKinsey & Co.	Brighter Africa Report	Castellano et al. (2015) http://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights
Summit processes	EnergyNet, Ltd. /Clarion Events	African Energy Forum	EnergyNet (2013, 2016) https://www.energynet.co.uk/ http://africa-energy-forum.com/

Source: authors.

As noted earlier, the private sector is taking up an increasing role in Africa's energy sector. Given the diversity of private operations in the energy sector, we used consulting firms that cater directly to private investors as their proxy. This choice can only indirectly characterize how actors in the private sector are thinking about the energy problem and what agenda they are interested in pursuing. To enhance the data, we looked also at energy summit processes, i.e. conferences and forums specifically designed to facilitate private investors, public officials and consultants to meet up and discuss opportunities to address Africa's energy sector. We were aware of a growing event-organizing industry around Africa's energy sector, which are promoted as places for crucial networking and deal making involving the private and public sector (e.g. Africa Energy Forum). We relied on conference reports available online as sources of insights for the way energy is being conceptualized and agendas are being set at these events. As such, the data captures a partial view of the discussions that take place at such events. While these methods make our research exploratory in character and its findings have limited generalizability, the article sheds light on the most prominent ways of thinking of the dominant players, which is also likely to influence others given their accessibility. This gives a route into exploring

the possibility of initiatives being aligned with either the status quo or with taking sub-Saharan Africa down a sustainable, pro-poor, low-carbon energy transition pathway. Further research on other actors' initiatives and/or more detailed initiative reports can also provide a more complete picture of where investments in Africa's energy sector are heading.

We present below a brief overview of each initiative studied.

The Africa-EU Energy Partnership (AEEP)

Intergovernmental initiative between African and EU governments that seek to foster dialogue among a diversity of stakeholders on three shared interests in the energy sector: energy access, security and efficiency. It is one among eight initiatives set in 2007 as part of the Africa-EU Joint Strategy and is funded through the EU-Africa Infrastructure Trust Fund (€812 million) and the ACP-EU Energy Facility (€800 million) that supports African and other developing countries. By 2020, the partnership aims are: (1) to bring access to modern and sustainable energy services to at least an additional 100 million Africans; (2) to double the capacity of cross border electricity interconnections; (3) to double the use of natural gas in Africa; (3) to build power generation facilities (10,000 MW hydropower; 5,000 MW wind power; 500 MW solar power); (4) to triple the capacity of other renewables (geothermal, modern biomass); and (5) to improve energy efficiency in Africa in all sectors, starting with the electricity sector (AEEP, 2011, pp. 9).

The IFC-World Bank Lighting Africa program

An initiative of the World Bank Group, started with pilot projects in 2007, Lighting Africa program supports the private sector in developing modern, high-quality off-grid lighting and energy products (e.g. CFLs and LEDs) that can be put to use largely in rural areas

(Lighting Africa, 2009, 2010). Ultimately, it seeks to provide access to basic electricity needs to 250 million Africans by 2030 through the program (Lighting Africa, 2011). The initiative is implemented in partnership with the Group's Energy Sector Management Assistance Program (ESMAP) and the Global Environmental Facility (GEF), fifteen European governments and the US government. Their main activities include: market intelligence, quality assurance framework for off-grid solutions products, access to finance for all the supply chain, consumer education, business development support and policy and public sector support (Lighting Africa, 2010, 2015).

USAID Power Africa initiative

Initiative launched in 2013 to promote strategic partnerships across various actors to promote energy access in sub-Saharan Africa. The initial commitment from the US government was of USD\$7billion (USAID, 2014), having mobilized an additional USD\$43 billion from other public and private investors by 2016. The main objectives of the initiative are to achieve, by 2030: (1) 60 million new electricity connections; and (2) adding 30,000 MW in generation capacity (USAID, 2016b). For this purpose, the initiative mobilizes funding, financial guarantees and technical assistance with a view to leverage private investment, as well as off-grid and small-scale technologies (USAID, 2014).

McKinsey & Company 'Brighter Africa' report

McKinsey is a global management consulting firm that offers services to businesses, governments, as well as NGOs and not-for-profit organizations. The firm has a dedicated practice offering analytics and services to the Electric Power & Natural Gas industry. The firm issued a report in 2015, *Brighter Africa: The growth potential of the sub-Saharan electricity sector* (Castellano et al., 2015), which explores “how power demand will evolve in the region, along with the associated supply requirements; how much it will cost to supply the needed power, plus the options available to manage the expense; and what is required to ensure

that the new capacity gets built” (ibid., pp. 2). They conclude that, “sub-Saharan Africa has an extraordinary opportunity but will have to do a lot of work to take advantage of it” (ibid., pp. 2).

EnergyNet’s African Energy Forum

EnergyNet, Ltd, a subsidiary of Clarion Events, is a London-based private outfit focused on organizing executive and investment meetings and forums on the power and industrial sectors across Africa to “facilitate investment summits where international investors can build relationships with credible African public sector stakeholders,” as stated on their website (<http://www.energynet.co.uk/page/about-us>). EnergyNet organizes in-country investment meetings (the Powering Africa Series) and other annual meetings, including the ‘African Energy Forum’ (19th edition in 2017), the ‘Powering Africa Summit’ (3rd edition in 2017), and the ‘Africa Energy Forum – Off the Grid’ (1st edition in 2016). All events have sponsorship from a large pool of interested parties, including the industry, banking and investment, consulting and government. The last African Energy Forum, held in London in June 2016, hosted over 250 speakers, 14 Ministers and senior government officials. It was attended by over 2100 participants from 80 countries (32 from Africa), and showcased large-scale centralized projects, as well as smaller off-grid projects (EnergyNet, 2016, pp. 2).

4. Results and Discussion

Table 4 presents an overview of the results of our analysis, followed by an outline of the analysis regarding each key aspect in the analytical framework. Overall, our analysis suggests that initiatives studied are generally aligned with the status quo of technological fixes and energy market creation, even though initiatives take partial consideration of key aspects of a socio-technical approach to the energy problem. Nonetheless, the initiatives have taken on board the pro-poor and low-carbon agendas, although they seem to do so in limited ways.

Table 4
Summary of results.

Concerns/ Key Aspects		Africa-EU Energy Partnership (EU)	Lighting Africa (IFC-WB)	Power Africa (USAID)	Brighter Africa (McKinsey)	Africa Energy Forum (EnergyNet)
1. Energy problem	Conceptualization of energy problem	Energy poverty – problem of lack of generation	Energy poverty – problem of lack of generation and consumer behavior	Energy poverty – problem of lack of generation and inefficient markets	Energy poverty – problem of lack of generation and inefficient markets	Energy poverty – problem of lack of generation
1.1. Complexity	Diverse actors	YES Experts, regional leaders, national governments, private sector, households, universities, NGOs	YES Manufacturers & distributors of off-grid solutions	YES National governments, private sector, development actors, civil society, communities	YES Investors and national governments	YES Investors, industry and national governments
	Diverse scales	YES	LIMITED Part of ‘product supply chain’	LIMITED Implicit only	LIMITED Part of ‘investment risk’	NO
	Diverse geographic locations	YES	LIMITED Part of ‘product supply chain’	LIMITED Implicit only	LIMITED Part of ‘investment risk’	LIMITED Either markets or global players
	Diverse timeframes	NO	LIMITED Part of ‘product supply chain’	LIMITED Implicit only	LIMITED Part of ‘investment risk’	NO
1.2. Path-dependency	Historical systems co-evolution	NO	NO	NO	LIMITED Forward-looking only	LIMITED Forward-looking only
1.3. Inertia	Consideration of obstacles to transition	LIMITED Political interests and governance arrangements	LIMITED Political interests and governance arrangements	LIMITED Political interests and governance arrangements	LIMITED Political interests and governance arrangements	NO
1.4. Urban scale	Consideration of urban scale	NO	NO	LIMITED	LIMITED Urbanization drives demand	NO
2. Agenda	Aims and concerns	Foster investment & market creation for energy access, security & efficiency	Foster investment & market for off-grid quality solutions	Foster investment & market creation for various energy solutions	Inform investors of market potential and obstacles	Networking among key actors
2.1. Pro-poor	Access, affordability, & quality service	YES	YES	YES	NO No specific focus on vulnerable communities	NO No specific focus on vulnerable communities
2.2. Low-carbon	Degree of engagement with renewable solutions	MEDIUM Generation via renewables and natural gas	HIGH Off-grid solar solutions	MEDIUM Generation via renewables and natural gas	LOW Large-scale generation opportunities via coal, natural gas, and renewables	N/A Attention to renewables; unclear about other forms of generation

Source: authors.

(1) Energy problem largely conceptualized as a problem of generation

Overall, initiatives consider electricity essential to promoting economic growth, prosperity and social development, even if the latter concern remains understated by some of them (Brighter Africa report and African Energy Forum). All initiatives point to the low baseline of electricity access and diagnose the problem as one of a lack of generation infrastructures, as well as transmission and distribution infrastructures. By framing the energy problem in such terms, the initiatives tend to emphasize the economic and also political dimensions, but largely obscure the social and ecological dimensions of energy systems. As a result, there is a widespread concern with investment, finance, and the creation of appropriate regulatory environments that can foster competitive energy markets and investments in infrastructures. There is also a particular interest with the technical aspects of managing energy supply, whether in terms of integration of national grids in regional power pools (AEEP), integration of grid and off-grid solutions (Lighting Africa, Power Africa), or with improvements in the management and operation of existing and new infrastructures (African Energy Forum). Except for the Lighting Africa's concern with consumer education (see 1.3 below), a conceptualization of the energy problem as inherent to specific economic models, lifestyles, or social aspirations of class and status are generally absent. All initiatives take for granted that improving access is a necessary and a foregone conclusion, with little questioning of what electricity is used for by households.

(1.1) Widespread acknowledgment of complexity of energy problem, despite limited specification

Initiatives tend to acknowledge the diversity of actors and scales of operation, as well as temporal dimension of energy transition (usually in the sense that it will take long to implement many of the initiatives). The Lighting Africa initiative pays particular attention to the various actors in the supply chain for off-grid technologies. Yet, there is a continued focus on the strategic importance of national scale actors, to the detriment of local scale

actors. The AEEP initiative does a better job at recognizing the diversity of geographical locations than the other initiatives, which tend to adopt a blanket overview of categories such as ‘rural communities’ (Lighting Africa, Power Africa) or ‘market demand’ (Brighter Africa). The African Energy Forum is perhaps the initiative that adopts the most reductionist view, by framing its initiatives around the industry, investors and governments, with limited attention to who its consumers are and what they will do with the electricity that will be provided to them.

(1.2) Limited engagement with path-dependency in energy system

Apart from a brief mention to the joint past of Europe and Africa in the context of the AEEP initiative, there was a marked absence of an understanding of the energy problem as one of numerous path-dependencies and historical legacies. Initiatives tended to adopt a forward-looking spirit. While acknowledging the continent’s insufficiencies and political fragilities, they tended to address the present nearly as a ‘blank-slate’ upon which markets could be created, technologies adopted, and large-infrastructure projects implemented. One aspect that applies across initiatives is how the continent’s natural resources are seen as ripe for use in increasing generation capacity, with little attention to the many environmental impacts implicated in diverse generation solutions. While the forward-looking spirit might generate much needed momentum in addressing Africa’s energy problem, a ‘blank-slate’ approach disregards the interdependencies of the energy system with varied issues such as: availability of an educated workforce to implement projects; labor market and income generation capable of sustaining consumption; race and ethnic tensions in deciding where investments will be made and which populations will be served; or even the fragility of some ecosystems, particularly in areas of intensive resource extraction.

(1.3) Inertia in energy systems recognized, but conceptualized mostly in political/governance terms

Initiatives acknowledge that existing governance arrangements – whether in terms of policies, legal and regulatory frameworks, electricity tariffs and markets, or investment mechanisms – are in need of improvements if Africa’s energy poverty is to be addressed. The Brighter Africa report is particularly pointed in this regard, noting the particular role that governments must play to unlock the favorable conditions for investment, even referring to their ‘political will’. Both the AEEP and the Power Africa initiatives share these concerns, thus aiming at addressing roadblocks to private sector involvement. The Lighting Africa is alone in an explicit concern with consumer behavior and consumer education. Yet, they frame it in atomistic terms – i.e. as a matter of adopting specific off-grid solutions, without a reflection regarding certain obdurate practices related to energy use (e.g. how having access to the grid is associated with a status or lifestyle aspiration).

(1.4) Only limited acknowledgement of urban scale

Given that access is largely lacking in rural areas, initiatives tend to focus on these and leave urban areas understated in their approaches. This is particularly the case with the AEEP and Lighting Africa initiatives, with their focus on increasing electricity access to the poorest and off-grid solutions (especially in the latter). The Brighter Africa report mentions explicitly the relationship between the pace of urbanization in Africa and the expected growth in electricity demand, thus acknowledging that households in urban areas consume more than those in rural areas. Yet, even in this case, the reference to the urban scale is limited to household consumption. No specific mention is made to urban economies, urban lifestyles that are energy-intensive, or the specific role urban governments and local actors may play in facilitating access or a transition to low-carbon economies.

(2) Main agenda focus: facilitate investment/create efficient markets to promote power generation and access

Because the initiatives tend to envision the energy problem as one of supplying electricity to an unfulfilled demand, they tend to adopt an economic-oriented agenda. This is particularly the case of the Brighter Africa report, the Power Africa initiative, and the Lighting Africa program. The African Energy Forum operates under a similar backdrop, but the events are specifically geared towards networking and ‘deal-making’.

(2.1) General commitment to solutions targeting poor communities, with some exceptions

The three initiatives facilitated by intergovernmental, bilateral or multilateral organizations showed the greater pro-poor concerns. The AEEP and Power Africa initiatives are admittedly pro-poor, and so is Lighting Africa, with its focus on off-grid solutions for unconnected communities in rural areas. The two private-oriented initiatives – Brighter Africa and African Energy Forum – tend to think of demand in global terms (as a growing market), not directly specifying a pro-poor concern in their initiatives.

(2.2) General commitment to low-carbon generation, but not necessarily to low-carbon transitions

The initiative with the highest low-carbon concerns would be Lighting Africa, with its focus on supply via off-grid, solar solutions. The AEEP and the Power Africa initiatives are both concerned with increasing the share of renewables generation, but also consider other options (namely natural gas). In the case of AEEP this focus on natural gas may be indeed the main (albeit understated) goal of the partnership – i.e. to secure a flow of Africa’s natural gas to Europe to satisfy its growing demand. The Brighter Africa report and the African Energy Forum also place attention on the growing share of renewables in the energy market (especially as off-grid solutions), but these are seen as complementary to centralized, large-scale grid infrastructures, or even coal generation.

5. Conclusions and Policy Implications

This article provided an exploratory review of recent initiatives by major players in sub-Saharan Africa's energy sector. It conducted a desk-review of documents made available online by the selected actors as a way of beginning to assess the extent to which players with the funds and technical capacity to influence the trajectory of investments in Africa's energy systems are conceptualizing the energy problem as a socio-technical problem – i.e. as a complex problem that involves technical, economic, political, social and ecological dimensions; multiple actors operating at various scales and across various geographical locations and timeframes; a problem that shows various path-dependencies with historical roots in the past and, as such, a high degree of inertia to change. The exploratory analysis also tried to assess the extent to which the initiatives studied were firmly grounded on pro-poor and low-carbon transition concerns, both necessary for the achievement of the UN's Sustainable Development Goals.

The analysis suggests that initiatives studied are generally aligned with the status quo of technological fixes and, most especially, energy market creation, even though they take partial consideration of key aspects of a socio-technical approach to the energy problem. Major actors continue to emphasize the economic and political dimensions of energy supply and demand, particularly in the creation of adequate and efficient markets and improvements in political will and governance arrangements capable of fostering the much-needed private sector investment in expanded electricity generation, transmission and distribution infrastructures. On a more positive note, the analysis suggests that major actors have taken on board the pro-poor and low-carbon agendas, although those outside the ODA community seem to do so in limited ways.

Two main policy implications can be drawn from these findings. First, unless the energy problem comes to be conceptualized in more complex terms, path-dependencies acknowledged and inertia taken into account, the ‘blank-slate’ approach will continue to return implementation inefficiencies. This will represent significant inefficiency in capital investments required to provide universal access to modern energy services to people in sub-Saharan Africa. For instance, investment needs to engage with various scales of intervention (not just the national level); fostering of renewable, off-grid systems needs to be coupled with workforce training programs with the knowledge to produce, implement, and maintain such systems; and policymakers looking to transition from charcoal to modern energy services will have to incorporate the impacts this will have on the existing charcoal supply chain, the many livelihoods that depend on it, and economic interests that may get in the way.

Second, until the energy problem comes to be conceptualized along the lines of the socio-technical approach, it will be difficult for policymakers to acknowledge that low-carbon transitions entail more than just providing technological fixes, economic incentives or governance adjustments to technology adoption or efficient market creation. In many oil and gas-rich African countries this will require policymakers to promote alternative economic development models beyond heavy reliance on fuel exports (as some North African countries are doing already). More broadly, policymakers must instigate broader discussions about the types of lifestyles people in sub-Saharan Africa aspire to. As elsewhere, addressing climate change while providing clean energy for all depends on a paradigm shift to a low-carbon society at all levels.

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