A Review of Energy Communities in Sub-Saharan Africa as a Transition Pathway to Energy Democracy

Amollo Ambole [1,*], Kweku Koranteng [2], Peris Njoroge [1] and Douglas Logedi Luhangala [1]

[1] Institute of Climate Change and Adaptation, University of Nairobi, 30197-00100 Nairobi, Kenya; perisnjoroge764@gmail.com (P.N.); douglaslogedi@gmail.com (D.L.L.)

[2] School of Public Leadership, Stellenbosch University, Stellenbosch 7602, South Africa; kweku.koranteng@gmail.com

[*] Correspondence: lambole@uonbi.ac.ke

Abstract: Energy communities have received considerable attention in the Global North, especially in Europe, due to their potential for achieving sustainable energy transitions. In Sub-Saharan Africa (SSA), energy communities have received less attention partly due to the nascent energy systems in many emerging SSA states. In this paper, we argue that these nascent energy systems offer an opportunity to co-create energy communities that can tackle the energy access challenges faced by most SSA countries. To understand how such energy communities are realised in the sub-region, we undertake a systematic review of research on energy communities in 46 SSA countries. Our findings show that only a few energy projects exhibit the conventional characteristics of energy communities; In most of these projects, local communities are inadequately resourced to institute and manage their own projects. We thus look to stakeholder engagement approaches to propose co-design as a strategy for strengthening energy communities in SSA. We further embed our co-design proposal in energy democracy thinking to argue that energy communities can be a pathway towards equity and energy justice in SSA. We conclude that energy communities can indeed contribute to improving energy access in Africa, but they need an enabling policy environment to foster their growth and sustainability.

Keywords: energy communities; energy democracy; stakeholder engagement; Sub-Saharan Africa; transitions

1. Introduction

1.1. Energy Communities and Energy Transitions

Access to clean, affordable, and sustainable energy is a requirement for developing low-emission economies that can support resilient communities [1]. Local communities are now seen as a conduit for developing these low-emission economies through decentralised production and consumption of renewable energy. As such, proponents of the sustainability narrative are pushing for democratic governance systems that gives local communities greater participation and decision-making roles in energy production [1,2]. These shifts in energy governance are happening mostly in the Global North, especially in Europe, where communities are empowered to mobilise resources and engage multiple stakeholders to exploit alternative energy pathways [3–5]. These alternative approaches are largely driven by the normative goals to reduce the carbon emissions resulting from the high use of non-renewables in the Global North [6–8]. However, in the Global South, especially in SSA, the energy transition conversation is simultaneously advocating for a switch to low-carbon economies, while increasing energy access to the millions of energy-poor citizens [9,10].

Recent studies on energy communities are characterized by distinct renewable community energy projects that have received considerable attention in countries such as the United Kingdom, Netherlands, and Germany [11,12]. For example, in Germany, approximately 22% of the installed renewable electricity capacity is owned by sustainable energy

communities [13]. In Chile, community energy initiatives have proven to be useful for exploiting economies of scale, and effective at reducing peak demand charges [14]. In the Netherlands, energy communities are explored and presented as social niches that contribute to transitions in the energy system [8]. In contrast, the United States is seen as lagging European countries in establishing energy communities due to its prevailing top-down strategies [11]. Generally, this rapid increase in community energy projects in developed economies is driven by renewable energy support schemes and policies that provide incentives and increased awareness on collective actions [13,15,16]. Their success is also linked to the existence of viable business models, innovative financing and remuneration schemes, smart technologies, social acceptance and more importantly, citizen participation [17].

1.2. Conceptualizing Energy Communities

Understanding the definitions and characteristics of successful energy communities is important in conceptualizing how energy communities in Sub-Saharan Africa (SSA) can lead to a sustainable energy transition in the sub-region. There are various definitions associated with the concept of energy communities and what such initiatives entail (See Table 1). Literature shows that the level of community involvement also varies based on the understanding of intermediary organizations, policy makers, academics, and ownership structures [18–20]. The following are different definitions of energy communities with a particular focus on projects defined as community energy initiatives. From these definitions (Table 1), it is apparent that energy communities are focused on shifting the benefits and governing powers to local communities. They ensure that community energy initiatives are managed collectively by consumers to improve their degree of ownership, participation, and energy security. In this paper, we argue that these attributes contribute to a community's attainment of energy democracy.

Table 1. Definitions adopted from different sources.

Definition	Citation
Energy communities are grassroot innovations that diffuse the local production and use of renewable energy at the community level. The complexity of establishing these grassroot innovations calls for "community energy intermediaries" who extract process generic lessons from context-specific cases studies. These intermediaries are non-governmental organisations or think-tanks that initiate and support community energy projects by networking communities with energy groups; providing communities with tools and resources such as carbon calculators and good practice case studies, offering professional and business support services; managing and evaluating funding programs, and interfacing with policy makers.	[20]
Energy communities are community-based energy projects, which are installations of one or more renewable energy technologies in or close to a community with input from members of that community. The community benefits from using renewable energy and conserving natural resources. In this regard, communities need institutional support to actively engage in project leadership roles.	[19]
Energy communities are decentralised community-scale energy systems that directly target the development and empowerment of communities to produce and consume their own energy and engage in decision making processes. This can be organised through cooperatives, where beneficiaries share infrastructure and services. Such arrangements have to deal with the challenges of diverse participation, co-management, and fair reimbursement of beneficiaries.	[18]
Energy communities according to the REScoop model in Belgium are energy cooperatives where citizens jointly own and democratically control a renewable energy enterprise. All citizens are eligible to become members of REScoop by purchasing a cooperative share and thus sharing in the benefits and profits of the cooperative. These energy cooperatives adhere to the principles of the International Cooperative Alliance that promotes voluntary membership; democratic member control; autonomy; education and training; cooperation and community.	[17]

Table 1. *Cont.*

Definition	Citation
Community energy are energy projects that are locally and collectively owned. These projects are viewed as essential drivers for transitioning from top-down, centralised energy supply to decentralised, democratic, and sustainable exploitation of renewable energy. These projects are thus characterised by micro-level participation, public acceptance, and stakeholder engagement. To thrive, community energy projects require supportive regulatory framework such as s feed-in regulations and tax incentives. Beyond the practical goals of switching to renewable energy, communities may be driven by cultural influences such as alternative movements and existing cooperative arrangements.	[21]
Community energy projects are diverse as they could range from individual energy production for single household use, to landowner groups or urban cooperatives that manage medium sized energy projects. The type of activity also varies, with examples ranging from electricity production to carpooling. The common characteristics across these diverse range of community type, size, and activity is the exploitation of renewable energy resources including biomass, geothermal, hydro, solar, tidal, wave, and wind resources.	[11]

From the above definitions, we derive the following principles that govern the establishment and management of energy communities as shown in Table 2.

Table 2. Principles that define and govern energy communities (Adapted from [17–21]).

Operative Principle/Key Characteristic	Description
Community involvement and cooperation	A community energy project should provide social, economic, and environmental benefits for its members and the local area where it is active. These benefits should be shared fairly amongst members in relation to their participation. In return, members should be willing to take up project leadership roles, as well as engage with diverse stakeholders.
Open and Voluntary Participation	Membership should be open to all persons in the community as final users who are willing to accept the responsibilities of membership.
Democratic governance	Communities have direct democratic governance based on equal decision-making rights. Projects should be controlled by the members or shareholders who are participating as final users; Outside investors or undertakings participating in the community must not have a controlling position within the board.
Institutional support	Communities need institutional and professional support to initiate and manage energy projects. Professional support can be provided by community energy intermediaries who network communities with relevant stakeholders and resources and provide them with business services. In addition, energy communities need conducive regulatory framework that incentivise locals and stakeholders to actively engage in initiating and managing energy projects.
Decentralised renewable energy and innovative technologies	Community energy projects should take advantage of innovative methods and technologies to exploit renewable energy resources sustainably and affordably. Off-grid and micro-grid technologies provide a promising approach.

1.3. Energy Communities, Energy Democracy, and Stakeholder Engagement in Energy Provision

The concepts of energy communities and energy democracy are closely aligned in several ways: both advocate for decentralised local energy systems; public participation in deliberative processes; multi-stakeholder involvement; and community ownership. In energy communities, stakeholder engagement is a tool for empowering local communities [21–23]. Similarly, in energy democracy, stakeholder engagement is a means for achieving energy justice, energy citizenship, and associative democracy [24–27]. We thus link these three bodies of knowledge to argue that energy communities need effective and contextualised stakeholder engagement strategies that can lead them towards achieving energy democracy.

In a review of 100 community energy groups in Scotland, Bomberg and McEwen [28] set out to examine how energy communities mobilize themselves to overcome barriers

in order to achieve energy democracy. The authors concluded that both structural and symbolic resources shape community energy mobilization and participation. In this case, structural resources refer to the broader political context as well as the structuring and constraining opportunities for community mobilization. On the other hand, symbolic resources refer to the less tangible factors such as a desire to have strong and self- reliant communities or self-identity that are used to mobilize participants [28]. Community energy systems can therefore potentially contribute to social equity goals by providing distributed generation access to consumers and mechanisms for communities to mobilize and overcome barriers to energy access [14].

1.4. Energy Communities in the Context of Sub-Saharan Africa

Sub-Saharan Africa (SSA) is made up of 46 countries located in the South of the Sahara Desert. The sub-continent is characterised by a young and rapidly growing population in need of effective solutions to deal with energy access challenges. Population statistics indicate that over 60% of the 1.11 billion people in SSA are below the age of 30 years [29]. This not only increases the potential for development, but also increases energy needs, which current energy systems are unable to provide for sufficiently [30–40]. Research shows that local community-based energy systems might be better in solving energy access issues compared to centralized systems [18,41–43]. In SSA, the few energy communities that exist are predominantly set up to bridge energy access gaps with underlying concerns such as poverty reduction and improvement in health. However, these communities are gradually emerging as a pathway towards sustainability and resilience for millions of households in the region [44–46].

As noted, SSA has the lowest energy access rates with only about half of its population having access to modern forms of energy. Over 600 million Africans lack access to adequate electricity and 890 million still depend on unsafe traditional fuels [34]. Though the challenges of energy access in SSA are rife, energy in SSA has received less attention in literature compared to European counterparts. This can be attributed partly to the nascent energy systems in many SSA states. In our review, we identified that the aforementioned factors associated with energy communities in Europe are either lacking or insufficient in SSA energy projects. Several authors characterise these insufficiencies as key barriers to establishing sustainable energy communities in the region [14,18,19,44–51].

In this paper we argue that the nascent energy systems in SSA offer an opportunity to collaboratively design energy communities that address energy access challenges present in many SSA countries. To foreground this argument, the paper is guided by two main research questions: (1) What are the main challenges facing energy communities in SSA? And (2) What stakeholder engagement strategies are needed to institute and drive energy communities in SSA? To answer these questions and understand how effective energy communities can be designed, we examine 19 community energy projects from SSA to assess the various challenges they faced and proposed co-design approaches that might be useful for their growth and spread. We do this by undertaking a systematic review of literature on energy communities across 46 SSA countries. We then interrogate our findings against effective stakeholder engagement strategies in energy projects and anchor our argument on emerging thinking in energy democracy discourse. In doing so, we draw linkages between energy communities, stakeholder engagement, and energy democracy.

This paper provides an important contribution to the literature on energy communities by giving a perspective from SSA. We undertook this study because as noted, most research on energy communities largely investigates initiatives implemented in the Global North. The characteristics of such initiatives might not be generalizable to the development, implementation, and management of community energy projects in the Global South. Nevertheless, we can draw lessons from the North and contextualise them for SSA [47].

2. Materials and Methods

This paper reviewed two sets of literature to build an argument for why energy communities can be a pathway towards sustainable and democratic energy transition in SSA. In the first review, the paper employed a systematic review of all potentially relevant literature on energy communities and stakeholder engagement in community energy projects from across 46 SSA Countries. Content analysis was applied to documents that fit the inclusion criteria to be included the final review stage. The analysis allowed us to interrogate the state of energy communities in SSA, and to proposed solutions drawn from stakeholder engagement strategies and energy democracy thinking. In the second review, the paper employed an argumentative literature review of research on stakeholder engagement in energy projects. This second review was necessitated by the inadequate conceptualization of how energy communities can be instituted in SSA in the first review. The conclusions and recommendations of this paper are thus drawn from the second review.

2.1. Inclusion and Exclusion Criteria

Publications included in this review were ones that: (a) were published in English between 2010 and 2020; (b) covered community energy projects in a specific SSA country, OR any of the SSA regions of Western Africa, Eastern Africa, Central Africa, or Southern Africa, OR covered the concept in SSA in general; (c) had an element of stakeholder engagement and/or stakeholder participation strategies. Publications were excluded if they did not meet these inclusion criteria.

2.2. Information Sources and Search

Two systematic searches of literature published between 2010 and 2020 were conducted independently. The first search focussed on energy communities and community energy projects in SSA while the other focussed on stakeholder engagement in energy projects from the region. We used Scopus as the main search engine and utilised Google and Google Scholar for snowballing and identifying relevant grey literature. In the first search, we used "community energy" AND Africa* OR sub-Sahara* OR "developing countries" OR "emerging markets" OR "third world". The search string used in the second search on stakeholder engagement was: stakeholder* OR multi-actor* AND Africa* OR sub-Sahara* AND "renewable energy" OR "sustainable energy" OR "energy poverty". These search strings produced a total of 77 potentially relevant documents on Scopus where 23 were on energy communities and 54 on stakeholder engagement in energy projects in SSA. Google and Google Scholar yielded more results on the subject matter. All the search results were subjected to the inclusion and exclusion criteria. Publications whose abstracts had sufficient indication that they were relevant either for the first or second search were retrieved for further screening of their eligibility for the scope of this paper.

2.3. Data Extraction Process

The systematic literature search began in July 2020 and ended in September 2020. Over 100 journal publications were screened. The abstracts of 77 publications found on Scopus were screened for inclusion eligibility. Of these, abstracts of 21 publications (11 on energy communities and 10 on stakeholder engagement) had sufficient indication that the document was eligible for inclusion. 56 publications (12 on energy communities and 44 on stakeholder engagement) were excluded because they did not meet the set inclusion criteria. The 21 Scopus publications that were eligible for inclusion were retrieved for an in-depth review process and data extraction alongside 16 other eligible google results that were selected via snowballing. From the 34 documents included in the review, 19 are on energy communities while 15 are on stakeholder engagement.

2.4. Attributes of Energy Communities in the Content Analysis

We assessed the publications on energy communities against conceptualisations of how successful energy communities are constituted. The content analysis was thus looking

for attributes of energy communities in the reviewed energy projects based on the operative principles or key characteristics identified in Table 2. The attributes were grouped as follows:

1. Engagement—community involvement; open participation; stakeholder engagement networking
2. Democratic governance—voting rights; shareholding
3. Institutional support—business services; policy advise; tools
4. Type of system—decentralised; micro-grid; hybrid; renewable energy

In addition, the content analysis used conceptualisations from other literature on improving energy access in general. These conceptualisations included the need for majority of shares to be held by local community [50,52]; and majority of economic and social benefits to be distributed locally [53,54].

3. Results: Systematic Review Results of Community Energy Literature in SSA

3.1. Literature on SSA Community Energy Projects

The 19 documents on energy communities in SSA are summarised in Table 3, while the attributes of energy communities from the 19 documents are explained in Table 4. 11 of the documents were research articles based on case studies. They therefore provided more information across the attributes of the content analysis. The remaining 8 documents were literature reviews of energy projects and so they provided less information across the attributes on the content analysis. The case studies therefore provide a better understanding of how energy communities are established and managed.

Table 3. Summary of Reviewed Literature on Energy Communities in SSA (Source: Compiled by Authors).

Country	Type of Community Energy Project	Publication Year	Citation
Malawi	Renewable energy acceleration program	2016	[55]
Zambia (Mpanta)	Renewable energy mini-grids	2018	[56]
South Africa (Mpumalanga District)	Plantation based biofuel schemes	2017	[18]
Ethiopia	Village biogas and solar energy scheme	2017	[57]
Uganda (Tribogo Village)	Community electricity mini-grids	2015	[58]
Tanzania	Electricity mini-grid deployment	2017	[59]
South Africa (Lucingweni)	Community electricity mini-grids	2016	[49]
Namibia (Tsumkwe Village)	Community electricity mini-grids	2017	[48]
Rwanda	Solar powered micro-grids and smart metering	2019	[44]
South Africa	Household energy models and plans	2005	[60]
South Africa	Off-grid schemes	2018	[61]
Developing countries	Renewable micro-grid community schemes	2019	[14]
Developing countries	Large scale rural electricity grids	2010	[45]
Sub Saharan Country	Sustainable energy for grid connected rural communities	2011	[46]
Several Countries	Integrated community energy systems	2016	[46]
Several countries	Efficiency for different schemes	2012	[62]
Several countries	Participatory smart grid systems	2016	[63]
East Africa	Renewable energy microgrids	2016	[50]
SSA	Sustainable energy for grid connected rural energy communities	2016	[64]

Table 4. Attributes of Energy Communities in SSA from reviewed literature in Table 3 (Source: Compiled by Authors).

	Case Studies				
Type of Community Energy Project	Engagement: Community involvement; Open participation; stakeholder engagement; networking	Democratic governance: voting rights; shareholding	Institutional support: business services; policy advise; tools	Type of system: decentralised; micro-grid; hybrid; renewable	Citation
Renewable energy acceleration program	Stakeholder engagement—government, Community Based Organizations (CBOs), and the community members Open participation at the start	No voting rights No shareholding	Community Based Organizations offer support Local government for financial support Expert advisers on energy	Hybrid system	[55]
Renewable energy mini-grids	Stakeholder engagement-open participation, government agencies (the Rural Electrification Authority (REA)) and local government,	Community participation and ownership rights through the Kafita Multi-Purpose Cooperative Society	Ownership through the Kafita Multi-Purpose Cooperative Society Policy support from the Rural Electrification Authority and the Energy Regulatory Board	Micro-grid	[56]
Plantation based biofuel schemes	Stakeholder engagement-cane growers, cane growing communities.	Shareholding for cane farmers	Government and industrial funding	Renewable energy scheme	[18]
Village biogas and solar energy scheme	Ugandan rural villages and energy regulators as stakeholders.	None	No mention of the support rendered	Renewable energy schemes	[57]
Community electricity mini-grids	Stakeholders engaged include households in Tiribogo village, the Centre for Research in Energy and Energy Conservation (CREEC), and local leadership.	Partial ownership by community-based organizations.	Business support from the Centre for Research in Energy and Energy Conservation.	Renewable energy Micro-grids	[58]
Electricity mini-grid deployment	Stakeholders include the national utility (TANESCO), private businesses, faith-based organizations, and local communities Open participation through community engagement workshops.	Owned and operated by the national utility (TANESCO), private businesses, faith-based organizations, and local communities All the owners have voting rights in the project.	Policy support from TANESCO Government support through the small power producers framework	Micro-grid	[59]

Table 4. *Cont.*

Case Studies				
Community electricity mini-grids	Engagement with the Energy Services Companies, rural households, and local governments. Open participation done	No ownership or voting rights for the community members	Business support from the Energy Services Companies Tools and policy support from the local government and NGOs	Micro-grids	[49]
Community electricity mini-grids	Engaging stakeholders like the World Bank, United Nations Development Program (UNDP), Global Environment Facility, governments, and households in Tsumkwe village in Namibia.	No ownership or voting rights for the community members	Policy support from the Otjozondjupa Regional Council Tools and business support from the Namibian Broadcasting Corporation	Hybrid systems	[48]
Solar powered micro-grids and smart metering	Engaging stakeholders from the government and agencies like the Rwanda Energy Group (REG) (the country's utility) and the Rwanda Utility Regulatory Agency (RURA) Networking between micro-grids in Rwanda	Partial ownership by the community members. Voting rights for the members of the community with ownership	Policy, business, and tools support from the Rwanda Energy Group (the country's utility) and the Rwanda Utility Regulatory Agency Business support from Public Energy Developers	Micro-grids	[44]
Household energy models and plans	Engaging stakeholders including Limpopo provincial administration and households (especially women). Open participation encouraged through community gatherings	No ownership or voting rights mentioned	Business and policy support not mentioned	Hybrid energy systems	[60]
Off-grid schemes	Engaging agencies like the Department of Energy (DOE)	No ownership or voting discussed	Business and tools support from energy service companies	Hybrid energy systems Renewable energy	[61]
Literature Reviews				
Type of Community Energy Project	Engagement: Community involvement; Open participation; stakeholder engagement; networking	Democratic governance: voting rights; shareholding	Institutional support: business services; policy advise; tools	Type of system: decentralised; micro-grid; hybrid; renewable	Citation
Renewable micro-grid community schemes	No stakeholders engaged. Case study used from literature	No ownership. Case study used from literature	No support offered. Case study from literature	Micro-grids	[14]
Large scale rural electricity grids	Systematic literature review. No stakeholders engaged and public participation	Systematic literature review. No ownership	Systematic literature review. No support	Hybrid systems	[45]

Table 4. *Cont.*

Literature Reviews					
Sustainable energy for grid connected rural communities	Meta-analysis of literature. No stakeholders engaged	Meta-analysis of literature. No ownership	Meta-analysis of literature	Renewable energy Hybrid systems	[46]
Integrated community energy systems	Meta-analysis of literature. No stakeholders engaged	Meta-analysis of literature. No ownership	Meta-analysis of literature	Renewable energy Hybrid systems	[46]
Efficiency for different schemes	Systematic literature review.	Systematic literature review.	Systematic literature review.	Hybrid systems	[62]
Participatory smart grid systems	Critical literature analysis and contextualization	Critical literature analysis and contextualization	Critical literature analysis and contextualization	Micro-grids	[63]
Renewable energy microgrids	Mini-grid desk study of peer-reviewed and grey literature	Mini-grid desk study of peer-reviewed and grey literature	Mini-grid desk study of peer-reviewed and grey literature	Micro-grids	[50]
Sustainable energy for grid connected rural energy communities	Contextual and comparative literature from Latin America, SSA, and Asia	Contextual and comparative literature from Latin America, SSA, and Asia	Contextual and comparative literature from Latin America, SSA, and Asia	Renewable energy systems Micro-grids	[64]

3.2. Challenges of Energy Communities in SSA

Countries in SSA face energy access challenges linked to institutional and social economic limitations. These limitations are attributed to the prevailing top-down approaches of SSA states, which emphasize on merely increasing energy access through large scale projects, without dealing with the complex needs of diverse communities or improving energy efficiency [33,54,62]. Scholars argue that in developing countries, innovations in the energy sector are impeded by many barriers that include: poor technical know-how; inappropriate financing models, weak capacity building mechanisms; low education levels; bureaucratic organizational structures; low incomes; and unsupportive policy frameworks as summarized in Table 5 below. These barriers hinder the uptake of the novel mechanisms needed to institute and sustain energy communities [58,65].

Table 5. Summary of challenges facing energy communities in SSA (Adopted from various sources).

Challenges	Description	Citation
Engagement and participation	Communities and other relevant stakeholders are not sufficiently engaged when micro-level energy projects are initiated in SSA countries. In addition, most projects are wholly owned by government or elite organisations that do not transfer power to local communities.	[18,44–48,50,55,56,58,59,61,66–69]
Policy	SSA states do not have adequate regulatory frameworks that would incentivise communities to engage in energy projects.	[14,18,44–48,50]
Institutional	Communities lack the institutional support such as policy advice or business services to develop and manage energy projects.	[44]
Technical	Individuals and communities lack the technical skills and expertise to effectively manage the renewable energy projects.	[45,48]
Data	Little research has been done on energy communities in SSA. Government institutions and other organisations do not provide adequate data on the energy sector in SSA.	[44,66]
Financial	Communities lack access to the upfront capital required to establish and maintain effective energy projects.	[14,18,44–48,50,67]

In SSA, the current regulatory environment is not sufficient to provide for the emergence and growth of energy communities [14,18,44–48,50]. Most notably, a review of the 19 energy projects listed in Table 3 shows a great consensus amongst scholars citing lack or poor community engagement as a major challenge or barrier to the success of energy communities in SSA [18,44–48,50,55,56,58,59,61,66–69]. Governments and energy regulators have also been reluctant to liberalize the market, which is a necessity for empowering energy communities. Nevertheless, there are energy projects in SSA that display some conventional characteristics of energy communities [18,48,49,56]. This is a sign that community energy initiatives in SSA are slowly taking root amid social, economic, institutional, and regulatory challenges. The table below summarizes the various challenges that energy communities and specific community energy projects in face in SSA.

3.3. Stakeholder Engagement in Energy Projects in SSA

Most of the reviewed community projects listed in Table 3 cite stakeholder engagement as an essential element of establishing and maintaining community energy. However, the 19 projects did not reveal any explicit strategies on how to effectively engage diverse actors. We thus reviewed a second set of literature on stakeholder engagement strategies in the energy sector. From this review, we found that stakeholder involvement is a necessity in the SSA energy landscape to alleviate imbalances and energy injustices [70,71]. There was a consensus in the literature that local communities should be engaged from the onset to the end of the project. The table below summarizes the key arguments for stakeholder engagement in community projects in SSA [52,54,68,72–84]. A co-design form of engagement was proposed by various authors as an effective strategy for engaging different stakeholders at all levels [52,54,80,81]. However, the authors have not elaborated on how

the co-design engagements can be conducted in order to achieve the desired outcomes. We address this gap in our discussion section by exploring how co-design can be used effectively to engage the community participants and other key stakeholders in discussions on establishing effective energy communities and how to run their community energy projects collaboratively and with potentially fewer challenges.

3.4. General Observations

From the review and analysis, we made the following general observations that are discussed further in the preceding discussion section.

1. The scale of energy communities in SSA are too limited to adequately support a transition towards sustainable energy for the millions of energy-poor households and businesses.
2. Communities are not sufficiently enabled to institute, manage, and own energy projects.
3. Stakeholder engagement is key to the establishment, operations, and management of future community energy projects in SSA.
4. There is a need for effective policy strategies at the national and local levels to encourage establishment and management of energy communities.

4. Discussion

Energy communities in SSA constitute a new form of socio-technical movement that encourages more participative and democratic energy processes. The common argument within the energy democracy discourse is that greater citizen involvement and ownership should be achieved through voluntary means, stakeholder engagement, participatory governance, co-operation, and local self-organization [8,24,85–87]. Energy communities are precisely a conduit for this type of voluntary engagement. Literature shows that community energy initiatives have a higher success rate when citizens are involved from the onset to the end of the project [52,72,75,82,84]. However, despite evidence that stakeholder engagement is required for effective energy provision in SSA, the concept of energy community is yet to emerge as a dominant form of energy provision. As summarised in Table 5, we attribute this weak conceptualisation in part to poor citizen participation and inadequacy of stakeholder engagement. The energy mandate in most countries in SSA lies with central governments as very few countries have energy mandates at the City or Municipal level [88]. This energy structure prompts top-down policy engagement, which have been noted over the years as insufficient for democratic energy policy planning, design, and practice [11].

We found that most SSA government actors in the energy sector engage in top-down approaches that superficially involve the public in validation workshops and interviews after project decisions are made [81–83]. Other top-down approaches are expert-centred in that experts are tasked with developing energy solutions with little or no participation from the communities they are designing for [11,77,82,83]. These top-down approaches, coupled with the structural inequalities rampant in SSA countries have hampered the transition towards more democratic and sustainable energy systems [36,37]. In contrast, Matinga [77] notes that debates and dialogue on energy in Africa should focus on understanding the position of different stakeholders based on the characteristics of their viewpoints including their professions and career trajectories. This will give communities more power in the provision of their energy needs and will also enhance the creation of context-based and need-specific energy solutions [77,80,89]. We therefore advance the argument that innovative configurations for energy communities can lead to more inclusive, participatory, and just systems for energy-poor urban and rural communities in SSA [57,90].

4.1. Management of Community Energy in SSA

Community groups that are empowered, are well placed to manage decentralised energy systems as displayed in the Global North examples used in this paper. In SSA, the dominant centralised energy systems, which are highly elitist and technocratic, are opposed to this form of democratised energy distribution. The sophisticated business

models such as peer-to-peer, prosumer-to-grid, and organised prosumer group models that are used by energy communities in the Global North, are not replicable for low-resourced, energy-poor communities in SSA. The regulatory frameworks required to govern these decentralised configurations and novel business models provide an additional layer of complexity that many SSA countries are not yet able to navigate [52,69,71]. In this regard, Damien and Frame [55] urge that SSA countries need contextualised community energy strategies that are driven by localised approaches, contextualised knowledge, and strong leadership.

Despite the challenges of establishing energy communities, early evidence shows that community-managed and operated mini-grids in SSA can provide cheaper electricity to the local citizens [18,48,49,53,56]. In East Africa, community energy has driven efforts to extend energy access to areas that do not have access to the national grid [91]. For example, broadened ownership of the rural electricity mini-grids is one of the main factors for the development and growth of electricity microgrids in Tanzania despite the slow growth within the sector [59]. In the case of Cameroon, Nfah [76] urges that local management committees should be in charge of the supervision, operation, and maintenance of installed energy systems, as well as the collection of revenue on a fee-for-service basis to ensure local stakeholders benefit most from the initiatives.

Koskimaki [62] further argues that African countries are ready to make the leap from minimal energy service provision to high efficiency energy systems. In this regard, grid connected microgrids have received considerable attention in the recent past in areas where the national energy grid is unable to sufficiently provide energy solutions for all citizens [64]. Tucho and Nonhebel [57] further maintain that community-based energy production and management systems can be an effective way of meeting energy needs if the technology gaps, social factors, and cost considerations can be effectively institutionalised [58]. There is also need for appropriate policy and enabling environments [45,47,62–64,92].

4.2. Co-Designing Energy Communities in SSA

Understanding users' experiences in community energy initiatives is critical to finding effective energy solutions for communities in SSA. Currently, the prevailing technocratic approaches pay little or no attention to user needs and other socio-political issues as they focus on the exploitation of new energy resources [6,53]. In this way, they disregard the need for the inclusive and participatory approaches required for achieving energy democracy [2,93–96]. We thus explore co-design as an approach for achieving equality and justice [86,87,96].

Omenge and co-workers [81] argue that citizen participation is a success factor of renewable energy projects in Kenya. The author maintains that interactive stakeholder participation should begin from the project conceptualization stage and be sustained through the entire project life. According to Muhoza and Johnson [56] better incorporation of the user perspective in the design, implementation, and evaluation of the project can help to identify potential barriers to the adoption of electricity services and in turn adapt it to the local context. Nfah [76] expands on the role of stakeholder participation in Cameroon's energy communities by showing how actors work together to achieve sustainable and renewable energy initiatives. Critical engagements especially on the part of the government and NGOs is necessary for assuring mutual accountability which is in the interest of the citizen who is the ultimate beneficiary.

Ambole and co-authors [80] used case studies in Kenya, Uganda, and South Africa to explore how cross-sector collaborations can support the co-creation of trans-local energy communities. From their fieldwork and stakeholder engagements in the three countries, the authors demonstrate the resources and capacities required to initiate trans-local energy communities. They show how such energy communities start off as place-based, meaning that they are motivated by the specific energy challenges of a settlement in the city. However, the complexity of these energy challenges necessitates collaborations with partners from outside the settlement to leverage diverse expertise and resources. The authors thus

delve into the transdisciplinary co-design approach they used to form a shared understanding amongst the diverse stakeholders drawn from the settlements, non-governmental organizations, policy, and academia. Specifically, they first established a baseline by collecting household and community data through surveys, focus groups, and participatory mapping. Using the insights from the analysed data, they then facilitated community dialogues, design thinking workshops, and policy seminars for diverse stakeholders. The trans-local perspective was thus achieved by using local case studies as starting points to initiate citywide conversations, which were later integrated at a regional workshop for the three case studies. The authors conclude that their co-design initiative needs a long-term collaborative agenda that is best facilitated by interdisciplinary academics who aim to empower local communities in steering their own energy futures [54,80].

In this paper, we posit that a co-design approach is required to institute the statutory, regulatory, and socio-technical configurations that will encourage the establishment of energy communities in different contexts. In this regard, we propose community energy intermediaries [20], such as non-governmental organisations or think-tanks, who have a broad understanding of energy issues in their context and a deep interest in enhancing community participation. In this way, these intermediaries can tackle the challenges we summarised in Table 4 through co-design strategies such as by networking local communities with energy groups and financiers that can build and fund viable energy projects with the communities. Community energy intermediaries can also carry out feasibility studies and provide co-design tools, business services, and policy advise to communities to enhance their active participation and ensure fair compensation. In addition, communities also need training and On the policy side, intermediaries are well placed to interface with policy makers to ensure that conducive regulatory frameworks are provided as incentives for community energy projects.

4.3. Energy Democracy as an Enabler for Energy Communities in SSA

This discussion has shown that energy communities can lead to improved energy access and sustainability in SSA. Proponents further argue that participatory approaches to providing energy have wider benefits beyond the SGD 7 on energy, as communities are empowered to achieve other sustainability goals that are foregrounded by access to sustainable energy [1]. Though local, these energy communities can also leverage their capacity and resources to achieve system wide changes that have national and regional impact. For example, in the Netherlands, a study by Doci and co-authors [8] demonstrates that energy communities are changing the Dutch energy system by networking with regime actors. The authors state that the success and advancement of Dutch energy communities depends on providing favourable regulatory frameworks and strengthening the links between different actors within the energy system.

As discussed in this paper, energy communities in SSA require socio-technical, financial, and policy innovations that Global North examples may not adequately provide [45]. Providing these innovations will thus call for robust multi-sectoral coordination to achieve contextualised and relevant solutions in diverse SSA states [80,94]. In this regard, there is need for more studies that can provide place-based experiences and practices that facilitate just outcomes for local communities [54,80,94]. More specifically, there is urgent need for more research on the successes and failures of energy communities in SSA. Such studies should look at the socio-technical, political, and financial configurations of individual case studies, in relation to national, regional, and global perspectives on sustainable energy and climate change [94].

This discussion has shown that SSA countries have policy gaps that impede the uptake and establishment of energy communities. In this regard, Sweeney [85] asserts that the transformative changes needed for energy communities to thrive should be carefully planned and coordinated at all levels of governance. This makes it imperative to address the present policy gaps in SSA by creating a more integrative framework in support of energy initiatives at the community, city, and national levels. In this way, organizational

formats and governance structures will be mindful of the lived experiences of local communities, while aligning to the long-term regulatory requirements of city and national governments [94]. More importantly, governments in SSA need to adopt smart strategies that create effective energy community ecosystems. Such ecosystems have the potential to leverage limited resources, enhance renewable energy exploitation, and sustain adaptive knowledge networks [61].

We posit that energy projects in SSA can become adaptive knowledge networks and achieve energy democracy if they are provided with effective and contextualised stakeholder engagement strategies. Such strategies call for an enabling policy environment that will allow communities to harness both structural and symbolic resources, allowing them to mobilize, influence policy actions, build strong identities, and actively participate in meeting their energy needs collectively and sustainably.

Research shows that there is a correlation between democracy, renewable energy, and carbon emission in SSA, in that democratic systems do promote renewable energy thereby reducing a country's carbon emissions [95]. If so, then we emphasize that energy democracy thinking can offer solutions for empowering energy communities in SSA. In this regard, we propose energy democracy understandings as policy enablers that will support processes, outcomes, and normative goals to sustain energy communities in SSA.

1. In terms of process, energy communities need the traditional support that is accorded to grassroots social movements and cooperatives.
2. In terms of outcomes, energy communities need support to institute socio-technical configurations that provide relevant product and service solutions.
3. Lastly, energy communities can achieve normative goals if they are supported to envision their aspirations for equity and justice [96].

Using these three lenses, experts and policy actors can support energy communities in SSA in a more holistic manner.

4.4. Limitations of the Systematic Review

This review was limited by the dearth of energy-related research in SSA, particularly on how energy communities in SSA are initiated and sustained. Nevertheless, the 19 case studies we found have provided a basis for future studies in SSA energy communities.

5. Conclusions

We have drawn lessons from the Global North on how energy communities can lead to sustainable energy transitions. These lessons will need to be contextualised and adapted to the unique needs, resources, and opportunities of SSA countries. Our findings show that some energy projects in SSA do bear the conventional characteristics of energy communities, but overall, communities in SSA are not sufficiently empowered to institute and manage their own energy projects. Currently, ownership of community energy projects is a challenge as most projects are owned by the government solely or in partnership with elitist groups. As such, majority shares are rarely held by local communities. Given Africa's nascent energy landscape, we argue that local communities can be empowered to drive project development and innovation towards more sustainable energy systems. Integrating a co-design approach in SSA's energy communities will provide a platform for participatory stakeholder engagement that allows the incorporation of citizens in the planning, implementation, and management of energy communities. Going forward, more research is needed on how SSA countries can create innovative and supportive regulatory environments that employ effective co-design strategies for engaging stakeholders and managing energy projects.

References

1. World Bank. *Tracking SDG 7, The Energy Progress Report 2020*; IRENA: Washington DC, USA, 2020.
2. Sovacool, B.; Sidorstov, R. Energy governance in the United States. In *The Handbook of Global Energy Policy*; John Wiley & Sons, Ltd.: Hoboken, NJ, USA, 2013; pp. 435–456.
3. Verbong, G.; Loorbach, D. *Governing the Energy Transition: Reality, Illusion or Necessity?* Routledge: New York, NY, USA, 2012.
4. LaBelle, M.; Horwitch, M. The Breakout of Energy Innovation: Accelerating to a New Low Carbon Energy System. In *The Handbook of Global Energy Policy*; Wiley-Blackwell: Chichester, UK, 2013; pp. 113–126.
5. Fouquet, R.; Pearson, P.J. Past and Prospective Energy Transitions: Insights from History. *Energy Policy* **2012**, *50*, 1–7. [CrossRef]
6. Van Der Schoor, T.; Van Lente, H.; Scholtens, B.; Peine, A. Challenging obduracy: How local communities transform the energy system. *Energy Res. Soc. Sci.* **2016**, *13*, 94–105. [CrossRef]
7. Moroni, S.; Alberti, V.; Antoniucci, V.; Bisello, A. Energy communities in the transition to a low-carbon future: A taxonomical approach and some policy dilemmas. *J. Environ. Manag.* **2019**, *236*, 45–53. [CrossRef] [PubMed]
8. Dóci, G.; Vasileiadou, E.; Petersen, A.C. Exploring the transition potential of renewable energy communities. *Futures* **2015**, *66*, 85–95. [CrossRef]
9. Farand, C. Campaigners Urge African Union to Stop Fossil Fuel Proliferation on Continent. 2020. Available online: https://www.climatechangenews.com/2020/02/10/campaigners-urge-african-union-stop-fossil-fuel-proliferation-continent/#:~{}:text=In%202018,%20nearly%2070%%20of,energy%20to%20help%20end%20poverty (accessed on 22 October 2020).
10. Newell, P.; Phillips, J. Neoliberal energy transitions in the South: Kenyan experiences. *Geoforum* **2016**, *74*, 39–48. [CrossRef]
11. Klein, S.J.; Coffey, S. Building a sustainable energy future, one community at a time. *Renew. Sustain. Energy Rev.* **2016**, *60*, 867–880. [CrossRef]
12. Thellufsen, J.Z.; Lund, H. Roles of local and national energy systems in the integration of renewable energy. *Appl. Energy* **2016**, *183*, 419–429. [CrossRef]
13. Romero-Rubio, C.; Díaz, J.R.D.A. Sustainable energy communities: A study contrasting Spain and Germany. *Energy Policy* **2015**, *85*, 397–409. [CrossRef]
14. Avilés, C.; Oliva, S.; Watts, D. Single-dwelling and community renewable microgrids: Optimal sizing and energy management for new business models. *Appl. Energy* **2019**, *254*, 113665. [CrossRef]
15. Walker, G. What are the barriers and incentives for community-owned means of energy production and use? *Energy Policy* **2008**, *36*, 4401–4405. [CrossRef]
16. Walker, G.; Devine-Wright, P.; Hunter, S.; High, H.; Evans, B. Trust and community: Exploring the meanings, contexts and dynamics of community renewable energy. *Energy Policy* **2010**, *38*, 2655–2663. [CrossRef]
17. The REScoop Model. Available online: https://www.rescoop.eu/the-rescoop-model (accessed on 2 December 2020).
18. Röder, M.; Stolz, N.; Thornley, P. Sweet energy—Bioenergy integration pathways for sugarcane residues. A case study of Nkomazi, District of Mpumalanga, South Africa. *Renew. Energy* **2017**, *113*, 1302–1310.
19. Rogers, J.; Simmons, E.; Convery, I.; Weatherall, A. Public perceptions of opportunities for community-based renewable energy projects. *Energy Policy* **2008**, *36*, 4217–4226. [CrossRef]
20. Hargreaves, T.; Hielscher, S.; Seyfang, G.; Smith, A. Grassroots innovations in community energy: The role of intermediaries in niche development. *Glob. Environ. Chang.* **2013**, *23*, 868–880. [CrossRef]
21. Wirth, S. Communities matter: Institutional preconditions for community renewable energy. *Energy Policy* **2014**, *70*, 236–246. [CrossRef]
22. Amansure, R.; Adendorff, C. The success of multi-sector participation in the management of revenue for beneficiary communities of South African renewable energy companies—Sub-model A. *J. Energy South. Afr.* **2017**, *28*, 63. [CrossRef]
23. Beck, B.; Greenberg, S.; Forbes, S.; Rothmann-Guest, L.; Maharaj, V.; Killian, D.; Finley, R. Public Engagement of CCS in South Africa. *Energy Procedia* **2013**, *37*, 7380–7387. [CrossRef]
24. Van Veelen, B.; van der Horst, D. What is energy democracy? Connecting social science energy research and political theory. *Energy Res. Soc. Sci.* **2018**, *46*, 19–28. [CrossRef]
25. Caramizaru, A.; Uihlein, A. *Energy Communities: An Overview of Energy and Social Innovation*; JRC Science for Policy Report JRC119433; Publications Office of the European Union: Luxembourg, 2020.

26. Burke, M.J.; Stephens, J.C. Energy democracy: Goals and policy instruments for sociotechnical transitions. *Energy Res. Soc. Sci.* **2017**, *33*, 35–48. [CrossRef]

27. Cantarero, M.M.V. Of renewable energy, energy democracy, and sustainable development: A roadmap to accelerate the energy transition in developing countries. *Energy Res. Soc. Sci.* **2020**, *70*, 101716. [CrossRef]

28. Bomberg, E.; McEwen, N. Mobilizing community energy. *Energy Policy* **2012**, *51*, 435–444. [CrossRef]

29. World Bank. Population, Total—Sub-Saharan Africa. Available online: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=ZG (accessed on 22 October 2020).

30. United Nations. International Youth Day: Key Takeaways. Available online: https://www.un.org/development/desa/youth/wp-content/uploads/sites/21/2019/08/WYP2019_10-Key-Messages_GZ_8AUG19.pdf (accessed on 12 August 2020).

31. Belward, A.; Bisselink, B.; Bódis, K.; Brink, A.; Dallemand, J.F.; De Roo, A.; Huld, T.; Kayitakire, F.; Mayaux, P.; Moner-Girona, M.; et al. *Renewable Energies in Africa*; European Commission-Joint Research Center: Publications Office of the European Union: Luxembourg, 2011.

32. UN-Environment. Goal 7: Affordable and Clean Energy. Available online: https://www.unenvironment.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-7#:~{}:text=a:%20By%202030,%20enhance%20international,Target%207 (accessed on 25 October 2020).

33. Karekezi, S.; Kithyoma, W. Renewable energy strategies for rural Africa: Is a PV-led renewable energy strategy the right approach for providing modern energy to the rural poor of sub-Saharan Africa? *Energy Policy* **2002**, *30*, 1071–1086. [CrossRef]

34. IEA. *Africa Energy Outlook 2019*; IEA: Paris, France, 2019; Available online: https://www.iea.org/reports/africa-energy-outlook-2019 (accessed on 20 October 2020).

35. LEA. Access to Electricity—SDG7: Data and Projections—Analysis. Available online: https://www.iea.org/reports/sdg7-data-and-projections/access-to-electricity (accessed on 10 October 2020).

36. Bhattacharyya, S.C. Energy Access and Development. In *The Handbook of Global Energy Policy*; John Wiley & Sons Ltd.: Oxford, UK, 2013; pp. 227–243.

37. Sweerts, B.; Dalla Longa, F.; van der Zwaan, B. Financial de-risking to unlock Africa's renewable energy potential. *Renew. Sustain. Energy Rev.* **2019**, *102*, 75–82. [CrossRef]

38. African Development Bank. The New Deal on Energy for Africa. A Transformative Partnership to Light up and Power Africa by 2025. *Update of Implementation.* 2017. Available online: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Brochure_New_Deal_2_red.pdf (accessed on 10 October 2020).

39. Hafner, M.; Tagliapietra, S.; de Strasser, L. Prospects for Renewable Energy in Africa. In *Energy in Africa*; Springer: Cham, Switzerland, 2018; pp. 47–75.

40. Kapfudzaruwa, F.; Fay, J.; Hart, T. Improved cookstoves in Africa: Explaining adoption patterns. *Dev. South. Afr.* **2017**, *34*, 548–563. [CrossRef]

41. Mugo, F.; Gathui, T. *Biomass Energy Use in Kenya*; ESPA: Nairobi, Kenya, 2010.

42. International Finance. Renewable Energy now over 90% of Kenya's Energy Mix. 2019. Available online: https://internationalfinance.com/renewable-energy-now-over-90-of-kenyas-energy-mix/#:~{}:text=Kenya%20recently%20brought%20its%20new,mix%2C%20according%20to%20media%20reports (accessed on 7 October 2020).

43. World Data. Energy Consumption in Ivory Coast. Available online: https://www.worlddata.info/africa/ivory-coast/energy-consumption.php (accessed on 16 October 2020).

44. Niyonteze, J.D.D.; Niyonteze, J.D.D.; Zou, F.; Asemota, G.N.O.; Bimenyimana, S. Solar-powered mini-grids and smart metering systems, the solution to Rwanda energy crisis. *J. Phys. Conf. Ser.* **2019**, *1311*, 012002. [CrossRef]

45. Cherni, J.A.; Kalas, N. A multi-criteria decision-support approach to sustainable rural energy in developing countries. In *Handbook on Decision Making*; Springer: Berlin/Heidelberg, Germany, 2010; pp. 143–162.

46. Kaygusuz, K. Energy services and energy poverty for sustainable rural development. *Renew. Sustain. Energy Rev.* **2011**, *15*, 936–947. [CrossRef]

47. Koirala, B.P.; Koliou, E.; Friege, J.; Hakvoort, R.A.; Herder, P.M. Energetic communities for community energy: A review of key issues and trends shaping integrated community energy systems. *Renew. Sustain. Energy Rev.* **2016**, *56*, 722–744. [CrossRef]

48. Azimoh, C.L.; Klintenberg, P.; Mbohwa, C.; Wallin, F. Replicability and scalability of mini-grid solution to rural electrification programs in sub-Saharan Africa. *Renew. Energy* **2017**, *106*, 222–231. [CrossRef]

49. Azimoh, C.L.; Klintenberg, P.; Wallin, F.; Karlsson, B.; Mbohwa, C. Electricity for development: Mini-grid solution for rural electrification in South Africa. *Energy Convers. Manag.* **2016**, *110*, 268–277. [CrossRef]

50. Pedersen, M.B. Deconstructing the concept of renewable energy-based mini-grids for rural electrification in East Africa. *Wiley Interdiscip. Rev. Energy Environ.* **2016**, *5*, 570–587. [CrossRef]

51. Blimpo, M.; Cosgrove-Davies, M. *Electricity Access in Sub-Saharan Africa: Uptake, Reliability, and Complementary Factors for Economic Impact*; The World Bank: Washington, DC, USA, 2019.

52. Tanko, A.I. Urban energy challenges in sub-Saharan Africa. *Curr. Opin. Environ. Sustain.* **2016**, *20*, 80–85. [CrossRef]

53. Safdar, T. Business models for mini-grids. In *Smart Villages: New Thinking for Off-Grid Communities Worldwide*; Smart Villages Initiative: Cambridge, UK, 2017.

54. Njoroge, P.; Ambole, A.; Githira, D.; Outa, G. Steering energy transitions through landscape governance: Case of Mathare informal settlement, Nairobi, Kenya. *Land* **2020**, *9*, 206. [CrossRef]

55. Damien, D.P.A.F. Critical Review of the Malawi Community Energy Model. In Proceedings of the IEEE PES Power Africa Conference, Livingstone, Zambia, 28 June–2 July 2016; pp. 78–82.

56. Muhoza, C.; Johnson, O.W. Exploring household energy transitions in rural Zambia from the user perspective. *Energy Policy* **2018**, *121*, 25–34. [CrossRef]

57. Tucho, G.T.; Nonhebel, S. Alternative energy supply system to a rural village in Ethiopia. *Energy Sustain. Soc.* **2017**, *7*, 33. [CrossRef]

58. Eder, J.M.; Mutsaerts, C.F.; Sriwannawit, P. Mini-grids and renewable energy in rural Africa: How diffusion theory explains adoption of electricity in Uganda. *Energy Res. Soc. Sci.* **2015**, *5*, 45–54. [CrossRef]

59. Odarno, L.; Sawe, E.; Swai, M.; Katyega, M.J.; Lee, A. *Accelerating Mini-Grid Deployment in Sub-Saharan Africa: Lessons from Tanzania*; World Resources Institute: Washington, DC, USA, 2017.

60. Masekoameng, K.; Simalenga, T.; Saidi, T. Household energy needs and utilization patterns in the Giyani rural communities of Limpopo Province, South Africa. *J. Energy South. Afr.* **2005**, *16*, 4–9. [CrossRef]

61. Monyei, C.G.; Adewumi, A.; Jenkins, K.E.H. Energy (in)justice in off-grid rural electrification policy: South Africa in focus. *Energy Res. Soc. Sci.* **2018**, *44*, 152–171. [CrossRef]

62. Koskimäki, P.-L. Africa could take a leap to energy efficiency: What lessons could Sub-Saharan countries learn from European energy efficiency policy implementation? *Energy Sustain. Dev.* **2012**, *16*, 189–196. [CrossRef]

63. Prinsloo, G.; Mammoli, A.; Dobson, R. Participatory smartgrid control and transactive energy management in community shared solar cogeneration systems for isolated rural villages. In Proceedings of the 2016 IEEE Global Humanitarian Technology Conference (GHTC), Seattle, WA, USA, 13–16 October 2016.

64. Hubble, A.H.; Ustun, T.S. Scaling renewable energy based microgrids in underserved communities: Latin America, South Asia, and Sub-Saharan Africa. In Proceedings of the IEEE PES Power Africa Conference, Livingstone, Zambia, 28 June–2 July 2016.

65. Aubert, J.E. *Promoting Innovation in Developing Countries: A Conceptual Frame-Work*; World Bank Publications: Washington, DC, USA, 2005; Volume 3554.

66. Kirubi, C.; Jacobson, A.; Kammen, D.M.; Mills, A. Community-Based Electric Micro-Grids Can Contribute to Rural Development: Evidence from Kenya. *World Dev.* **2009**, *37*, 1208–1221. [CrossRef]

67. Koirala, B.P.; Araghi, Y.; Kroesen, M.; Ghorbani, A.; Hakvoort, R.A.; Herder, P.M. Trust, awareness, and independence: Insights from a socio-psychological factor analysis of citizen knowledge and participation in community energy systems. *Energy Res. Soc. Sci.* **2018**, *38*, 33–40. [CrossRef]

68. Musonye, X.S.; Davíðsdóttir, B.; Kristjánsson, R.; Ásgeirsson, E.I.; Stefánsson, H. Integrated energy systems' modeling studies for sub-Saharan Africa: A scoping review. *Renew. Sustain. Energy Rev.* **2020**, *128*, 109915. [CrossRef]

69. Nkoana, E.M. Community acceptance challenges of renewable energy transition: A tale of two solar parks in Limpopo, South Africa. *J. Energy South. Afr.* **2018**, *29*, 34–40. [CrossRef]

70. Büscher, B. Connecting political economies of energy in South Africa. *Energy Policy* **2009**, *37*, 3951–3958. [CrossRef]

71. Ahlborg, H.; Hammar, L. Drivers and Barriers to Rural Electrification in Tanzania and Mozambique—Grid Extension, Off-Grid and Renewable Energy Sources. In Proceedings of the World Renewable Energy Congress, Linköping, Sweden, 8–13 May 2011; Volume 57, pp. 2493–2500.

72. HazHazelton, J.A.; Windhorst, K.; Amezaga, J.M. Forest based biomass for energy in Uganda: Stakeholder dynamics in feedstock production. *Biomass Bioenergy* **2013**, *59*, 100–115. [CrossRef]

73. Moner-Girona, M.; Bódis, K.; Morrissey, J.; Kougias, I.; Hankins, M.; Huld, T.; Szabó, S. Decentralized rural electrification in Kenya: Speeding up universal energy access. *Energy Sustain. Dev.* **2019**, *52*, 128–146. [CrossRef]

74. Sarkodie, S.A.; Ackom, E.K.; Victor, F.B.; Owusu, P.A. Energy–Climate–Economy–Population Nexus: An Empirical Analysis in Kenya, Senegal, and Eswatini. *Sustainability* **2020**, *12*, 6202. [CrossRef]

75. Nyasimi, M.; Okang'a, J.; Mutuo, M.; Masira, J. Change from within: Engaging local communities in achieving the Millennium Development Goals in Sub–Sahara Africa. *Omertaa J. Appl. Anthropol.* **2009**, 474–494.

76. Nfah, E.M.; Ngundam, J. Identification of stakeholders for sustainable renewable energy applications in Cameroon. *Renew. Sustain. Energy Rev.* **2012**, *16*, 4661–4666. [CrossRef]

77. Matinga, M.N.; Pinedo-Pascua, I.; Vervaeke, J.; Monforti-Ferrario, F.; Szabó, S. Do African and European energy stakeholders agree on key energy drivers in Africa? Using Q methodology to understand perceptions on energy access debates. *Energy Policy* **2014**, *69*, 154–164. [CrossRef]

78. Maji, I.K. Impact of clean energy and inclusive development on CO_2 emissions in sub-Saharan Africa. *J. Clean. Prod.* **2019**, *240*, 118186. [CrossRef]

79. MacLean, L.M.; Brass, J.N. Foreign aid, NGOs and the private sector: New forms of hybridity in renewable energy provision in Kenya and Uganda. *Afr. Today* **2015**, *62*, 57–82. [CrossRef]

80. Ambole, A.; Musango, J.K.; Buyana, K.; Ogot, M.; Anditi, C.; Mwau, B.; Kovacic, Z.; Smit, S.; Lwasa, S.; Nsangi, G.; et al. Mediating household energy transitions through co-design in urban Kenya, Uganda and South Africa. *Energy Res. Soc. Sci.* **2019**, *55*, 208–217. [CrossRef]

81. Omenge, P.M.; Eshiamwata, G.W.; Makindi, S.; Obwoyere, G.O. Public Participation in Environmental Impact Assessment and Its Substantive Contribution to Environmental Risk Management: Insights from Eia Practitioners and Other Stakeholders in Kenya's Renewable Energy Sub-Sector. In *Energy and Sustainability VIII*; WIT Press: Southampton, UK, 2019; pp. 133–144.

82.   Pillay, S. A Critical Analysis of the Role of Stakeholder Engagement in Establishing the Renewable Energy Sector in South Africa. Master's Thesis, University of Pretoria, Pretoria, South Africa, 2011.

83.   Van der Zwaan, B.; Dalla Longa, F.; de Boer, H.; Johnson, F.; Johnson, O.; van Klaveren, M.; Mastop, J.; Ogeya, M.; Rietkerk, M.; Straver, K.; et al. An Expert Elicitation of Public Acceptance of Renewable Energy in Kenya. *Challenges Sustain.* **2019**, *7*, 30–39. [CrossRef]

84.   Abiero, O.A. Challenges of Stakeholder Management in Implementation of Sondu Miriu Hydro-Electric Power Project in Kenya. Master's Thesis, School of Business, University of Nairobi, Nairobi, Kenya, 2010.

85.   Sweeney, S. Working toward Energy Democracy. In *State of the World 2014*; Island Press: Washington, DC, USA, 2014; pp. 215–227.

86.   Fairchild, D.; Weinrub, A. Energy Democracy. In *The Community Resilience Reader*; Island Press: Washington, DC, USA, 2017; pp. 195–206.

87.   Becker, S.; Angel, J.; Naumann, M. Energy democracy as the right to the city: Urban energy struggles in Berlin and London. *Environ. Plan. A: Econ. Space* **2020**, *52*, 1093–1111. [CrossRef]

88.   Szabó, S.; Bódis, K.; Huld, T.; Moner-Girona, M. Energy solutions in rural Africa: Mapping electrification costs of distributed solar and diesel generation versus grid extension. *Environ. Res. Lett.* **2011**, *6*, 034002. [CrossRef]

89.   Musango, J.K.; Smit, S.; Ceschin, F.; Ambole, A.; Batinge, B.; Anditi, C.; Petrulaityte, A.; Mukama, M. Mainstreaming gender to achieve security of energy services in poor urban environments. *Energy Res. Soc. Sci.* **2020**, *70*, 101715. [CrossRef]

90.   Stephens, J.C. Energy democracy: Redistributing power to the people through renewable transformation. *Environ. Sci. Policy Sustain. Dev.* **2019**, *61*, 4–13. [CrossRef]

91.   World Future Council. A Record Breaking Year for Renewable Energy—And Community Energy. 2016. Available online: https://www.worldfuturecouncil.org/record-breaking-year-for-renewables-and-community-energy (accessed on 1 October 2020).

92.   Jaccard, M.; Failing, L.; Berry, T. From equipment to infrastructure: Community energy management and greenhouse gas emission reduction. *Energy Policy* **1997**, *25*, 1065–1074. [CrossRef]

93.   Szulecki, K. Conceptualizing energy democracy. *Environ. Politics* **2018**, *27*, 21–41. [CrossRef]

94.   Lennon, B.; Dunphy, N.; Sanvicente, E. Community acceptability and the energy transition: A citizens' perspective. *Energy Sustain. Soc.* **2019**, *9*, 1–18. [CrossRef]

95.   Adams, S.; Acheampong, A.O. Reducing carbon emissions: The role of renewable energy and democracy. *J. Clean. Prod.* **2019**, *240*, 118245. [CrossRef]

96.   Szulecki, K.; Overland, I. Energy democracy as a process, an outcome and a goal: A conceptual review. *Energy Res. Soc. Sci.* **2020**, *69*, 101768. [CrossRef]