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Integrating sustainable energies into local government plans in Ghana

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ABSTRACT

Despite significant efforts to mainstream sustainable energies into national policies, the extent to which such energies are integrated into local government plans in Ghana remains unclear. This study explored the status and factors affecting the integration of sustainable energies in local level planning using the Wa Municipality in the Upper West Region as a case study. Key informant interviews were held with four heads of departments alongside a content analysis of eight policy and planning documents using ATLAS.ti software. The scope of the study covered the 2010–2013 and 2014–2017 development plans prepared by the Municipality and was conducted between May and July 2019. We found that energy-related projects constituted only 1.4% and 1.1% of all the projects found in the 2010–2013 and 2014–2017 MTPs of the Municipality, respectively. The focus on energy in the plans was on increasing electricity access through grid extension, with little attention to off-grid applications and alternative energy sources. We conclude that low priority is given to sustainable energy issues in the local government plans, and this situation is partly attributed to the fact that planning guidelines and national policy frameworks did not explicitly outline strategies for integrating sustainable energies into local government plans. Hence, provisions in national policy frameworks and national guidelines for local development planning significantly affects the integration of sustainable energies at the local government level. We recommend that the National Development Planning Commission should incorporate explicit provisions for integrating sustainable energies into the district/local planning guidelines.

Introduction

Since the Rio Earth summit in 1992, influencing change from the local level has gained increased momentum, with the Local Agenda 21 becoming the first substantive political initiative to encourage the full incorporation of grassroots level actions into national and local level policies on sustainability [1]. According to Fudge and Peters [1], the growing concerns

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around sustainable energy now includes a wide acknowledgement of the effectiveness of projects that are embedded within a bottom-up approach, incorporating social, cultural, and economic concerns. Such an approach forms the foundations of decentralisation, a process by which central government functions are devolved, deconcentrated or delegated to local governments. Through decentralisation, local governments play crucial roles such as urban land-use planning, transport planning, water supply, street and traffic lighting, municipal waste management, and environmental protection [2]. These roles place them in a strategic position, and through their activities, they can influence national energy policies and the benefits accruing from them [3]. Even though local governments in Africa already manage a wide range of developmental activities through various decentralised systems, the approach to energy planning in many countries remains centralised [4–6]. This situation poses a major challenge to the deployment of renewable energies in the continent.

Despite the vast availability of renewable energy resources, renewable energies still constitute less than 2% of sub-Sahara Africa's energy mix [7]. Among the critical factors identified for this problem are; centralised energy planning [4,5,8], and lack of systematic planning [9]. The absence of this systematic planning has resulted in high transmission and distribution loses and a high dependence on hydro dams and diesel plants [10]. According to Hiremath et al. [8], centralised energy planning fails to incorporate variations in socio-economic and ecological factors in a region which influence the success of any intervention. This failure has created the need for more decentralised approaches; hence, the need to involve local governments. Local governments act as key mediums for coordinating and implementing effective local energy and environmental policies [11]. They understand where challenges with regard to sustainable energy come from and they can assess local renewable energy resources and how these resources can be optimized. They can also identify the strengths, weaknesses, opportunities and threats with regard to renewable energy development in their respective jurisdictions [12]. Notwithstanding these important roles played by local governments, the traditional approach to planning in many African countries remains centralised [4,8]. Ghana has, over the past decades tried to resolve this problem through its decentralisation policy.

Since the launch of Ghana's decentralisation policy in 1988, and the subsequent adoption of decentralised planning as the approach for local-level development, six rounds of medium-term plans have been prepared since 1996. Through their District Medium Term Development Plans (DMTDPs), local governments prepare and implement plans for various infrastructure and social services including energy, health, education, transport, water and sanitation amongst others. In response to local and international demands for sustainable energies and climate change mitigation, the government of Ghana has made significant efforts to mainstream sustainable energies into national policies. Notable among these policies is the Sustainable Energy for All (SEforALL) action plan, the Renewable Energy Master Plan and the ECOWAS Renewable Energy Policy (EREP) to which the Ghana government is a party.

The Energy Commission (EC), established by an Act of Parliament (Energy Commission Act, 541) is mainly responsible for energy planning in Ghana, with a core mandate to "prepare, review and update indicative national plans to ensure that all reasonable energy demands are met, and to secure a comprehensive database for national decision making" [13]. As seen clearly in the mandate of the EC, it prepares national energy plans. Hence, energy planning is centralised, with no clear links to local development plans. While the efforts at the national level have been widely acknowledged in Ghana, it remains unclear the extent to which local governments participate and mainstream sustainable energies into their local development plans [14]. Borchers, Euston-Brown and Ndlovu [15] acknowledged the fact that local governments in Africa have a crucial role to play in sustainable energy transitions, but they emphasized that these local governments are "…poorly understood by those trying to be agents of change, and research often remains at a superficial level" (p. 1). Bale et al. [16] also noted that local governments play a significant role in distributed generation and energy efficiency improvements, but their willingness and capacity to play this role remains questionable.

Consequently, many studies have tried to explore the role of local governments in sustainable energy planning and development [12,17–23]. However, despite almost three decades of decentralised governance in Ghana and the emergence of decentralised energy supply systems as an approach to energy supply at the global level, there has been limited (e.g. [20,21]) systematic investigation into the status of the integration of sustainable energies at the local level of governance in the country. Also, even though past studies (e.g. [4,5,14,22,23] have identified centralised energy planning as a challenge to sustainable energy development, studies exploring the causes of such centralization are somewhat limited. Thus, the novelty of this study lies in its attempt to examine the causes of such centralized energy planning in Ghana. It is also the first attempt in Ghana to explore the extent to which sustainable energy issues are mainstreamed into local government plans (by conducting a content analysis of the plans), and how the decentralised planning system for development planning in the country currently influence this process. The challenge of centralised energy planning is common across many sub-Sahara African countries (see for example [2,15,22]) and the decentralised planning system used in countries such as Kenya, Uganda and Ethiopia are similar to Ghana's system. Hence, the findings of this study provide insights that could help to decentralise energy planning in other African countries. For example, in their study of county-level energy planning in Kenya, Johnson et al. [21] emphasised the need for decentralised energy planning to ensure active participation at the grassroots.

Planning for sustainable energies at the local level of governance is crucial for energy security, livelihood enhancement and climate change mitigation [6]. Sustainable energy development at the local level not only enhances access to electricity, but it also improves healthcare delivery, employment opportunities, education, and security in rural areas [24–26]. The goal of this study is to examine the state of sustainable energies in local government plans, and how key policy frameworks and guidelines for district-level planning affect sustainable energy planning at the local level. We use the term *sustainable energy planning* to denote planning for both renewable energy resources as well as ensuring sustainable use of energy/energy

resources through energy efficiency, and sustainable use/management of forest biofuels such as firewood and charcoal which are common at the local level.

The Wa Municipal District in the Upper West Region of Ghana is used as a case study. Wa Municipality was selected for the study because of its phenomenal urban growth in population and space, and consequently huge energy requirements to meet the demand from the growing population. The rapid growth in the Municipality is associated with its upgrading as a regional capital and a municipality, as well as the establishment of the Wa Campus of the University for Development Studies, and the Wa Polytechnic. The Municipality is also the oldest district in the Upper West Region and the first district to attain municipal status in 2004. It does have a prolonged experience in decentralised planning in Ghana, making it an ideal case study area in the Upper West Region. We attempt to answer two main questions in this paper: 1) What is the status of integration of sustainable energies in local development planning? 2) What factors influence the integration of national policy frameworks and planning guidelines on sustainable energy in local development planning? We begin by reviewing relevant literature on the subject in the ensuing section. In Section 2, the methodology used in carrying out the research is explained while in Section 3, we present the results and discuss the findings of the study. Finally, we draw conclusions and propose some policy recommendations in Section 4 based on our findings.

Decentralization and energy policy in LDCs and SSA countries

Access to sustainable energy especially in rural areas can be greatly enhanced if national policies promote decentralised development planning and service delivery, especially when local governments are given the mandate and capacity to address community energy needs [6]. Havet et al. [6] stress the fact that the involvement of local people and institutions in the planning and implementation of sustainable energy projects can enhance government accountability in delivering modern energy services. However, their review of energy in the decentralisation policies of some Least Developed Countries (LDCs) and sub-Sahara Africa (SSA) countries showed that the connections between energy and decentralisation were hardly addressed in policy documents, hence, creating a lacuna in the decentralisation approaches of many developing countries. The linkage between energy and decentralisation was better discussed in sector-specific policies even though the discussions vary widely across different energy issues. Three main themes related to energy and decentralisation dominate in the national policy documents of the countries studied: participation, local planning, and service delivery [6]. In all, 96% of countries in SSA had decentralisation policies; however, only 4% of those policies explicitly mention 'energy' [6]. Overall, 92% of LDCs had decentralisation policies yet; only 6% of the policies explicitly mention 'energy' [6]. These statistics imply that the provision of sustainable energies through decentralised approaches is still a gap in many developing countries' national policies; hence, energy planning is not adequately devolved to the local government level.

Bawakyillenuo et al. [22] in their study of the extent to which local governments control and regulate various energy-related services and facilities in SSA, also observed that limited provisions were made for the involvement of local governments in facilitating, regulating, and setting policies concerning sustainable energy. They particularly noted the limited power by local governments in decentralised renewable energy generation. However, the experience from other countries (e.g., Nepal) shows that when national decentralization policies and legislations give energy-related functions to local governments, the development of renewable energies is greatly facilitated [27]. In Nepal, the establishment of national decentralisation legislation in 1990 and the passage of the Local Self Governance Act of 1999 gave local governments substantial control over the development of mini and micro-hydropower, and it paved the way for the government to integrate energy issues into local government discussions [27]. Before this Act, approaches to rural energy supply were highly centralised, resulting in coordination problems which hampered the delivery process [28]. The decentralisation legislation resulted in a transfer of the authority to plan local energy programmes from centralised institutions to local governments which significantly enhanced the delivery of energy services to rural areas [28].

Havet et al. [6] found that 58% of sectoral policies explicitly addressed energy in the context of decentralisation in SSA countries. Notably, most of these policies were focused on fossil-based electricity and traditional biomass, with little emphasis on renewables and biofuels. However, they found no policies on modern energies for cooking and mechanical power which are essential especially for the poor [6]. Decentralised electricity generation was found in 12 LDCs and 11 SSA countries, yet, the focus was mainly on supply factors such as electricity generation, the establishment of regulatory agencies, and grid extension. Where local governments were given the responsibility for electricity generation or distribution, inadequate financial and human resources often constrained their ability to effectively deliver such services [6].

Bawakyillenuo et al. [22] view devolution of power as the way to deal with the financial and human resource constraints to the involvement of local governments in energy planning and management. Devolution, which is a form of decentralisation involves the transfer of specific governance responsibilities and functions to subnational or local levels that are usually not under the direct control of the central government [29]. Johnson et al. [21] emphasise that devolution helps to address past discrepancies created by centralised energy planning, noting that centralised approaches to energy planning have tended to give more credence to large-scale energy systems with less attention to the household sector in Kenya. Devolution brings the government closer to the grassroots, allows for a better understanding of local needs, and helps to develop appropriate interventions. However, such an understanding and interventions may remain limited if, in practice, there is inadequate participation at the grassroots level, and planning remains firmly controlled by the central government [30]. To overcome the challenges of centralized planning, Ghana has since 1988 established decentralized planning system for translating such national level goals and objectives into action through local governments. However, the place of energy in this

system is not well-understood and the connections between national development planning and local level energy planning remains blur [14,22].

This study attempts to address this gap by examining local energy planning in the context of the decentralised national development planning system in Ghana. Decentralised development planning in Ghana is done under the guidance of the National Development Planning Commission (NDPC) which was created by the NDPC Act, 1994 (Act 479). The commission is responsible for coordinating all development planning efforts in Ghana. It develops planning guidelines for the preparation of district and sectoral plans in the country. The decentralised planning system ensures that development planning in Ghana follows a bottom-up approach which begins with the preparation of community action plans by unit committees. Upon completing the DMTDP through various participatory approaches and public hearings, the plan is submitted to the Regional Coordinating Council (RCC). The Regional Planning and Coordinating Unit (RPCU) of the RCC harmonises the DMTDP in accordance with national objectives and priorities. After harmonisation, the DMTDP is sent to the NDPC which validates and approve the plan in accordance with the guidelines issued to the districts. We examine how this entire process of planning currently affects sustainable energy planning at the local level in Ghana.

Materials and methods

Study area

The study was conducted in the Wa Municipality of the Upper West Region. The Wa Municipal Assembly (WMA) is one of the eleven districts in the Upper West Region of Ghana. The capital of the Municipality is Wa, which also doubles as the capital of the Upper West Region. The Municipality lies within Latitudes 1°40′N to 2°45′N and Longitudes 9°32′ to 10°20′W and shares administrative boundaries with Nadowli District to the North, Wa East District to the East and South and the Wa West District to the West and South. The total population of the Municipality is 107,214 persons with growth rates of 2.7% and 4% for rural and urban areas, respectively [31]. Given that all MMDAs have the same administrative structure as stipulated by the Local Government Act (Act 462) of 1994 (Amended as Local Governance Act, 2016—Act 936) and follow the same guidelines for local development planning, the findings from this study can be fairly generalized for other districts.

The Municipality lies within the savannah high plains zone with an average height of between 160meters and 300meters above sea level [32]. The climate of the area is generally hot and dry. South-West monsoon winds from the Atlantic Ocean brings rains between April and October while North-Eastern trade winds from the Sahara Desert brings a long dry season from November to March. The mean annual temperature ranges from 27 to 28 °C [32]. The average annual rainfall range between 840 mm and 1400 mm [32]. The strong winds and all-year-round sunshine in the Municipality provide good opportunities for solar and wind energy development. The proportions of dwelling units using electricity for lighting from the national grid is 81.5% in urban areas and 48.4% in rural areas. Many of the rural population still rely on flashlights/torch (31.5%) and kerosene lamps (18.4%) for lighting, while only 0.2% of dwelling units in the entire Municipality use solar energy and gas lamps [31]. The dominant source of fuel for cooking in the Municipality is charcoal and wood with 55.2% and 22.9% of households relying on these sources respectively while only 16.3% of them use LPG [31].

Research approach and methods of data collection

A qualitative case study approach was used for the research [33]. Local government agencies/departments responsible for development planning were purposively sampled for data collection. The Regional Planning and Coordinating Unit (RCPU), the Municipal Planning and Coordinating Unit (MPCU), the Community Development Department (CDD) and the Ghana Statistical Service (GSS) department were selected for the study. Eight documents were also selected purposively for review. These documents include the Medium-Term Development Plans (2010–2013 and 2014–2017) of the Wa Municipal Assembly, National Development Planning Commission (NDPC) guidelines for district-level planning (2010–2013 and 2014–2017), National Medium-Term Development Planning Framework (2010–2013, 2014–2017 and 2018–2021), and the Ghana Renewable Energy Master Plan. Consequently, data were derived from primary and secondary sources. Primary data was collected through interviews with various heads of the local government units/departments selected for the research, while secondary data were extracted from the documents analysed. An interview guide entailing open-ended questions was the research instrument used in collecting data from the local government units/departments. Hence, face-to-face interviews and document analysis were the main methods of inquiry used in this study. Document analysis is a step-by-step technique for reviewing and evaluating both print and electronic documents [34].

Methods of data analysis

Both interview data and documents selected for analysis were inputted into the primary unit of ATLAS.ti software for analyses. Document analysis involves content and thematic analysis. Bowen [34] defined content analysis as a process of organising information into categories in accordance with the research questions. Thus, the documents were read, and the information was organised into categories by assigning specific quotations and codes to sections that are related to sustainable energy planning at the local level. The network feature within the ATLAS.ti software was used to visualise relationships between specific issues identified in the documents. For example, in creating the networks in Figs. 2 and 3, specific energy

problems and projects listed in the DMTDPs were identified and marked as codes under two groups (energy problems and energy projects). The network creation window in ATLAS.ti was opened and these two groups of codes were added. The groups were expanded using the "Add Neighbours" function to display the various problems and projects. The "Relations Manager" function was then used to establish the relationships between the problems and projects as seen Figs. 2 and 3. The same process was repeated for Fig. 4.

Thematic analysis, on the other hand, involves recognition of patterns within the data, with the resulting themes forming the categories for analysis [35]. This analysis entails a more careful and in-depth reading and review of the documents. Following the initial categories generated in the content analysis, the researchers did a careful review of the categories to identify specific themes with regard to the study objectives. The difference between the first and second categorisation is that the first stage only identified categories based on sections relating to energy issues in the documents under review while the second stage entailed a more detailed analysis of these sections to identify specific themes/patterns that relate to the subject matter.

For example, in the 2014–2017 DMTP, energy issues were captured under sections such as "The Economy of the Municipality," "Current Development Priorities," "Development Policy Objectives and Strategies," and "Composite Development Programs" amongst others. Hence, these sections were first identified and marked as quotations through searching for key terms such as "energy" "electricity" "charcoal" "LPG" and other energy-related terms within the documents. Next, the marked quotations were read in detail and specific energy issues of interests to this study were identified, and assigned specific codes. For example, the energy projects presented in Fig. 3 were identified under the section "Composite Development Programs" and they were coded specifically as "energy projects 2014–2017″ within the "Composite Development Programs" quotation created in the first step. This procedure was repeated for the policy documents. Qualitative data obtained from the interviews were typed in Microsoft Word, and imported into the ATLAS.ti software where codes were assigned to specific themes in each interview data. Since specific questions were asked and their corresponding responses were recorded (in writing) during the interviews, themes were easily developed based on the interview questions.

For the DMTPs, these themes included the emphasis on energy in the plans, connections between identified energy problems and proposed projects/solutions. Themes identified from the planning guidelines and policy frameworks included the expectations of local governments in national policy frameworks, what the NDPC planning guidelines expect from local governments, and implementation arrangements of energy policy objectives in the national policies. For the interview data, emphasis was placed on the local governments involvement in sustainable energy planning based on the views of the heads of departments interviewed. The word cloud feature of the ATLAS.ti software was used to generate a word cloud with specific emphasis on energy-related keywords in the DMTDPs. All quotations created were selected, and the word cloud was generated from these quotations. The quotations were used instead of the entire documents in order to ensure that the word cloud reflects only energy-related keywords. Upon generating the initial word cloud, an exclusion list containing unnecessary words such as "is" "the" "of" amongst others was incorporated to ensure that only energy-related keywords were displayed. This word cloud enabled the researchers to examine the level of attention given to energy issues in the local government plans as well as to compare the emphasis placed on conventional and non-conventional energy sources in the plans. Results were discussed and where necessary quotations were presented verbatim to support the findings.

Results and discussion

In this section, we present the results and discuss the findings of our study. We begin the section with the presentation of the results and discussion on the status of the integration of sustainable energy issues in the development plans. Next, we examine the linkages between planning guidelines, policy frameworks, and how they affect sustainable energy planning at the local level. Findings from this section formed the basis for our recommendations on how to mainstream sustainable energies into the local development plans in section 4.

The state of sustainable energies in the local government plans

Emphasis on electricity, weak linkages between identified energy problems and solutions, and limited awareness and involvement of local government actors in energy planning emerged as themes on the status of integration of sustainable energies in the local District Medium Term Development Plans (DMTDPs) of the municipality. These themes are discussed as follows:

Emphasis on electricity in the local government plans:

A word cloud of energy-related keywords generated from the DMTDPs (2010–2013 and 2014–2017) of the Municipality showed that the emphasis is on electricity access in the DMTDPs. The word 'electricity' had the highest frequency in both plans with a count of 90 while 'solar' and 'LPG' have frequencies of only 25 and 8, respectively. Fig. 1 shows the word cloud of energy-related keywords in the 2010–2013 and 2–14–2017 DMTDPs of the Municipality.

The content analysis of the DMTDPs of the Municipality revealed that very little emphasis is placed on energy issues in general, with barely nothing on sustainable energies. Even though issues of solar energy, fuelwood and LPG usage were briefly discussed in the 'district profile' section of the 2010–2013 DMTDP, projects were not formulated for the development and utilisation of these energy sources. Out of 210 projects enshrined in the 2010–2013 DMTDP, only 1.4% of them were

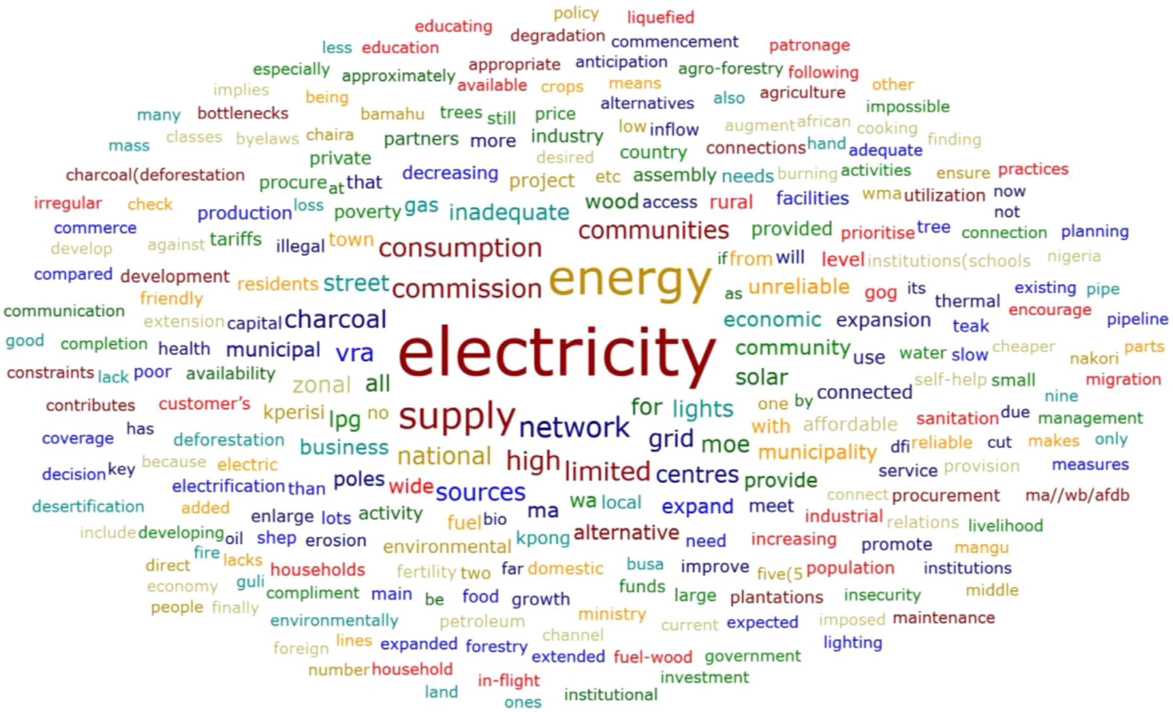

Fig. 1. Word cloud of energy-related keywords in the DMTDPs of Wa Municipality (Authors' construct, created with ATLAS.ti software).

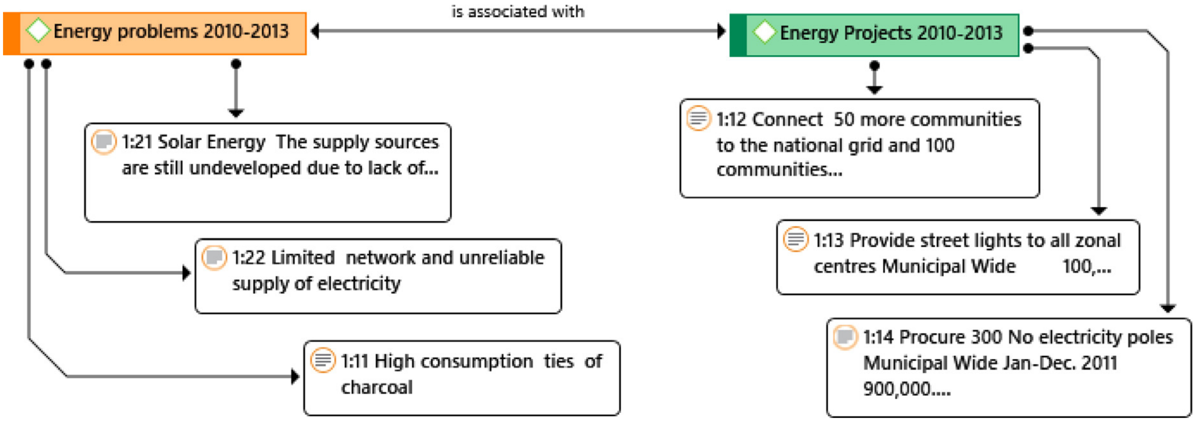

Fig. 2. Energy problems and projects in the 2010–2013 DMTDP (Authors' construct, created with ATLAS.ti software).

on energy, and they were all centred on expanding electricity access through the extension of the national grid (see Fig. 2). Similarly, out of 188 projects, only 1.1% of the projects in the 2014–2017 DMTDP deal with energy, and they were all focused on electricity access through grid extension. Even though high charcoal consumption is mentioned as a problem in the DMTDP (see Fig. 3), no project was formulated to address this issue. The presence of this problem in both DMTDPs highlights the severity of the issue of unsustainable use of wood-based fuels in the Municipality.

These findings reflect the fact that sustainable energies are still not a priority in local development planning in Ghana. An interview at the Municipal Development Planning Unit (MDPU) affirmed this when the interviewee stated that "*…incorporating renewable energies into the [District Medium Term] plans is also a matter of priority and how the communities view it as a felt need.*" (Interview at MDPU, May 2019). With a low level of education and awareness on REs and their benefits [36], it is not surprising that local communities do not recognize REs as a priority or felt need. Raising the level of awareness is crucial not only for ensuring that renewable energies are incorporated into local government plans, but also to ensure their acceptability in the local communities. Whether REs are a priority at the local level or not, is also dependent on the emphasis placed on local level RE planning in the national policy frameworks and planning guidelines for the local authorities. We explore this aspect in detail in section 4.2.

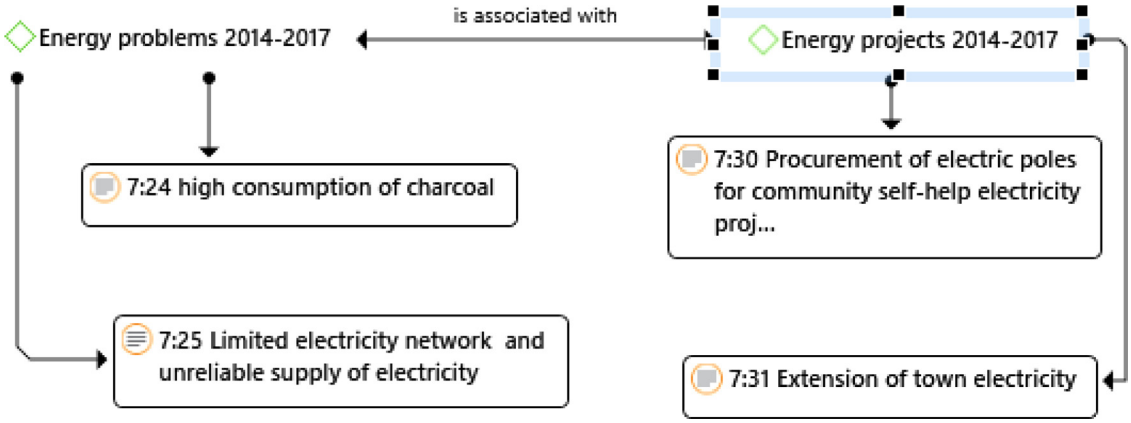

Fig. 3. Energy problems and projects in the 2014–2017 DMTDP (Author's construct, created with ATLAS.ti software).

Poor connections between energy problems and solutions to the problems:

According to the NDPC guidelines for preparing the DMTDPs, the "District Profile" section of the plan is supposed present a comprehensive baseline on the current developmental issues in the district/municipality. Information required in this section range from geophysical features such as the climate, vegetation, and topography to economic and social issues such as employment, education and health. Local planning authorities are required to identify current development problems based on this baseline information and formulate solutions/projects to address these problems in their "Composite Programs of Action" section of the DMTDP. From Fig. 2, two main problems related to sustainable energies were identified in the 2010–2013 DMTDP (underdeveloped solar energy sources due to lack of technology, and high consumption of charcoal). However, the only energy-related projects formulated in this plan do not address the problems mentioned above. All three projects were focused on extending the national grid. Also, a principal energy-related objective set out in the 'Municipal Development Objectives and Strategies' section of the 2014–2017 DMDTP is to *"expand energy supply to meet the needs of residents and local industry"* and one of its corresponding strategies is to *"encourage the use of improved stoves and environmentally friendly energy sources (solar, biogas etc.)"* [32]. However, not a single project was found on this strategy in the Composite Programmes of Action of the DMTDP. A mismatch between problems and solutions can also be seen in Fig. 3, where identified energy problems do not correspond with the proposed energy projects in the 2014–2017 DMTDP. Connections between energy problems and solutions are, therefore, weak and could stem from the lack of coherent guidelines for identifying and incorporating energy issues into the DMTDPs.

Limited awareness, and involvement of local government actors in national energy planning:

When asked whether they were involved in the activities of the Energy Commission, an interviewee at the RPCU stated that "*…we only get involved if they are undertaking any projects that require our coordination or participation*."(Interview at RCC, May 2019) Similarly, an interviewee at the Community Development Department (CDD) recounted that *"…unless the Energy Commission needs us to do something for them (like data collection), we usually don't do much on energy"* (Interview at CDD, May 2019), while a respondent at MDPU indicated that the EC mostly engages them in policy briefing meetings only. Overall, 69% of all local actors in the Municipality were not aware of Ghana's renewable energy master plan, while 31% have only heard about it [24]. As noted by van Staden [12], local actors know better about their sustainable energy challenges and they can identify potentials and opportunities to address these challenges. Hence, their inputs into national energy plans is vital if these national energy plans are to reflect local conditions and present realistic solutions to local problems. The limited awareness of local actors of the RE master plan implies that these local actors were not adequately involved in the preparation of this plan. As Ghana's blueprint for renewable energy development, this situation holds several implications for the success of the plan. First, proposed solutions may not be realistic in local contexts, and secondly, without knowing what specific roles they are supposed to play in its implementation, local actors may not be able to effectively implement this plan in their jurisdictions. Such a situation will rather impede the implementation of the plan and for that matter slow the anticipated progress in sustainable energy development which the plan purports to achieve.

How planning guidelines and policy frameworks affect sustainable energy planning at the local level

Three key issues emerged on the effect of policy directions and guidelines on the integration of sustainable energy planning at local level development planning: potential for policy directions and guidelines to influence integration of energy planning at local level exists; planning guidelines should be explicit on integration of energy planning at local level, and highlighted role of local government actors in energy policy.

Potential of guidelines and policy frameworks to influence energy planning at the local level:

National policy frameworks are expected to significantly shape how sustainable energy activities are undertaken at the local government level. These planning guidelines and policy frameworks form part of the wider context within which

the local governments operate. Development planning in Ghana follows a bottom-up process where local government units prepare DMTDPs for the development of their districts with guidelines from the NDPC. To ensure that these plans are in line with the developmental objectives or priorities of the central government, local governments are often required to organise their plans in accordance with the Medium-Term Development Policy Framework (MTDPF) of the government. For instance, it is clearly stated in 2010–2013 guidelines for district-level planning that; "*The Guidelines are designed to provide focus and direction on national development priorities and enhance harmonisation and rationalisation of development programmes, projects and activities initiated from the community, district and national levels respectively*" [37]. Hence for every medium term (which is usually four years) a new set of guidelines are prepared under the MTDPF of the ruling government for the preparation of DMTDPs by the MMDAs. This process is also stated in the preface of the 2010–2013 NDPC guidelines for district-level planning;"*…the current Guidelines are therefore designed to facilitate the preparation of DMTDPs under the Medium-Term Development Policy Framework (MTDPF 2010–2013)"* [37]. Similarly, the linkages between district-level planning and the MTDPF is reiterated in the 2014–2017 NDPC guidelines as:

> The Guidelines, which are a set of proposals based on the synergy between the National Medium-Term Development Policy Framework (NMTDPF) and the principles of Programme Based Budgeting (PBB), are meant to assist MMDAs in translating the policies and strategies in the NMTDPF into their Medium- Term Development Plans (MTDP) for implementation [38].

The NMTDPF is often organized into thematic areas, and consequently, MMDAs are required to organise the programs and projects in their DMTDPs according to these thematic areas. Both NMTDPFs for 2010–2013 and 2014–2017 NMTDPF had seven thematic areas. The thematic areas of the NMTDPF for 2010–2013 were;

- Improvement and Sustenance of Macroeconomic Stability
- Expanded Development of Production Infrastructure
- Accelerated Agriculture Modernization and Agro-Based Industrial Development
- Sustainable partnerships between Government and the Private Sector
- Developing Human Resources for National Development
- Transparent and Accountable Governance
- Reducing Poverty and Income Inequalities [37]

Thematic areas of the 2014–2017 NMTDPF were listed below:

- Ensuring and sustaining macroeconomic stability
- Enhancing the Competitiveness of Ghana's Private Sector
- Accelerated Agriculture Modernization and Sustainable Natural Resource Management
- Infrastructure, Energy and Human Settlements
- Oil and Gas Development
- Human Development, Productivity and Employment
- Transparent and Accountable Governance [38].

Need for planning guidelines to be explicit on energy planning at local level:

Energy is not explicitly mentioned in the thematic areas of the 2010–2013 NMTPDF. A difference is, however, observed between the thematic areas spelt out in the district guide and those enshrined in the NMTPDF 2010–2013 (also known as the Ghana Shared Growth and Development Agenda-GSGDA I). For instance, the sixth thematic area in the GSGDA I is 'Infrastructure, Energy and Human Settlements Development'. This thematic area is, however, missing among those spelt out in the district guidelines for 2010–2013 DMTDP by the NDPC [37]. This situation perhaps explains why energy issues have not received much attention in the DMTDP. The three energy projects found in the DMTDP were listed among projects found under the 'Expanded Development of Production Infrastructure' section in the 2010–2013 DMTDP of the Wa Municipal District. A possible reason for the difference in thematic areas presented in the NDPC guidelines and those spelt out in the GSGDA 1 is seen in the 2010–2013 NDPC guidelines. The NDPC stresses in 2010–2013 guidelines that: *"using the MTDPF 2010- 2013 as the main source of reference to prepare the DMTDPs, particular attention should be paid to sections where the DAs have been mentioned as either lead or collaborating agencies"* [37].

Need for emphasized role of local authorities in sustainable energy in policy frameworks and guidelines:

Local government agencies are encouraged by the guidelines to focus on policy objectives and strategies that mention them as lead or collaborating agencies. A review of the GSGDA 1 showed that, even though issues of sustainable energy development are well-captured and discussed in detail, policy objectives and strategies for their development did not list MMDAs or local government units as lead or collaborating agencies. The implementing and coordinating agencies for all the energy related-projects in the NMTDPF do not include MMDAs. Instead, central government agencies such as the Ministry of Energy, Energy Commission, Volta River Authority, Electricity Company of Ghana, among others are those given the responsibility to implement and coordinate these policy objectives.

A review of the NMTDPF for 2014–2017 yielded virtually the same results as those obtained under the 2010 –2013. In exception of waste-to-energy development where MMDAs were listed as implementing and collaborating agencies, all other sustainable energy projects had central government agencies and ministries as the implementing and collaborating agencies. Similarly, the current NMTDPF (2018–2021) does not assign the responsibility for implementing policy objectives related

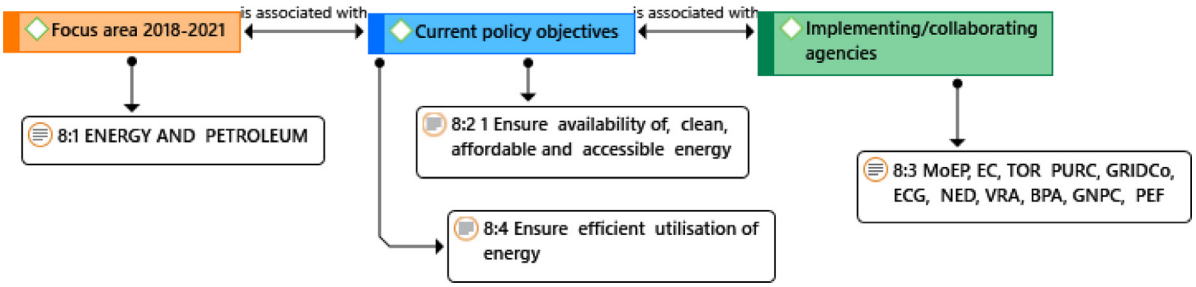

Fig. 4. Sustainable energy-related policy objectives and their implementing/coordinating agencies in the NMTDPF, 2018–2021 (Authors' construct, created with ATLAS.ti).

to sustainable energy development to MMDAs. As seen in Fig. 4, MMDAs are not listed as implementing or collaborating agencies for policy objectives that deal with sustainable energy development.

Findings from Fig. 4 affirm the assertion made by an interviewee at the Municipal Planning and Coordinating Unit. When queried as to why little attention is paid to sustainable energy issues in the DMTDPs, the interviewee asserted that:

> We participate more often in sectors such as education and health than renewable/sustainable energy. It is not because we cannot do these things; it is because everything is done at the top. Even though issues of renewable energy are incorporated under the Infrastructure and Human Development dimension of the new Medium-Term Development Framework, it does not mention local government agencies as implementing or collaborating agencies (Respondent, MPCU, May 2019).

Havet et al. [6] argued that enhancing sustainable energy access especially in rural areas can be rapidly achieved if national policies promote decentralised planning and local governments are given the mandate to address energy needs at the community level. From the above findings, it is clear that national policy frameworks that guide development planning activities at the local government level in Ghana have not paid much attention to giving local governments the responsibility to plan and implement sustainable energy initiatives. This situation is acknowledged in the Ghana Renewable Energy master which identifies the lack of clear initiatives to integrate renewable energies into development plans as one of the challenges to RE development at the local level [14]. The EC also recognise the fact that *"at the national level, significant advances have been made in the development and promotion of renewable energy, however not much focus has been placed in decentralising the planning and development process"* [14].

Consequently, incorporating REs into district development plans has been identified in the Renewable Energy Master Plan as one of the strategies to address the above challenge. However, the plan does not state specifically how this integration will be done, and very little emphasis is placed on the role of MMDAs in the implementation arrangements of the plan. As seen in the quotation below, MMDAs are not listed among the main institutions identified as implementors of the master plan. According to the Energy Commission [14], the plan will be implemented by Components Implementation Entities and Beneficiaries (CIEBs), and these CIEBs include;

> Energy Commission, Public Utilities Regulatory Commission, National Petroleum Authority, Forestry Commission, Ministry of Food & Agriculture, Ghana Irrigation Development Authority, Ghana Grid Company, Training & Research Institutions, Electricity Distribution Companies, Public Electricity Generation Companies, Renewable Energy Private Sector Companies, Civil Society Organizations, etc. (p. 48).

Inferring from Havet et al. [6] standpoint, the failure of the various NMTDPFs to assign sustainable energy development responsibilities to the MMDAs is a significant limitation to the rapid development and utilisation of sustainable energies at the local level. As stressed by the NDPC in the 2010–2013 guidelines for district-level planning, the MMDAs are often encouraged to focus on aspects of the NMTDPF that mentions them as implementing and collaborating agencies. Obviously, the above content analysis has shown that policy objectives dealing with sustainable energy virtually have no MMDAs as collaborating and implementing agencies. Thus, the low level of attention paid to sustainable energy issues in the MTDPs of the Wa Municipality can be attributed to the failure of the NMTDPF to assign such responsibilities to the MMDAs and also the lack of clear initiatives to mainstream sustainable energies in local plans as identified by the EC. These findings also support Havet et al. [6] findings that the connections between energy and decentralisation were hardly addressed in policy documents of many LDCs and SSA countries.

A proposed framework for integrating sustainable energies into local development plans

In accordance with the principle of subsidiarity and the recognition of the fact that local governments can better assess local resources and plan development in general, the NDPC has established a decentralised planning system/framework (which was conceptualized by Inkoom [39]) for development planning in Ghana. The framework is based on a bottom-up approach where national development planning begins from the local government level. Based on the existing framework

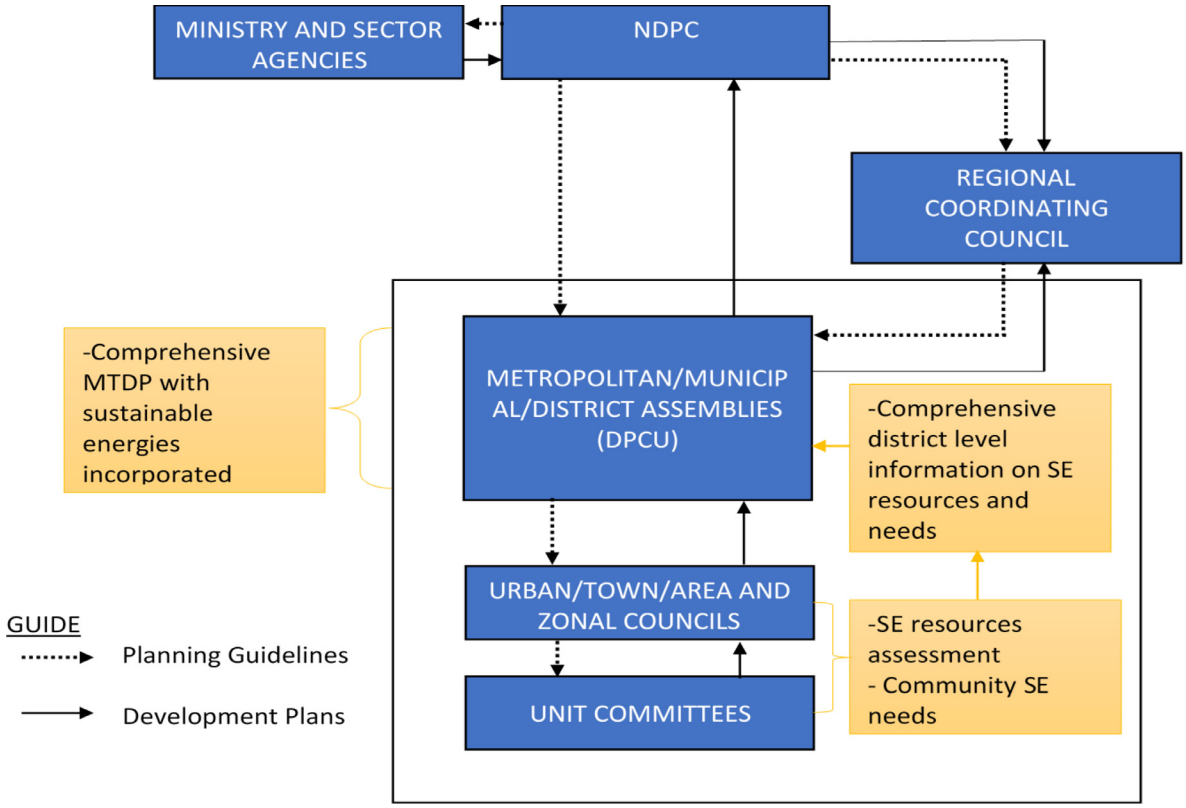

Fig. 5. Proposed framework for integrating sustainable energy planning into local development plans (Adapted from [39]).

for decentralised planning in Ghana, we propose a framework for integrating sustainable energies into the decentralised planning system (see Fig. 5). The blue boxes and lines with black colour represent the original decentralised planning system as conceptualised by Inkoom [39] while the yellow boxes and yellow lines represent the proposed additions for integrating Sustainable Energies into the MTDPs.

Development planning in Ghana generally follows a bottom-up approach which begins with the preparation of community action plans by unit committees with the guidance of the District Planning and Coordinating Unit (DPCU). These plans are a valuable source of data for planning and decision making and, where such plans are unavailable, each district is required to gather data on the real needs of at least 50% of their communities [38]. As shown in Fig. 5, it is proposed that in addition to health, education, water, sanitation and other social services that are usually planned from the community level, the community action plans should also include sustainable energy needs and priorities of each community. Unit committees and urban/town/area and zonal councils, through the same participatory approaches they use in identifying the needs of their communities for the other sectors, should identify sustainable energy needs of their communities and incorporate them into their community action plans. By the NDPC guidelines, these local plans become inputs into the DMTDP and enable the district to have realistic targets. The MPCU can also initiate studies to identify potential large scale mini-grid and off-grid RE projects in the District and incorporate them into the DMTDP.

Various sustainable energy needs related to clean cooking fuels, lighting and productive activities such solar-powered irrigation schemes, and water pumping systems will thus be an integral part of the DMTDP, hence, providing comprehensive information on the state of sustainable energy needs at the local level. Such information is vital for government intervention and will also attract investors into the district since they will know where the need exists, and what potentials are available. These investments will facilitate the deployment and usage of renewable energy technologies and consequently facilitate sustainable energy transitions. As noted by Bawakyillenuo et al. [22], decentralised sustainable energy programs such as rooftop solar, efficient cookstoves, off-grid wind energy amongst others are most likely to be effective when local governments are involved in their planning and implementation.

Conclusion and recommendations

Local governments in Ghana play a crucial role in translating national policies into action through their DMTDPs. However, the extent to which they plan and implement sustainable energy projects and the factors that influence this process remain unclear. Our study is an attempt to address this problem, and it makes two important contributions to understanding

the situation and advancing local government participation in energy planning. First, we have demonstrated that implementation arrangements of national policy frameworks significantly influence energy planning at the local government level. In the case of Ghana, the participation of local governments in sustainable energy planning is limited because current policy frameworks that guide local-level planning have not assigned implementation mandates of national energy policy objectives to the local governments. Consequently, little attention is given to energy issues in the local government plans and emphasis in the plans is often placed on extending the national grid. Secondly, we found that national development planning guidelines for local governments have the potential to affect energy planning at the local government level. Our study revealed that the planning guidelines provided by the National Development Planning Commission (NDPC) of Ghana for development planning at the local level have not provided explicit strategies to integrate sustainable energy planning into the local government plans.

We recommend that the Energy Commission should devolve sustainable energy planning functions to the local government level. The Ministry of Energy and the Energy Commission should give a greater role to local governments in sustainable energies development by making the MMDAs lead and collaborating agencies for policy objectives that deal with sustainable energies in both National Energy Policies and in the National Medium-Term Development Planning Frameworks. Once the mandate is given to MMDAs, it is recommended that the National Development Planning Commission should incorporate sustainable energies into the decentralised planning system by incorporating sustainable energies into the planning guidelines it provides to the local governments. It is very important for the Energy Commission raise more awareness of the National Renewable Energy Master Plan, especially among local government agencies and local actors in the country.

This awareness raising can be done through workshops with various local government agencies to ensure that they are aware of their roles in the implementation of the plan. Such awareness will also enable them to align the contents of the plan with their activities to ensure a smooth and successful implementation of the plan. Other national energy agencies such as the National Petroleum Authority which is making efforts to decentralise LPG access could liaise with local governments and include them in such decentralisation efforts to ensure that awareness of such projects is far reaching, not only among agencies but also the general population who are the target beneficiaries of such programs. The Energy Commission should also conduct training programs on sustainable energy planning for District Planning Officers. Officers should be trained on how to use software such as Long-Range Energy Alternatives Planning (LEAP) for simulating future energy scenarios. This training will help them to set realistic targets for meeting sustainable energy needs at the local level.

Overall, our study contributes to understanding some of the factors that influence sustainable energy planning at the local government level. While national policy frameworks and planning guidelines were key influencing factors, we also found through our key informant interviews that other contextual factors such as the level of awareness and priority of sustainable energy use at the local level could influence their integration in local government plans. Hence, future research could expand upon this work by undertaking similar studies across other municipalities in the country to provide a wider understanding of the factors that could influence the integration of sustainable energies into local government plans in Ghana. The study could also be replicated in other SSA countries with similar decentralised planning systems to enable cross-country comparisons and broader understanding of decentralising sustainable energy planning in Africa.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Author contributions

Mark Akrofi: Conceptualisation, Methodology, data curation,Visualisation, Writing-Original draft preparation, Writing- Reviewing and Editing. Bernard Akanbang: Writing- Original draft preparation, Writing- Reviewing and Editing, Validation.

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