Scaling up distributed solar PV adoption in Ghana: a focus on the commercial sector

Dr. Emmanuel Kofi Gavu, Kwame Nkrumah University of Science and Technology (KNUST), Ghana, ekgavu1.cap@knust.edu.gh
Prof. David Ato Quansah, Kwame Nkrumah University of Science and Technology (KNUST), Ghana, david.ato.quansah@gmail.com
Dr. Giulia Ragosa, University College London (UCL), UK. +447951180651, giulia.ragosa.17@ucl.ac.uk
Prof. Jim Watson, University College London (UCL), UK, +44 203 108 5937, j.watson@ucl.ac.uk
Mustapha Abdul Mugiss, Kwame Nkrumah University of Science and Technology (KNUST), Ghana, mugisnash@gmail.com

Overview

This paper systematically analyses the barriers and enablers of distributed solar PV investment in Ghana's commercial sector. The aim is to determine the key techno-economic, policy/regulatory and social factors behind the decision to adopt (or not adopt) solar PV in the hospitality and real estate sectors.

The potential of solar PV generation in Ghana is high as solar resources are abundant in all parts of the country. However, despite a 10% renewable energy generation target by 2030, progress towards this target is slow. Ghana continues to rely on conventional fossil-based generation to meet its electricity needs. The country has also set a net-zero greenhouse gas emissions target for 2070. The Energy Commission of Ghana[1] reported in 2023 that almost 70% of the country's current electricity generation capacity (of 5454 MW) is from thermal power plants, with 29% (1584 MW) coming from three large hydropower plants. Non-hydro renewables constitute less than 1% of installed capacity. As a developing country that is seeking to achieve universal access to electricity, industrialisation and economic growth, demand for power has been growing steadily.

While growth in residential electricity demand has been robust over the years, the commercial and industrial sectors account for a substantial portion of electricity demand (almost 70% in 2022). Thus, beyond investing in utility-scale renewables, directly installing distributed solar systems in commercial buildings offers a viable pathway to help meet Ghana's renewable energy and decarbonisation targets. In 2023, distributed PV constituted 26.1% of total installed renewable electricity capacity of about 162 MW. Beyond decarbonisation, wider deployment of distributed renewable generation in the commercial sector can yield many other co-benefits. The commercial sector, including hospitality, banking and telecoms, requires a reliable supply of electricity to generate revenues. However, unreliable electricity supply and power outages can interrupt production and services, affecting product quality and damaging equipment. Indeed, electricity is considered a restriction and barrier to growth by many Ghanaian companies (Odoi-Yorke et al. 2022; Ofori et al., 2022). In the past, many companies have resorted to the use of diesel generators. Due to high electricity tariffs, distributed solar systems are increasingly seen as a viable alternative to diesel generators as a way of increasing power supply reliability and the performance of Ghana's commercial sector.

Anecdotal evidence suggests that while there have been some significant installations of distributed solar PV, the drivers of this trend are not well understood. Installation activities have been observed across sectors such as hospitality (hotels), real estate, banking and finance, and among oil marketing companies (e.g. Total Energies). Decision-making for these types of installations could be more straightforward than utility-scale solar, as it does not require extensive stakeholder consultations. Permitting requirements are also generally less onerous than for MW-scale installations. The scale of these projects, generally a few kilowatts, presents fewer barriers to entry for participation by local design and installation businesses. Commercial installations of solar PV could therefore increase the participation of local renewable energy businesses in the value chain, job opportunities and the use of local financial intermediation services. These could help Ghana to implement a just energy transition.

Another dimension of interest is the dynamics between prospective system owners, installers, and local utilities. Globally, power utilities have been concerned about the potential repercussions of distributed generation on their revenue streams. This has started to change in recent years. For example, electricity distribution utilities in Ghana are examining novel business models aimed at transforming the perceived revenue loss stemming from the energy transition into opportunities for generating new income streams[1]. However, these efforts are still in their early stages, and primarily involve discussions among senior staff in this organisations. Within this paper, the role of utilities is examined – including the extent to which they enable or inhibit solar PV investment.

The more specific objectives of the paper are: 1) to develop an understanding of the dynamics, key barriers, and enablers of distributed solar adoption in the commercial sector; 2) to analyse real-world decision-making processes that led to decisions to adopt (or not) solar PV across different segments of the commercial sector; and 3) to provide

[1] One of the authors, Dr Quansah, has been actively involved in these initiatives.

evidence that informs the debate about the role of distributed renewables in Ghana, and to develop recommendations for reforms to policies, reguilations and utility practices.

Methods

The methodology for the paper has three components: a literature review, analysis of current policies and interviews with hotel and real estate companies. The literature review focused on the drivers and barriers to solar PV installation in Ghana and other comparable countries. The review confirmed that there is a lack of empirical research focusing specifically on the commercial sector. It was used to develop a framework of drivers and barriers. This framework formed the basis of the interview questions.

The policy analysis focused on key policies and regulations relevant to solar PV investment in the commercial sector. It included a review of published documents complemented by the authors' knowledge of policy implementation challenges. This analysis also informed the interview questions, as well as the conclusions and recommendations from the research.

The in depth-interviews were carried out with representatives of 12 hotels and 11 real estate developers in three cities in Ghana: Accra, Kumasi and Sunyani. A purposive sampling approach was used to ensure a diverse range of views and expertise. Two additional interviews were conducted with trade associations: the Ghana Real Estate Developers Association and the Ghana Hotels Association. The interviews explored perceptions of solar PV, reasons for investment (or decisions not to invest), and barriers to investment (financial, regulatory, economic, other). Most interviews were conducted on site, and were also an opportunity to collect data on the technical characteristics of solar PV systems, their performance, their contribution to meeting electricity demand and, where possible, the financial costs and benefits. The interviews were transcribed and analysed using thematic analysis.

Results

A number of key findings have emerged from the analysis of interviews so far. The use of solar PV in the hospitality and real-estate sectors in Ghana is not yet widespread. Most hotels, including those in the 5-star category, do not have solar installed. High upfront costs are the most significant barrier to solar PV adoption in the commercial sector. However, other techno-economic factors also matter such as investment in grid infrastructure, uncertainty about returns, installation and maintenance challenges, and a lack of information and expertise. The research also found some misconceptions about the reliability and effectiveness of solar PV.

Where companies have invested in solar PV, the role it plays varies widely. In both sectors, some installations have a very specific purpose such as water heating or street lighting. By contrast, a minority use solar PV as their primary electricity source, with the grid serving as a backup facility. Several factors have driven decisions to invest in solar PV. They include environmental concern, the potential for significant long-term cost-savings, increased electricity supply reliability and the desire to improve the public image of a company.

Conclusions

In addition to identifying the main drivers and barriers for investment in solar PV, including any sectoral differences (see above), the paper will conclude with some recommendations for government and other actors. Three recommendations have been identified from preliminary analysis:

- Financial incentives: both sectors would benefit significantly from government incentives like subsidies, tax breaks, and low-interest loans to offset the high initial costs of solar PV installations.
- Technical support and education: providing technical assistance and education on the benefits and operation of solar PV systems is required to address misconceptions, improve decision-making and adoption rates.
- Regulatory reforms: effective net metering policies (or regulations that enable payments for surplus power that is exported) and streamlined permitting processes could further encourage the adoption of solar energy.

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