

POLICY BRIEF

Trajectories of solar energy development in Ghana: drivers and barriers pre-COVID-19 and beyond

INTRODUCTION

Ghana's rising living standards, population growth and urbanisation have relatively increased its energy consumption, which is dominated by fossil fuels. The burning of fuels such as coal and oil emits the greatest amount of CO₂ into the atmosphere, contributing to global warming and climate change. While renewables offer enormous potential to reduce reliance on fossil fuels, developing nations lag far behind the rest of the world in terms of renewable energy technology implementation.

In Ghana, several obstacles stand in the way of renewable energy's integration into the national energy mix. These include financial and monetary constraints, technological and network, policy regulatory framework, over-reliance on a centralised system, and reliance on fossil fuel supplies. Renewable energy accounts for about 6¹ percent of Ghana's total final energy consumption (Energy Commission 2020). The emergence of the COVID-19 pandemic in the latter part of 2019 has led to a significant decline in energy generation using fossil fuels, while renewable power has gained momentum.

This policy brief provides a snapshot of solar PV technology and related applications in Ghana prior to and during the COVID-19 pandemic. It also highlights the drivers and barriers to renewable energy development in Ghana. The brief offers policy recommendations to assist the government in promoting and stimulating solar energy development.

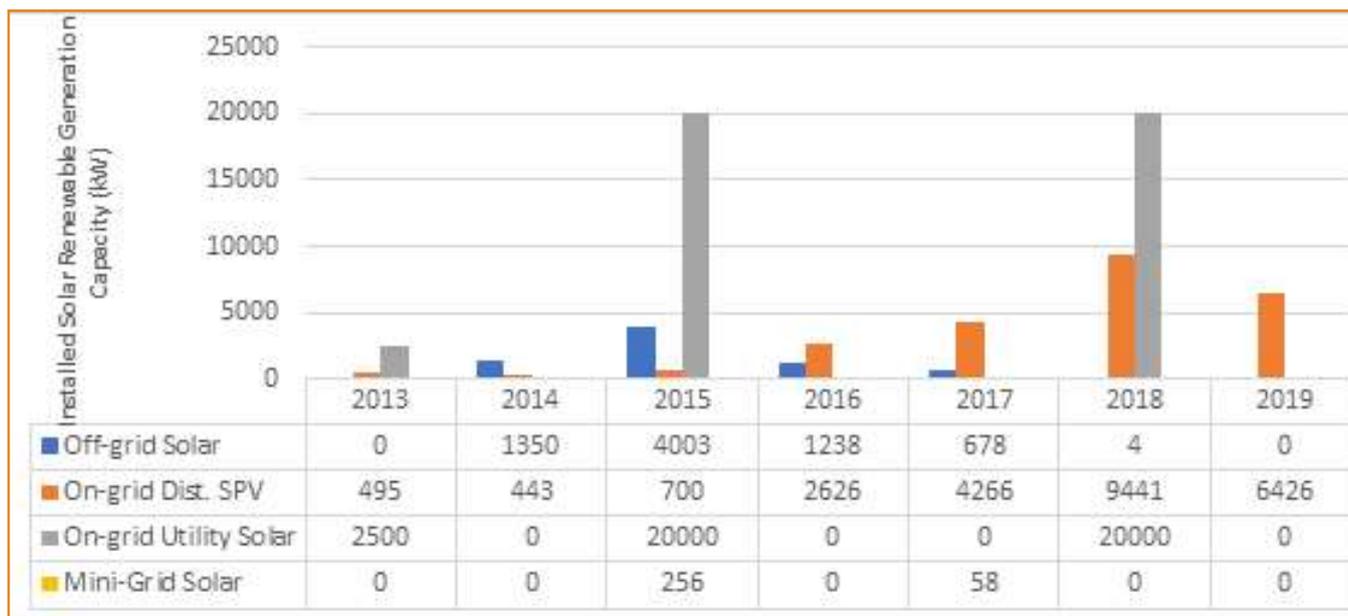
Solar Power in Ghana pre-COVID-19

Solar energy is regarded as a highly efficient and effective resource among the renewable energy sources for home and commercial use. Ghana is located between latitudes 5° and 12° N and gets between 4.0 and 6.0 kW/m² of solar radiation per day on a yearly basis. The nation receives around 330 days of sunlight per year and an annual sunshine length of between 1800 and 3000 hours, which may indicate a significant potential for grid connection. Ghana's first grid-connected solar plant started in 2013, when the Volta River Authority built a 2.5 MW solar facility at Navrongo in the Upper East Region.

In 2019, a 40 MW solar plant and a 100 kW biogas plant were built, bringing the total capacity to 52 GWh. Solar energy generated by utility solar panels has the biggest percentage (4,250 kW), while solar energy generated by mini-grids has the lowest share (314 kW). See figure 1 (Energy Commission (2020)).

1 Exclude wood fuels and large hydro (electricity consumed from solar, biogas and small hydro only)

Figure 1: Installed Solar Renewable Generation Capacity (kW)



Source: National Energy Statistics, Energy Commission (2020) NB: Dist. SPV = Distributed Solar PV

Drivers of Solar Energy Initiatives in Ghana

While over 85percent of Ghana's population now has access to electricity (Energy Commission, 2020), there are still a significant number of off-grid villages (Agyekum, Velkin, & Hossain, 2020). Although progress has been gradual, the situation of solar energy development in the nation has been impacted by a number of drivers, which are addressed below.

- Energy Sector Reforms such as the passage of the 2011 Renewable Energy Act, which provides for the development, management, utilisation, sustainability, and adequate supply of renewable energy (Hagan, 2015).
- The Pressure to Reduce CO₂ Emission/ Footprint, resulting from Ghana being a signatory to international agreements or goals such as the Sustainable Development Goals (Goal 7), the Climate Change Convention (2015), the Sustainable Energy for All ('SE4ALL') initiative, and the Paris Agreement, as well as ratifying the Kyoto Protocol.
- Increasing demand for modern energy due to adverse environmental effect of fossil fuels use.
- The pressure to ensure energy security and rural electrification through the deployment of solar decentralization techniques for off-grid power generation in areas that are not connected to the

national grid.

- Relatively negative effects of fossil fuels which result in substantial costs to society, including human health expenses (i.e. lost workdays, health care expenditures), and, probably most significantly, the costs connected with climate change.
- The advancement of technology such as solar dryers and water heating systems for agricultural and hospitality applications, respectively.

Barriers to Solar Initiatives in Ghana

Despite these favorable conditions, there are some barriers that hinder the full development of the solar energy sector in Ghana:

- A strong national preference for fossil fuels, with commercial grid electricity taking precedence over renewable energy and dispersed or embedded generation.
- The high initial capital cost of renewable energy sources making it unfeasible for most investors to support them.
- Lack of financing institutions and currency risk encouraging solar energy adoption.
- Lack of public awareness and information regarding the benefits that solar technologies offer.



Solar panels on a roof top. Photo: [tawatchai07/freepik.com](https://www.freepik.com/free-photo/tawatchai07/freepik.com)

- Small market size of renewable energy compared to traditional fuels.
- Low level of local human capacity and training at the university and professional or vocational levels on solar energy.
- Ineffective regulations and administrative complexities, such as the lack of an independent regulator exclusively responsible for the execution of renewable energy policies and regulatory measures in the sector obstruct the adoption of solar energy technology in Ghana.

Solar Energy During and After the COVID-19 Pandemic

The COVID-19 pandemic has had a substantial influence on the global energy sector. Reduced energy demand, falling energy prices, and a sharp decline in oil prices have already been observed (IEA 2021, IRENA 2021).

Despite this global upheaval, Ghana's transition to clean energy did not come to a halt. In the midst of the epidemic, Richard Kwarteng and Jude Osei built solar-powered hand washing basins equipped with automated sensors to promote personal hygiene². Yet again, in an effort to assist businesses in managing recurring utility costs in the face of slowed business due to the COVID-19 pandemic, German Pay-As-You-Go (PAYG) solar distributor Redavia

2 <https://edition.cnn.com/2020/05/09/Africa/Ghana-coronavirus-handwash/index.html>

introduced a new concessionary solar programme, the COVID-19 Resilience Lease, for its clients in Kenya and Ghana. Under the programme, Redavia will supply solar panels to its corporate clients for six months at no cost. After six months, customers may opt to renew the lease or re-deploy the equipment. Mankoadze Fisheries Limited in Tema and the Royal Senchi Hotel and Resort in Ghana have joined this innovative Redavia initiative.

Again, StellFuturera is creating a pipeline from the 344 Christian Health Association of Ghana (CHAG) health institutions to offer solar energy to off-grid health clinics through power purchase agreements (Larson J et. al., 2020).

CONCLUSION AND RECOMMENDATIONS

Ghana's solar photovoltaic (PV) improvements have been limited when compared to the potential of the country's solar resources. A number of technical, economic, institutional, and political obstacles have been identified as preventing the widespread use of solar energy technology in Ghana. Now, more than ever, is the time for the Ghanaian government to close the energy access gap and prioritise sustainable energy in economic stimulus and recovery policies.

Ghana's exploitation of solar energy technologies is relatively low. This calls for improvements in incentives, coordinated and targeted efforts, research and development. A strong institutional framework for solar energy development in Ghana can help boost its economy.

These can be achieved if the following recommendations are implemented by the government and other private sector developers.

- Providing solar energy subsidies and tax rebates to encompass a wider variety of solar products. Although the Ghanaian government has implemented total import duty and value-added tax exemptions for solar photovoltaic (PV) systems, the same cannot be said for other solar-related technology.
- Ensuring coordinated efforts of stakeholders in solar power technologies by building concerted effort and a regulatory framework that brings together all important players, particularly the Ministry of Energy, the Energy Commission, and the Electricity Company, to streamline and encourage solar energy investments in the nation.
- Enhancing research and development of solar power technologies by championing the effective collaboration and interactive linkages between industry, research institutions, and universities.
- Harmonising policies, acts and institutions in order to maximise their potential for complementarity.

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Researcher

Aba Crentsil (PhD)
ISSER, University of Ghana, Legon
aocrentsil@ug.edu.gh

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ISSER
P.O.Box LG 74, Legon, Accra
Tel: +233 (0) 57 769 9900 (1/2)
Email: isser@ug.edu.gh
Website: www.isser.ug.edu.gh
Twitter, Facebook: @ISSERUG

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Vicentia Quartey
vquartey@ug.edu.gh