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# Renewable Energy and Energy Efficiency in Achieving Ghana's Industrialization Agenda

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# Introduction



Access to energy and energy security are a necessity for any society seeking to promote economic growth and development to increase employment for its citizenry. Energy serves as the major catalyst to any industrialization drive in the attainment of macro-economic growth and development.



The increasing cost of fossil fuel and its negative impact on the environment has necessitated the need for increased investments into renewable energy sources globally.



Ghana is focused on integrating renewable energy into its energy mix in order to promote security of energy supply, ensure a cleaner and cheaper source of energy to help mitigate climate change in fulfillment of the Sustainable Development Goal (SDG) 7 – Affordable and clean energy



# Ghana Renewable Energy Master Plan



The REMP is a US\$5.6 billion investment master plan with over 80% expected to come from the private sector over a 12 year period



Investment focused framework for the development and promotion of renewable and sustainable energy



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# Industrialization Agenda and Importance of Affordable, Reliable, Accessible And Sustainable Energy for Ghana

## One District One Factory (1D1F)

will benefit tremendously from energy generated from renewable sources. The goal of this initiative is to establish a factory in each of the 216 districts using raw materials from within each of these districts.

## Bauxite & Aluminium industry

Renewable energy will provide increased power at more competitive rates towards the establishment of the country's Bauxite and Aluminium industry across the whole mining, refining and smelting value chain.

## VW's Assembly Plant

VW's assembly plant in 2020 and the expected entry into the Ghanaian car assembly market by Nissan, Toyota and Sinotruk turning Ghana into a regional hub for the car assembly industry; There is the need for energy to power this industry. Renewable energy sources will play a role in helping the government achieve this goal.



## Iron and Steel Industry:

Discovery of f 1.7bn tonnes of iron ore in Northern Ghana. Expected to increase to about 3bn tonnes after complete feasibility studies. The mining and processing of steel will need to be powered by a cheap source of energy to produce steel products at competitive costs.

## Petroleum Hub

Government to make Ghana a petroleum hub. The hub will consist of refineries, petrochemical plants, light industries, waste and water treatment facilities, storage facilities, business and residential centres. The petroleum hub will benefit tremendously from Renewable Energy.

## AfCFTA – Manufacturing, etc:

Ghana needs to increase its level of manufacturing in order to add value to the country's raw materials to take maximum advantage of the benefits associated with free trade. This goal can be supported with power from renewable energy.



# The Role of Renewable Energy and Energy Efficiency towards Ghana's Industrialisation Drive

- Renewable Energy in Ghana is defined as energy from non-depleting sources which include; wind, solar, hydro, biomass, biofuel, landfill gas, sewage gas, geothermal energy and ocean energy - Renewable Energy Act, 2011 (Act 832)
- As at 2015, the primary source of Ghana's energy supply was from oil (44.48%), biomass (37.87%), hydroelectricity (5.27%) and natural gas (12.38%).
- Ghana's electricity generation was dominated largely by hydro power until the early 2000s, however, in recent times thermal contribution has increased from about 1,159 GWh in 2005 to about 5,644 GWh by 2015.
- The thermal sources of electricity include natural gas, light crude oil and diesel. Ghana saw a reduction in electricity generation in 2007 and 2015 due to low rainfall experienced in the Volta Basin. This shortfall had a tremendous impact on the private sector with many businesses suffering due to insufficient power supply.
- This necessitated stakeholder consultations in order to draw up a Renewable Energy Masterplan which was launched in 2019 to develop more Renewable Energy sources in order to end the volatility in power supply due to the unpredictability of rainfall. This is to provide an investment-focused framework, contribute to the improvement in social life and to reduce the adverse effects to the climate.
- With regards to Renewable Energy on the solar front, some successes have been made in small scale solar PV (for rooftop and lanterns), grid-connected systems and to a small extent, solar water heating mostly for the hospitality sector. So far only about 42.5 MW utility scale PV systems are connected to the national grid.
- A few biomass-based industries exist who use combustion technologies to generate heat and power from biomass waste with some varying levels of success. There is however the scope to expand solar PV and biomass-based industries to generate more heat and electricity.
- The prospect for tidal, wind and other Renewable energy use in Ghana is also exciting.





## Opportunities within the Renewable Energy Sector in Ghana

- In order to sustain the current rate of economic growth in Ghana, the country needs to add an estimated 200 MW of additional generation capacity over the next 20 years which will require Ghana to tap into its vast renewable energy sources.
- These include 6.0kWh/m<sup>2</sup>/day of solar irradiation with the highest levels occurring in northern Ghana, 1100MW of total wind energy potential, tidal energy potential in excess of 1000MW and 800m<sup>3</sup> of liquid waste per month produced in Accra which can be converted into energy.
- The Government, through the Ministry of Energy, is encouraging public-private sector partnership by securing private sector investment for re-capitalization of the Renewable energy supply system.
- The renewable energy services sector in Ghana has numerous investment opportunities that are yet to be tapped and fully exploited both by the public and private sectors.
- The market opportunities in the energy and renewable services include:



# Opportunities within the Renewable Energy Sector in Ghana

## Market Opportunities

The market opportunities in the energy and renewable services include:

- Energy Audits & Energy Management Strategies
- Power Factor Correction
- Electrical Load Management
- Monitoring and Targeting Energy Management
- Tariff Analysis
- Refrigeration and Air Conditioning Systems
- Compressed Air Systems

**Supply of energy-monitoring equipment** to meet the increased requests for power monitoring and tariff analysis from industry.

**Solar vaccine refrigerators for the preservation of vaccines** for child immunization programmes in remote and off-grid parts of the country.

**Provision of solar energy systems** to schools in off-grid communities.

**New, higher quality and cost-competitive energy services** to the poor, for cooking, transport, water heating and other home appliances.

## Demand Opportunities

- Use of solar energy in hotels, restaurants and institutions using solar water heaters
- Increased LPG penetration
- Improved efficiency cook-stove penetration
- Use of biogas for cooking in hotels, restaurants and institutional kitchens
- Increase the penetration of modern energy into agriculture for increased agricultural production, to help achieve the nation's food supply security objectives
- Substitution of diesel with biodiesel in agricultural mechanization
- Drying of exportable farm produce such as pepper with solar dryers
- Displacing the use of diesel for irrigation with grid electricity and mechanical wind pumps
- Large-scale commercial poultry farmers to meet at least 10 percent of their electricity needs from biogas, using the droppings from the birds.



# Opportunities within the Renewable Energy Sector in Ghana



## Other Opportunities

### Hydro Power

- Increase export of hydro power to neighboring countries and other African countries.
- Build capacity in small and medium hydro project management.
- Develop irrigation projects and water supply schemes as co-benefits.

### Solar Energy

- Increase generation capacity – through utility scale projects, mini-grids, standalone applications for street lighting, traffic controls, aviation signals, telecommunication, light electronic devices, etc.
- Demand side management (net-metering) – integration of solar PV and solar water heaters into existing and new buildings, and captive power due to increasing cost of conventional power.
- Opportunities exist to develop a market and production hub for electric vehicles; and Solar Water Heaters have the potential to contribute 2GWh of savings from energy demand (ECREEE, 2015).

## Other Opportunities

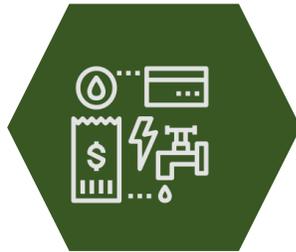
### Wind Energy

- Applications in irrigation – poldaw wind pumps requiring low operating wind speeds can be used for irrigation and community water provision, particularly in off-grid applications.
- Scale-up manufacturing – principally in the areas of standalone wind turbines and increase research, development, demonstration and commercialization of wind energy technologies.

### Biomass

- Diversify cooking fuel mix.
- Build capacity in solid biomass technologies and empower women businesses/ entrepreneurs.
- Reduce deforestation by using dedicated woodlots.

# Energy Sector measures taken by Government to mitigate/reduce the negative effects of the pandemic with opportunities identified for recovery



Governments sought to ease the resultant burden that fell on their citizens, especially poor and marginalized groups. These measures came in the form of electricity bill waivers, suspension of bill payments as well as fiscal and regulatory measures. The government of Ghana absorbed the cost of electricity during the lockdown period for 6 months. High energy consumers were required to pay 50% of their consumption while it was free for low users. Consumption of water is free till December 2020.



Ghana is undertaking a National Adaptation Planning (NAP) process, in which it seeks to improve its resilience to climate change and its impact over the next 60 years. By developing anticipated climate change scenarios, the country aims to reduce its vulnerability to future climate risks. Ghana's goal is to use post COVID-19 investments and stimulus to create a more self-sufficient future.



## Others

- Extension of due dates from 4-6 months after the end of the financial year.
- Grant of waiver of penalties on principal tax liabilities owed by taxpayers who redeem their outstanding liabilities by 30th June 2020;
- Waiver of VAT on donations of stock of equipment and goods for fighting the Covid-19 pandemic
- Grant of deduction against income tax for private sector contributions and donations made towards addressing the COVID-19 pandemic; and
- Institution of an email filing and direct transfer payment system to allow taxpayers file and pay taxes with the various Ghana Revenue Authority (GRA) offices remotely.

