

# GHANA'S RENEWABLE ENERGY MASTER PLAN EXECUTIVE SUMMARY



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Ghana's Renewable Energy Master plan was developed with funding from the "China-Ghana South-South Cooperation on Renewable Energy Technology Transfer" project, which is a collaboration between the Energy Commission in Ghana, the Ministry of Science and Technology in China together with the UNDP Country Offices in Accra and Beijing. The project, with funding from DANIDA, is facilitating exchange of expertise and technology between China and Ghana, building on China's unique development experience.

This booklet has been developed by the policy team of SYND to educate young people on the status on Renewable energy development in Ghana. It contains the overview of Ghana's Renewable Energy Master plan.

## **REFERENCE**

Ghana's Renewable Energy Master plan, 2019.  
Add link to the main document online.

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Globally, renewable energy is going through exciting times with increasing investment in many countries. Solar PV capacity increased from 3.1 GW in 2005 to 227 GW in 2015. Within the same period, wind power capacity increased from 59 GW to 433 GW. Large hydropower has remained at very high annual market volumes as well. Bio-power partly operated as cogeneration plants quadrupled to a total global generation capacity of 106.4 GW over the same time period. Other renewable energy technologies have made significant progress as well, with total annual biofuels production increasing from 37 billion litres in 2005 to 128 billion litres in 2015. As production levels have soared, costs have dropped significantly for most of the technologies.

In view of the global trends, the Government of Ghana has identified renewable energy as one of the options that could contribute to the overall energy supply mix and minimize the adverse effects of energy production on the environment. Indeed, renewable energy programmes and projects implemented in recent years have demonstrated that renewable energy interventions have enormous potential to reduce poverty and improve the socio-economic development of the country, particularly, in rural communities.

Ghana is signatory to several international conventions, treaties and regional programmes such as UN Sustainable Energy for All (SEforALL) Initiative, Sustainable Development Goals (SDGs), Paris Agreement on the Intended Nationally Determined Contributions (INDCs), AU Agenda 2063, Economic Community of West African States (ECOWAS) White Paper on Energy Access, ECOWAS Renewable Energy and Energy Efficiency Policies, among others aimed at promoting sustainable energy development.

In line with this, Government through the energy commission with support from 'China-Ghana South-South Cooperation on Renewable Energy Technology Transfer' project, has developed the Renewable Energy Master Plan with the goal to provide investment-focused framework for the promotion and development of the country's rich renewable energy resources for sustainable economic growth, contribute to improved social life and reduce adverse climate change effects.

# Visions, Goals and objectives of Renewable Energy Master Plan

The vision of the Renewable Energy master plan is to ‘develop the renewable energy sector with the capacity to sustainably utilize resources and transform Ghana into a country with expertise in renewable energy research, production, and services.’

The goal of the Renewable Energy master plan (REMP) is to provide investment-focused framework for the promotion and development of renewable energy resources for economic growth, improved social life and minimized the adverse effects of climate change.

- The REMP aims to achieve the following objectives by 2030.
- Increase the proportion of renewable energy in the national energy generation mix from
- 42.5 MW in 2015 to 1363.63 MW (with grid connected systems totaling 1094.63 MW);
- Reduce the dependence on biomass as main fuel for thermal energy applications;
- Provide renewable energy-based decentralized electrification options in 1,000 off-grid communities;
- Promote local content and local participation in the renewable energy industry



# Targets and Actions of RE Master plan.

Existing policies, strategies and resource potentials were taken into consideration to establish the targets and actions required for each of the renewable energy technologies.

The implementation of the REMP starts from the year 2019 and run through to the year 2030. The scope of the targets and plan of action are based on a thorough stakeholder consultation and analysis of the renewable energy resources and applications, economics and financial implications.

The REMP also prescribe action plans for all the Renewable Energy Technologies (RETs). For each of the RET areas (solar, wind, hydro, biomass, etc.), the action plan analysed the resource availability, opportunities in developing the resource, and recommends interventions for their promotion and development. Further details and actions are provided for each of the technologies/ interventions under each resource with specific considerations given to the challenges and strategies to promote it.

The broad strategies proposed for the successful implementation of the REMP are as follows:

- Boost and sustain local assembly and manufacture of RETs through a systematic phasing out of import duty exemptions on RETs where the country has a competitive advantage;
- Strategically recommend consideration for tax exemptions on components and materials for assembly and manufacture to make RETs competitive on the local and sub-regional markets;
- Provide support to existing RET assembling/manufacturing companies including preferential procurements under public financed projects;
- Guarantee local market through local content and local participation actions;
- Support the private sector through concessional financing and government on-lending facilities to RE investments;

- Continuously provide investment support for the upgrading of the National Interconnected Transmission System to accommodate the planned renewable energy power targets;
- Incorporate land requirements for renewable energy projects in the national spatial planning framework;
- Develop legislation to ensure that increased development of renewable energy projects does not become detrimental to the environment;
- Intensify awareness creation;
- Build capacity in various aspects of renewable energy development; and
- Support research and development.
- Explore opportunities to develop a market and production hub for electric vehicles in Ghana.



In line with the Renewable Energy Act, 2011 (Act 832), the Ministry of Energy will implement the plan through the REMP Coordinating Unit (REMP-CU). The REMP-CU shall be responsible for the overall procurement and fiscal management, coordination with key REMP Components Implementation Entities and Beneficiaries (CIEB) and reporting obligation. The Ministry of Energy will from time to time designate relevant entities to implement key components of the REMP.

A National Steering Committee (NSC) made up of experts drawn from all relevant institutions will be established to provide overall guidance to the REMP and will among other responsibilities review progress made at the end of each cycle. Members of the NSC will serve for not more than two terms aligned with the REMP implementation cycles. The NSC will hold quarterly meetings and as and when necessary.

The REMP-CU will be staffed with competent personnel. The REMP-CU arrangements, assets and liabilities shall be given to the Renewable Energy Authority when it is established and operational.





# **Economic, Social and Environmental Impacts of the Renewable Energy Master Plan.**

The REMP is an US\$ 5.6 billion investment master plan, with more than 80% coming from the private sector. On annual basis, the REMP translates into an estimated US\$ 460 million investment. The plan is being implemented over a 12-year time-space, from 2019 to 2030.

The successful implementation of the plan would lead to an installed electricity capacity of 1363.63 MW (with grid connected systems totaling 1094.63 MW), the creation of 220,000 jobs, and carbon savings of about 11 million tonnes of CO<sub>2</sub> by 2030.

The REMP proposes strategies to minimize the adverse impact of the various renewable energy technologies and targets on land use through spatial planning.

## **ENABLING ENVIRONMENT.**

Government shall continue to provide an enabling business environment and work to remove the bottlenecks that hinder growth in the private sector. Manufacturing and assembling shall be consciously promoted. Incentives proposed for renewable energy manufacturing and assembling firms include:

- Substantial tax reduction;
- Exemption of materials, components, equipment and machinery (that cannot be obtained locally) for manufacturing or assembling, from import duty and VAT, up to the year 2025.
- Exemption of Import duty on plants and plant parts for electricity generation from renewable energy resources.

With regards to infrastructural development, government would dedicate significant budgetary allocations to fund detailed technical studies at national level and assist GRIDCo to invest in modern weather forecasting equipment and stations synchronized with weather stations at various

utility scale renewable electricity installations for proper and timely planning of the subsector and evacuation of renewable electricity. In view of this, all variable renewable electricity generation plants shall be required to install weather stations on site.

To boost mini-grid development, government would facilitate an efficient and cost-effective water transportation system to support mini-grid activities in island and lakeside communities.

Government would team up with well-equipped training centres to provide technical and entrepreneurial training programmes to interested groups and individuals on renewable energy technologies. Technical capacity development will target areas such as solar PV system design and installation, construction of biogas digesters, design and construction of gasifiers, improvements in the design and construction of improved household and institutional cookstoves, design and construction of small-scale biomass briquetting and pelleting machines, repair and maintenance of aforementioned systems, among others.



# IMPLEMENTATION PLAN OF THE RENEWABLE ENERGY MASTER PLAN.

The REMP will be implemented in three cycles with the first cycle (or transition phase) running from 2019 to 2020. Subsequent cycles will run from 2021 to 2025 and 2026 to 2030 respectively. Each cycle will be reviewed in the last year of implementation and the outcome used to improve the implementation of the next cycle. The utilities will play key roles, especially in relation to utility scale projects. The Volta River Authority, Bui Power Authority and the Renewable Energy Authority (yet to be established) will be encouraged to grow and expand the renewable energy electricity space through public sector led investments and or through public private partnerships. GRIDCo will drive strategic investments and expansion of the National Interconnected Transmission System (NITS) in line with provisions defined in the 'Renewable Energy Sub-Code and the National Grid Code' to accelerate the interconnection of utility renewable energy projects.

The Renewable Energy Purchase Obligation (REPO) will be implemented to ensure that the distribution companies, ECG, NEDCo, and Enclave Power Company (EPC), and all other bulk customers integrate electricity generated from renewable resources in their distribution and consumption mix. ECG, NEDCo and EPC will also ensure that net-metered systems have access to the distribution grid, in line with the 'Net-Metering Code'. Private sector investment is at the centre of the REMP. In addition to government and donor-led programmes, the private sector investments toward achieving the targets in the REMP, especially, utility scale projects, will be given priority. The REMP will continue to create opportunities through the RE-FiTs, Competitive Procurement of RE projects (Tenders) and Purchase Obligations to increase investment in the sector.

The government will give significant financial incentives and procurement preferences to private sector actors engaged in the local assembly and manufacturing of renewable energy technologies and related services.

Manufacturing and assembling of renewable energy technologies is pivotal to the overall success of the REMP. This will not only stimulate sustainable growth of the sector, but also contribute to the overall development of the West African renewable energy market. Manufacturing and assembling along strategic links in the renewable energy value chain in the REMP would be fully implemented

In accordance with the Local Content Policy for the sector and to boost local production, both state sponsored and private sector renewable energy projects would source a minimum 20% of goods from the local market (where applicable) in the medium term. The scope and content of local sourcing of goods will be broadened as the local production market matures.

The REMP would strengthen the GSA to ensure that local production of renewable energy technologies meet national/ international standards.



Below is the implementation schedule of the RE master plan from 2019 – 2023.

REMP IMPLEMENTATION PLAN - RE TARGETS UP TO 2030										
Renewable Energy Technologies	Reference 2015		Cycle I (2019-2020)		Cycle II (2021-2025)		Cycle III (2026-2030)		Cumulative in 2030	
	No. of units	MWp	No. of Units	MWp	No. of Units	MWp	No. of Units	MWp	No. of Units	MWp
<b>Solar Energy</b>										
Solar Utility Scale	-	22.5	-	130	-	195	-	100	-	447.5
Distributed Solar PV		2		18		80		100		200
Standalone Solar PV	-	2	-	8	-	5	-	5	-	20
Solar Street/Community lighting	-	3	-	4	-	4	-	14	-	25
Solar Traffic signals (% of total traffic signals installed in the country)	14	3	11	-	15	-	20	-	60	-
Solar Lanterns	72,000	-	128000	-	300000	-	500000	-	1000000	-
Solar Irrigation	150	2.8	6000	6	20000	20	20000	20	46150	48.8
Solar Crop Dryers	70	-	80	-	250	-	300	-	700	-
Solar Water Heaters	4,700	-	15300	-	50000	-	65000	-	135000	-
<b>Wind Energy</b>										
Wind Utility Scale	-	0	-	0	-	275	-	50	-	325
Standalone Wind Systems	-	0.01	-	0.1	-	0.9	-	1	-	2
Wind Irrigation/Water Pumping	10	-	25	-	30	-	35	-	100	-
<b>Biomass / Waste-to-Energy</b>										
Biomass Utility-Scale	-	0	-	0	-	72	-	0	-	72
Waste-to-Energy Utility Scale	-	0.1	-	0	-	30	-	20	-	50.1
Biogas (Agricultural/Industrial Organic Waste)	10	-	20	-	70	-	100	-	200	-
Biogas (Institutional)	100	-	80	-	140	-	180	-	500	-
Biogas (Domestic)	50	-	30	-	50	-	70	-	200	-
Woodlot Cultivation (ha)	190,000	-	60000	-	100000	-	78000	-	428000	-
Charcoal (Local Demand)	1,551,282	-	94017	-	93947	-	100877	-	1840123	-
Charcoal (Export)	190,450	-	59550	-	100000	-	78000	-	428000	-
Briquetting/Pelleting	19,700	-	20300	-	25000	-	35000	-	100000	-
Biofuel (tonnes)	0	-	100	-	4900	-	15000	-	20000	-
<b>Hydro / Wave Power</b>										
Small/Medium Hydro Plants	-	0	-	0.03	-	80	-	70	-	150.03
Wave Power	-	0	-	5	-	0	-	45	-	50
<b>Hybrid Mini-Grids</b>										
Mini/Micro-grids	13	-	73	-	114	-	100	-	300	12
<b>End User Technologies</b>										
Improved Biomass Cookstove (Domestic)	800,000	-	500000	-	500000	-	1200000	-	3000000	-
Improved Biomass Cookstove (Institutional/Commercial)	1,800	-	1200	-	7000	-	8000	-	18000	-
<b>Total Installed RE Electricity Capacity</b>										<b>1353.63</b>

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