Join the GrEEEn Webinar series
No.1: Findings from the 2020 Renewable Energy Market Scan

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Find out more about the GrEEEn project here: https://bit.ly/SNV-GrEEEn
Boosting Green Employment and Enterprise Opportunities in Ghana

**Sustainable and climate resilient local economies, green jobs and development**

**Result 1**: Local economies are stimulated and short-term job opportunities for youth, women and returnees are created through green and climate resilient investments.

**Result 2**: Employability and entrepreneurship capabilities of youth, women and returnees are improved in sectors of economic opportunities, for the benefit of green and climate resilient local economies.

**Result 3**: Increased access and usage of financial services, leveraging remittances, adapted to the needs of (i) youth, women and returnees benefiting from cash for work schemes and (ii) local communities and MSMEs.

**Result 4**: SMEs, offering decent and sustainable jobs to youth, women and returnees, are incubated and/or accelerated and contribute to green and climate resilient local economies.

**Project duration**: 11/2019 – 11/2023

**Target regions**: Ashanti & Western

**Target sectors**: Agriculture, Renewable Energy, Water
Objectives of the webinar

- **Validate findings** of GrEEn’s market scan
- **Introduce and receive feedback** on GrEEn’s **planned interventions** in the Renewable Energy Sector

**Key points covered in the market scan:**
- What are market opportunities within the two targeted regions?
- How is the renewable energy sector relevant to COVID-19’s recovery phase?
- Who are the key stakeholders and players in the sector?
- How can interventions in the sector be coordinated?
- Which areas has GrEEn identified as high impact areas in terms of business growth and employment creation?
1. Global Outlook
2. Ghana’s RE and EE Ecosystem
3. Market Outlook
4. Value Chains
5. Skills
6. Energy Efficiency
7. GrEEn offer
8. Questions to discuss
Global Outlook
Renewable Energy (RE) and Energy Efficiency (EE)

1. Different Revenue Streams
   RE and EE Measures and Technologies increase the energy mix and provide users with different sources of revenue from both energy savings and other co-generation benefits. Consumers and businesses have more money to spend.

2. Save Energy
   RE and EE technologies reduce the energy used while also making available energy for different demands.

3. Gender Equality
   With the increasing boost in investment for RE and EE there is increasing opportunities for women to serve as energy managers and provide them with stable sustainable jobs.

4. Climate Friendly
   RE and EE reduces global GHG emissions thereby improving air quality, improving health and reducing premature death.
COVID-19 “Building Back Better”

Ensuring energy access to health facilities and other places of sanitation for clean water for drinking and washing

Clean Cooking solutions for the most vulnerable and rural communities

Increasing resilience of local communities

Employment opportunities

Ensuring energy access for information spread and Communication

Climate Change Goals

The Paris Agreement seeks to keep global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

Renewable Energy and Energy Efficiency provide options for lowering GHG emissions while also satisfying global energy demand.

Sustainable Development Goals
1: No Poverty
2: Zero Hunger
3: Good Health and Well-being
4: Quality Education
5: Gender Equality
6: Clean Water and Sanitation
7: Affordable and Clean Energy
8: Decent Work and Economic Growth
9: Industry, Innovation and Infrastructure
10: Reduced Inequality
11: Sustainable Cities and Communities
12: Responsible Consumption and Production
13: Climate Action
14: Life Below Water

Ghana RE and EE Ecosystem
National Policies

Renewable Energy Master Plan

REMP

Investment framework for the development of Ghana's rich renewable resource providing long term projection

Sustainable Energy for All

SEforAll


Renewable Energy Act

RE Act

Provides an enabling regulatory environment to attract private sector involvement in the development, management and utilisation of renewable energy in an efficient and environmentally sustainable manner.

Energy Sector Strategy and Development Plan

ESSDP

Emphasises on 'increasing the renewable energy supply in national energy mix to 10% by 2020'.
Institutional Arrangement

Ministry of Energy

- Energy Commission
  - ECG
  - NEDCo
  - GRIDCo
- PURC
- EPA

Standards
  - Ghana Standards Authority

Investment
  - Ghana Investment Promotion Centre

Taxes
  - Ghana Revenue Authority
Facilities Available

Business Incubation
- Climate Innovation Centre
- SEES
- PEF
- AGI Energy Service Centre

Consultancies/NGO's
- CEESD
- Abantu
- KITE

Financiers
- Fidelity Bank
- RDF Ghana
- Ecobank
- IFC
- PfAN
- Wangara Capital Partners
- SNS
- GrEEn
Training Institutions

Institutions
1. Ghana Technology University College – Greater Accra
2. DENG Solar Training Centre – Greater Accra
3. CSIR – IIR – Greater Accra
4. ISEES – Greater Accra
5. Suka Solar (Private) – Greater Accra
6. Centre for Renewable Energy Entrepreneurship and Innovation – Greater Accra
7. Koforidua Technical – Eastern Region
8. Kumasi Technical University University (Centre for Renewable Energy and Energy Efficiency) – Ashanti Region
9. Kwame Nkrumah University of Science Technology (Brew Hammond Energy Centre) – Ashanti Region
10. Technology Consultancy Centre – Ashanti Region
11. University of Energy and Natural Resources - Brong Ahafo Ahafo Region
12. Lady Volta Vocational Centre for Electricity and Solar Power – Volta Region

Courses
1. ECOWAS Certification of Sustainable Energy Skills (ECSES) with a scholarship scheme for women. Certificate level
2. Short courses on Renewable run by The Energy Centre mostly in May. Certificate level
3. Suka Solar did trainings for mostly women in renewable energy mainly focused on solar. Certificate level
4. KNUST has a graduate programme that awards a Masters in Renewable Energy Technology
5. GTUC has an undergraduate with Anhalt University of Applied Sciences, Germany that awards a Bachelor of Solar Engineering
6. University of Energy and Natural Resources (UENR), Kumasi Polytechnic and Koforidua Polytechnic, run degree and HND programmes in renewable energy technologies or allied disciplines. The Department of Energy Systems Engineering at Koforidua Polytechnic runs an HND and BTech in Renewable Energy Systems Engineering aimed at Competency-Based training approach to prepare engineers to design and implement energy systems for innovative applications
Market Outlook
Energy Demand and Supply

Total Installed Renewable Energy Capacity as at 2017

- Offgrid: 1%
- Ongrid: 17%
- Mini-grid: 82%

Primary Energy Supply
- Oil (ktoe)
- Natural Gas
- Hydro
- Solar
- Biomass

Final Energy Consumed
- Grid Electricity (ktoe)
- Petroleum (ktoe)
- Biomass (ktoe)

Energy Demand and Supply Sources: USAID, MOE, Energy Commission, GLSS 7
RE and EE Technologies
Solar water heaters, solar dryers, solar powered irrigation systems, solar homes systems, solar lanterns, bio-digesters, improved cookstoves, timer switches, led lights, woodlot cultivation
Government Targets

**Utility Scale Target**
- 22.5 MwP 2015
- 447.5 MwP 2030

**Distributed Solar Target**
- 2 MwP 2015
- 200 MwP 2030

**Solar Irrigation Target**
- 150 Units 2015
- 46,150 Units 2030

**Solar Lantern**
- 72,000 (2015)
- 1,000,000 (2030)

**Solar Crop Dryers**
- 70 (2015)
- 700 (2030)

**Solar Water Heaters**
- 470 Units 2015
- 135,000 Units 2030

**Biogas Agricultural/Industrial Organic Waste**
- 10 units (2015)
- 200 units (2030)

**Biogas Institutional**
- 100 Units 2015
- 500 Units 2030

**Household Biogas**
- 50 units (2015)
- 200 units (2030)

**Improved biomass household Stoves**
- 800,000 (2015)
- 3,000,000 (2030)

**Institutional stoves/Commercial**
- 1,800 (2015)
- 18,000 (2030)

**Charcoal local demand**
- 1,551,282 tonnes (2015)
- 1,840,123 tonnes (2030)

**Charcoal for export**
- 190,450 tonnes (2015)
- 428,000 tonnes (2030)

**Biquettes and Pellets**
- 19,700 tonnes (2015)
- 100,000 tonnes (2030)

**Woodlot**
- 190,000 ha (2015)
- 428,000 ha (2030)

Source: Renewable Energy Master Plan
### Installation and Maintenance Holders 2020

<table>
<thead>
<tr>
<th>No.</th>
<th>Region</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Greater Accra</td>
<td>43</td>
</tr>
<tr>
<td>2</td>
<td>Eastern</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Ashanti</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Western</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Northern</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>49</td>
</tr>
</tbody>
</table>

### Charcoal Exportation Companies

- **1 Ashanti**: 37%
- **2 Greater Accra**: 18%
- **3 Volta**: 18%
- **4 Brong Ahafo**: 18%
- **5 Eastern**: 9%

### Companies with Importation License

<table>
<thead>
<tr>
<th>No.</th>
<th>Region</th>
<th>Companies with Importation License</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Greater Accra</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>Eastern</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Takoradi</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>37</td>
</tr>
</tbody>
</table>

Source: Energy Commission
## Private Sector Spread

### Biogas Private Companies

<table>
<thead>
<tr>
<th>No.</th>
<th>Region</th>
<th>Biogas Private Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Greater Accra</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>Ashanti</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Central</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>19</td>
</tr>
</tbody>
</table>

Source: Ghana Climate Innovation Centre, Ghana Biodigester Market Study

### Companies in Briquetting

<table>
<thead>
<tr>
<th>No.</th>
<th>Region</th>
<th>Companies in Briquetting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Greater Accra</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>Central</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Eastern</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Energy Commission
Solar: Value Chain

- Solar PV system manufacture
- Solar Home System
- Research and Testing Centre
- Solar Installation
- Solar Maintenance
- Government and Regulation
- Financial Institution
- Solar End User

Source: Adapted by Author from Ghana Cookstove Mapping Report
UNDP, CEESD
Biogas: Value Chain

- Importers and manufacturers
- Marketing and Sales
- Government and regulatory agency
- Research and Testing Centres
- Financial Institutions
- Installation and Construction
- Maintenance
- User

Source: Adapted by Author from Ghana Cookstove Mapping Report UNDP, CEESD
Biomass: Value Chain

Source: Adapted by Author from Ghana Cookstove Mapping Report UNDP, CEESD
Challenges

Policy and Regulation
- Lack of enforcement codes and standards
- Unfavourable policies
- Intellectual property rights
- Land Acquisitions

Market
- Underdeveloped supply chain
- Failed past experience
- Unstable market situation
- Information asymmetry

Technical
- Lack of skilled human capital in the areas of manufacturing, project development, installation, and maintenance
- There is difficulty in obtaining parts especially when installations are broken
- New technology too complicated
- Lack of infrastructure

Economic and Financial
- High upfront costs
- Limited access to capital
- Currency fluctuations
- Lack of consumer financing options
- Unaccounted cost on conventional technologies
- High operations and maintenance cost

Source: Study on Barriers to RET by EC, DANIDA, UNDP
Jobs and Skills
Investment and Jobs

Source: Renewable Energy Master Plan

**Solar**
- Solar Utility Scale: 49%
- Distributed Solar PV: 7%
- Standalone Solar PV: 13%
- Solar Street Community Lighting: 12%
- Mini-Microgrids: 0%
- Solar Lanterns: 5%
- Solar Water Heaters: 10%
- Solar Irrigation: 3%
- Solar Crop Dryers: 2%

**Biomass**
- Woodlot Cultivation: 70%
- Charcoal (local demand): 10%
- Charcoal (Export): 5%
- Briquetting/Pelleting: 3%
- Improved Biomass Cookstove (household): 0%

**Biogas**
- Biogas (Agricultural/Industrial Organic Waste): 23%
- Biogas (Institutional): 15%
- Biogas (Domestic): 62%
# Skills Needs in the RE Sector

## Improved Cookstove

<table>
<thead>
<tr>
<th>Construction/Erection and Installation</th>
<th>Operation and Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Mechanical technicians</td>
<td></td>
</tr>
<tr>
<td><strong>Medium Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Stove combustion expert</td>
<td></td>
</tr>
<tr>
<td>Laboratory Technicians and assistants</td>
<td></td>
</tr>
<tr>
<td>Ceramics expert</td>
<td></td>
</tr>
<tr>
<td>Metal fabricators</td>
<td></td>
</tr>
<tr>
<td>Metal welders</td>
<td></td>
</tr>
<tr>
<td>Metal artisans</td>
<td></td>
</tr>
<tr>
<td>Spraying</td>
<td></td>
</tr>
<tr>
<td><strong>Low Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>General Construction</td>
<td></td>
</tr>
<tr>
<td>Transportation workers</td>
<td></td>
</tr>
</tbody>
</table>

## Solar

<table>
<thead>
<tr>
<th>Construction/Erection and Installation</th>
<th>Operation and Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Commissioning engineer(electrical)</td>
<td></td>
</tr>
<tr>
<td><strong>Medium Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Control and Software technicians</td>
<td></td>
</tr>
<tr>
<td>Quality assurance specialist</td>
<td></td>
</tr>
<tr>
<td>Installer</td>
<td></td>
</tr>
<tr>
<td>Distribution and wiring electricians (CEWP)</td>
<td></td>
</tr>
<tr>
<td>Construction Professionals</td>
<td></td>
</tr>
<tr>
<td>Project and installation technicians</td>
<td></td>
</tr>
<tr>
<td><strong>Low Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Transportation Workers</td>
<td></td>
</tr>
<tr>
<td>Construction professionals</td>
<td></td>
</tr>
</tbody>
</table>

## Woodlots

<table>
<thead>
<tr>
<th>Planting</th>
<th>Operation and Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Soil Scientist</td>
<td></td>
</tr>
<tr>
<td>Plantation shrubculture</td>
<td></td>
</tr>
<tr>
<td><strong>Medium Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Agronomist</td>
<td></td>
</tr>
<tr>
<td>Tree nursery developer</td>
<td></td>
</tr>
<tr>
<td>Woodlot pest and disease Manager</td>
<td></td>
</tr>
<tr>
<td><strong>Low Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Transportation workers</td>
<td></td>
</tr>
</tbody>
</table>

## Biogas

<table>
<thead>
<tr>
<th>Construction/Erection and Installation</th>
<th>Operation and Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Chemical, mechanical, electrical, biological technicians</td>
<td></td>
</tr>
<tr>
<td><strong>Medium Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>Environmental Technicians</td>
<td></td>
</tr>
<tr>
<td>Laboratory Technicians and assistants</td>
<td></td>
</tr>
<tr>
<td>Control and Software Technicians</td>
<td></td>
</tr>
<tr>
<td>Construction professionals</td>
<td></td>
</tr>
<tr>
<td>General electricians, plumbers, roofers</td>
<td></td>
</tr>
<tr>
<td>Commissioning technicians (electrical)</td>
<td></td>
</tr>
<tr>
<td><strong>Low Skilled</strong></td>
<td></td>
</tr>
<tr>
<td>General Construction</td>
<td></td>
</tr>
<tr>
<td>Construction professionals</td>
<td></td>
</tr>
</tbody>
</table>

Source: Adapted by Author from Africa-EU Renewable Energy Cooperation Programme, TVET Country Mapping
Energy Efficiency
Government Strategies

Demand Side Management

1. Replacement of incandescent lamps with Compact Fluorescent Lamp (CFL);
2. Replacement of inefficient refrigerators with new energy efficient ones in homes under a rebate scheme;
3. Power factor correction in about 32 public institutions;
4. Energy efficiency training and capacity building for energy managers in Ministries, Departments and Agencies (MDAs) and Metropolitan, Municipal and District Assemblies (MMDAs);
5. Nationwide public education and capacity building for members of Ghana Hoteliers Association; and
6. Promotion of energy efficient lighting and electrical appliances as part of the National Rooftop Solar Programme.

Government Implemented Programmes

Source: Renewable Energy Master Plan

- Mandatory Energy Audits in commercial buildings
- Awareness creation on benefits of energy efficiency and conservation
- Build the capacity of energy auditors and institute certification for auditors
- Programmes and measures to help consumers optimize energy use
- Provision of incentives for real estate and constructors to implement energy efficiency measures and technologies in their buildings
- Promotion of efficient lighting (LED)
### Skills Need in the EE Sector

<table>
<thead>
<tr>
<th></th>
<th><strong>Construction/Erection and Installation</strong></th>
<th><strong>Operation and Maintenance</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Skilled</strong></td>
<td>Project Managers (Technical)</td>
<td>Recycling Specialists</td>
</tr>
<tr>
<td></td>
<td>Energy Modelers</td>
<td></td>
</tr>
<tr>
<td><strong>Medium Skilled</strong></td>
<td>Energy Auditors</td>
<td>Operating Engineer</td>
</tr>
<tr>
<td></td>
<td>Sustainability Managers</td>
<td>Electricians</td>
</tr>
<tr>
<td></td>
<td>Architects</td>
<td>Inspectors</td>
</tr>
<tr>
<td></td>
<td>Quality Assurance Specialist</td>
<td>Sales Reps</td>
</tr>
<tr>
<td></td>
<td>Electricians</td>
<td>Monitoring and Evaluation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marketing Reps</td>
</tr>
<tr>
<td><strong>Low Skilled</strong></td>
<td>General Construction</td>
<td>Accounting Clerks</td>
</tr>
<tr>
<td></td>
<td>Construction professionals</td>
<td>Facility Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inspectors</td>
</tr>
</tbody>
</table>

Source: Adapted by Author from Africa-EU Renewable Energy Cooperation Programme, TVET Country Mapping
GrEEEn Offer
Employability and entrepreneurship capabilities of Youth, Women and Returnees

**Demand Driven Training Delivery**
- Agri-based renewable energy training (Efficient charcoal production, solar lanterns)
- Mainstreaming OYE into RE TVET service providers

**Peer to Peer networking sessions**
- RE Entrepreneurs skills improvement
- MOU’s with Private Sector companies under associations (GHACCO, REAG, AGSI & BAG)

**Value Chain Fora**
- Forums on solar irrigation, businesses in solar lanterns, woodlots, improved cookstoves

**Web Based Platform**
- Representation of RE markets (solar importers and various solar installers) hosted on website.
- Job and Business Opportunities

**Business Plan Competitions**
- Innovative RE solutions that affect other targets areas (Franchising models for cheaper quality solar powered irrigation systems, briquetting, efficient charcoal production)

**Matching Grants**
- Provide access to financing reducing high cost of technologies
**GrEEn Offer**

**Incubation and acceleration of SME’s led by Youth, Women and Returnees**

**Strengthen business hubs to incubate and accelerate inclusive MSME**
- Introduce modules with RE practicality for RE companies (RE focused business model, financing RE offgrid businesses)
- Support and build network of coaches and advisors for RE companies

**Business Incubation and Acceleration services**
- Providing incubation and acceleration support for RE (briquette, solar) businesses to expand their operations creating job opportunities

**Semi-annual International Green Investment forum with diaspora**
- Organising investment forum for RE businesses (Collaborating with gov’t led programmes (RE Fair))
- Assessing financing options available to improve investment

**Market Research**
- Identifying market research information needed for upscaling of RE and EE businesses

**Blended Finance**
- Increasing financing from FI’s for Green businesses
- "Green biz” Web based platform
  - Linking RE business(solar sector, efficient fuel industry) with market players(investors)

**Challenge Fund**
- Access to finance for RE based businesses to overcome high cost of technologies

**Greening MSME’s and Project Activities**
- Ensuring zero emission from project activities( SME’s switching to the use of RE and EE based technologies, packaging, ensuring non flaring of biogas technologies)
Questions to discuss

1. Have the right sub sectors been focused on for job creation and business growth in the sector?
2. How can the market information for Western and Ashanti be improved?
3. How many internship and job placement can be provided by the RE and EE sector in the next 2 to 3 years?
4. How many RE and EE SME’s can be incubated or accelerated in the next 2 to 3 years?
5. How can dialogue and collaboration be established at the regional level?
Nagode Oyiwad)

Thank you Akpe Medaase

Be updated, follow us

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