Presentation of Research on, “Addressing Barriers And Opportunities In Solar Powered Irrigation For Smallholder Farmers In Ghana”

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05.02.2021
The GrEEn project – theory of change

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.

[UNCDF] [SNV]
1.0 Introduction

PUE in various sectors of the economy such as agriculture can provide employment, improve income levels and prevent migration from Africa to other parts of the world especially Europe.

The Ghana Renewable Energy Master Plan being spearheaded by the Ministry of Energy, anticipates a solar irrigation coverage of 48,000ha by 2030.

Irrigation aids in the production of a wider variety of crops as well as crops that cannot be cultivated under dryland agriculture.

The geographical focus of the study was the Western and Ashanti regions of Ghana.

Ghana requires a comprehensive assessment. Identification of the various challenges in the solar irrigation sector will provide alternate solutions.
2.0 Objective and scope of the research

Identify key players such as state institutions, solar pump companies, farmer-based groups, donor agencies and other stakeholders in the solar irrigation space.

Assess the general technical, economic, social and political barriers hindering the usage of SPIS by small holder farmers and propose effective interventions to address these barriers.

Identify opportunities and outline strategies for SPIS usage by small scale farmers.

Outline and explain the benefits of the adoption of the solar pump technology by small holder farmers in respect to their farm production levels, income and social impact.
3.0 Research Methodology

- Review of Government policy documents and relevant literature from other countries.
- In-depth interviews with key stakeholders
- Direct observations from the solar pump industry and
- Field visit to inspect and monitor installed solar pumping systems.
<table>
<thead>
<tr>
<th>Data collection/analysis approach</th>
<th>Description of Participants and documents reviewed</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews</td>
<td>Public Institutions, Private solar pump companies, International donors, Financial institutions</td>
<td>34</td>
</tr>
<tr>
<td>Direct Observations and field visits</td>
<td>Farms with installed SPIS in Greater Accra, Western, Ashanti Regions and other parts of the country.</td>
<td>10 fields</td>
</tr>
</tbody>
</table>
4.0 Solar Powered Irrigation Systems - Challenges, Policies and Trends

- Modernization of the agriculture sector has been a long-standing priority of the Government of Ghana, since the sector is a major contributor to Ghana’s economy, contributing about 18% of GDP and creating 28.4% of employment.

- The usage of Solar PV for irrigation and farming purposes received a major boost in 2014 under the Energising Development (EnDev) project which was implemented by the Government of Ghana and the German Development Cooperation (GIZ). Under the initiative, 78 solar pumps were installed for the benefit of about 300 farmers.

- The Government through the Coordinated Programme of Economic and Social Development Policies (CPESDP) (2017-2024) intends addressing the challenge through the use of solar and wind mini grids.

4.1 SPIS Sector in Ghana in Brief

Irrigation systems are an integral part of GoGs climate change response strategies for the Agric sector.

Over 46000 SPIS are expected to be installed by 2030 (48.8 MW).

Capital subsidy programmes remain an important delivery approach.
5.0 Findings

5.1 Key stakeholders in the SPIS sector in Ghana

Figure 1: Stakeholders in Ghana’s SPIS Sector
5.2 Potential Areas for high demand of SPIS by farmers

- Keta and Anlonga metropolis (Volta Region)
- Akumadan (Offinso North District in the Ashanti Region)
- Damang (Western Region)

Other Potential Areas

Ashanti Region

✓ Namong, BAfranco, Tano Kwaem, Bosomponso, Mmeredane, Saniso (Offinso North District)
✓ Onsua, Tutuase, Akwadum, Ayensua Fufuo, Ayensua Korkor (Offinso South District)
✓ Agogo, Oyimso, Pataban (Asante Akim North District)
5.2 Potential Areas for high demand of SPIS by farmers (cont’d)

Western Region
The following districts in the region are known for cultivating vegetables, plantain, maize, cocoyam, vegetables, cocoa, coffee, oil-palm, rubber, citrus and black pepper:

✓ Bibiani (Bibiani/ Anhwiaso Bekwai District),

✓ Essam (Bia West District)

✓ Juaboso (Juabeso District)

✓ Asokore Adabokrom (Bia East District)

✓ Wiaiwso (Sefwi – Wiawso Municipality)

✓ Daboase (Mpohor/ Wassa East District)
5.3 Barriers and Challenges to SPIS in Ghana

Technical

- Poor sizing of SPIS
- Poor quality of support structures
- Lack of after sales and maintenance service
5.3 Barriers and Challenges to SPIS in Ghana (cont’d)

Financial

- High initial investment cost
- Lack of credit facilities for farmers and affordable long-term financing

Political

- Lack of Market-oriented GOG policies for the promotion of the technology

Social

- Lack of awareness of the benefits of SPIS
- Land tenure system
- Lack of Security and natural disasters
- Natural Disasters such as fire outbreak and flood

Environmental

- Ground water depletion and unsustainable water abstraction rates

Marketing

- Limited connections to key players in the solar irrigation space
5.4 Addressing Barriers and Promoting SPIS

- Policy drive from GOG to provide incentives
- Establishment of a license scheme to regulate activities of solar pump installers
- Building capacity on the design, operations and maintenance of system
- Advising farmers to cultivate high value crops

Table 3: Price of Vegetables at Farm Gate verse Retail price

<table>
<thead>
<tr>
<th>No.</th>
<th>Vegetable</th>
<th>Price per kg farm gate/GHS</th>
<th>Price per kg retail/GHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tomatoes</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>Onion</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Chili</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>Lettuce</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Cabbage</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Carrot</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Farmers in Peri-Urban Accra/Volta and Retailers in Accra (Eden Tree)

Table 4: Prices of vegetables at Mallam Atta Market in Accra as at December 2020

<table>
<thead>
<tr>
<th>No.</th>
<th>Vegetable</th>
<th>Price per kg retail / GHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tomatoes</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>5</td>
<td>Cabbage</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Cucumber</td>
<td>12</td>
</tr>
<tr>
<td>7</td>
<td>Carrot</td>
<td>12</td>
</tr>
<tr>
<td>8</td>
<td>Green Sweet Pepper</td>
<td>13</td>
</tr>
</tbody>
</table>

Source: Field Data
5.5 Available financing schemes/grants for smallholder farmers

❖ Green People’s Energy implemented by German Development Cooperation (GIZ)
  Contact Person: Rafael Wiese (Project Manager)
  Email: Rafael.wiese@giz.de

❖ The Green Climate Fund implemented by Ecobank Ghana Limited
  Contact Person: Ms. Joana Mensah (Chief Country Risk Officer)
  Ecobank Ghana Limited, Email: Jmensah@ecobank.com
5.5 Available financing schemes/grants for smallholder farmers (cont’d)

- **The Rural Development Fund (RDF)**: RDF currently is in partnership with the following rural banks:
  - **Faiseman Rural Bank Limited**: Location: 2 Bogoso – Tarkwa Road, Prestea – Huni Valley District
    Phone: +233 50 133 0918
  - **Bucco Bank Limited**
    Location: Bucco Bank Building, Opposite Sandema Market Square, Fian – Navrongo Road. P. O. Box 25, Sandema.
    Phone: +233 (0) 38 209 7151/2, Email: info@bucobank.com /bucobank@gmail.com
  - **Sefwiman Rural Bank**: Private Mail Bag, Bibiani
    Phone: +233 (0) 24 320 6647
  - **Nwabiagya Rural Bank Limited**
    Barekese, Head Office Ashanti - Ghana
    Phone: +233 (0) 322 091 880 +233 (0) 277 872 883
    Email: nwabiagyarbb@yahoo.com
5.6. Available business models by technology providers

- PEG Solar PAYGO solar pump system

- Pumptech PAYGO Solar Pump systems

- Foundries and Agricultural Machinery Ltd – Payment in tranches
Prince Manu Yeboah and Rhodallyn Yeboah are the owners of Ropryn Farms. The farm is located in Agona Borkor in the Western Region of Ghana.

Together with the support of PEG solar, a 5.5KW solar pumping system was installed on the farm. The system is made of a submersible pump on a floating badge on a stream, solar panels, support structure, overhead tank, irrigation system comprising sprinkler and spray tubes. The solar powered irrigation system was installed in 2019. The total cost of the system is GHS 35,000.00 with 30% grant support from Hortifresh, 20% initial payment from Ropryn farms and the remaining 50% cost has been spread for 18 months period. After a year of installation, the land under irrigation has been increased to 2.5 acres.

Ropryn Farms sells its produce to supermarkets in Takoradi and its environment. The company uses their farm as a demonstration site for others farms to have first hand knowledge on the use and benefits of SPIS
7.0 Conclusion

The study identified twelve key barriers, which are organized into six categories, as follows:

**Financial**
- High initial investment cost
- Lack of credit facilities for farmers and affordable long-term financing

**Technical**
- Poor Solar Pump and Power sizing
- Poor construction of support structures
- Lack of technical know-how on the operation and maintenance of system
- Lack of quality assurance and readily after sales service

**Political**
- Lack of Market-oriented GOG policies for the promotion of the technology
7.0 Conclusion (cont’d)

Social
• Lack of awareness of the benefits of SPIS
• Land tenure system
• Lack of Security and natural disasters

Environmental
• Ground water depletion and unsustainable water abstraction rates

Marketing
• Limited connections to key players in the solar irrigation space
8.0 Recommendations

Government of Ghana

➢ GOG should continue to incentivize the SPIS segment with measures such as reduction/removal of import levies on SPIS systems and components.

➢ Quality standards and quality assurance mechanisms need to be established.

➢ Establishment of a comprehensive database of Technology providers by the EC.

➢ The involvement of water sector regulatory agencies (e.g. Water Resources Commission) need to be prioritized in SPIS policy formulation and implementation. To reregulate over-abstraction of water through the usage of SPIS.

SPIS Companies

➢ Awareness creation on the benefits of SPIS
➢ Flexible payment schemes
➢ Introduction of workable business models

Development partners

➢ Capacity development programmes in support of SPIS should be developed and rolled out with nodal institutions such as technical universities and NVTI schools.