Biogas value chains in Africa: SWOT analysis

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Aims

- Sustainable value chains for food and energy security
- Demonstrate effective systems, challenges and opportunities in Africa
- Understand the perceptions of stakeholders on the factors important for success of biogas value chains in Africa
  - Both small scale and large scale

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ECOWAS/GBEP Bioenergy Week 2017

- Over 90 participants from Africa, the Americas, Southeast Asia and Europe
- Session II “Sustainable value chains for food and energy security”
  - Focus group on “The Biogas option in Africa”
  - Aim: to discuss the potential for biogas in Africa at both small and large scales

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SWOT Analysis

Strengths Certain inherent qualities that give a business model comparative advantage, ability to add value to or competitive edge over a competitor.	**Weaknesses** Internal factors that are unfavouarable in achieving the objectives of a business model and that place the business model at comparative disadvantage.
Opportunities Advantages that exist within the ecosystem, external to the business model but available to all players within the industry/environment of which it takes benefits from to increase its value addition.	**Threats** External risks that the business model is exposed to; factors from the external environment of the business model that poses danger in achieving system objectives.

Internal Aspects

External Aspects

Source: adapted from Team FME (2013)

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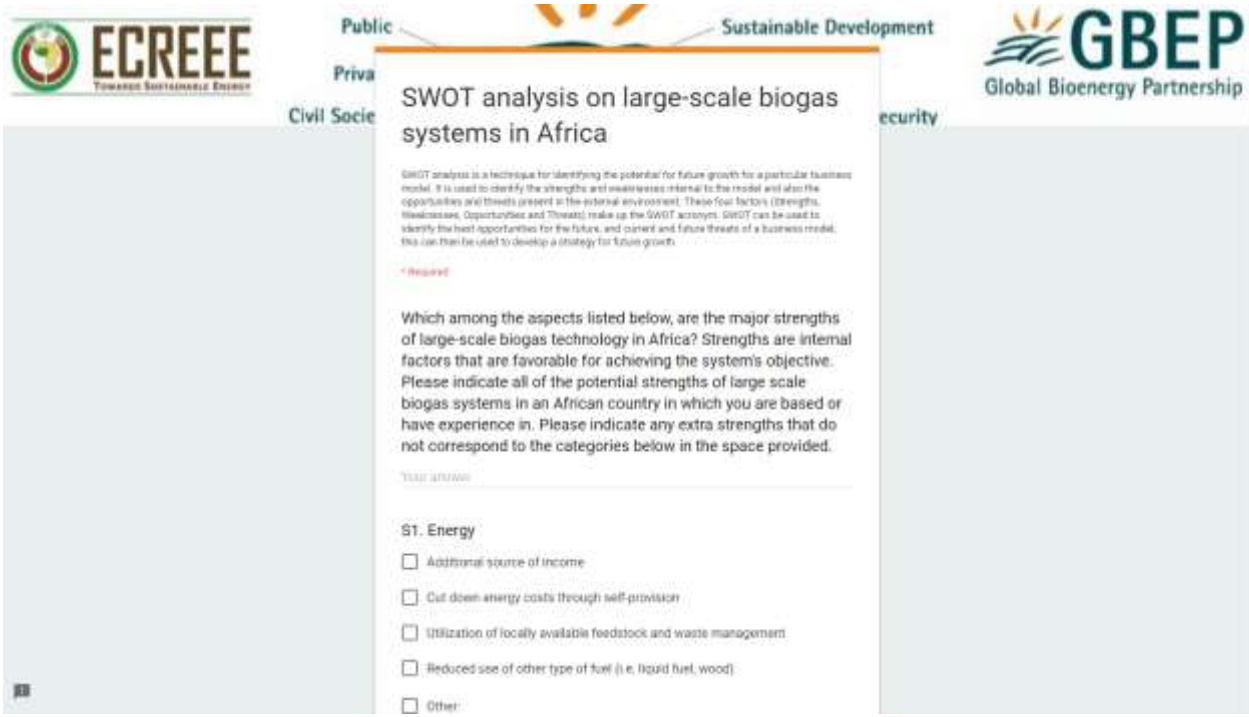
Large-scale biogas - methods

- Online survey to identify *all* relevant factors that determine the success of large-scale biogas systems
- Validation of results at ECOWAS/GBEP Bioenergy Week



Extract from survey

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Small-scale biogas - methods

- Focus group at ECOWAS/GBEP Bioenergy Week provided a list of relevant factors
- Subsequent survey used to compare importance of factors
- Pairwise comparison used for Analytical Hierarchy Process to give ranking of factors

Focus group at ECOWAS/GBEP Bioenergy Week

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Large-scale biogas - results

Strengths	Weaknesses	Opportunities	Threats
• Reduced number of sanitation-related diseases and sicknesses due to poor waste management • Reduces the use of other type of fuel (e.g. fossil fuel, wood) and the related environmental impacts • Improved community sanitation • Increase crop yield • Cut down energy costs through self-provision • Increase soil quality (soil organic matter content) and fight soil depletion • Effective use of agro-industrial waste: easy and healthy waste disposal	• Lack of technology know-how in plant management • High cost for collecting and transporting the feedstock • Low financial returns • Limited financial access for initial investment • High initial investment for plant setting • Lack of know-how in digestate utilization • Lack of know-how for plant maintenance • High maintenance cost • Lack of use for heat generated • No regular feedstock supply (i.e. because of seasonality) • Lack of data on feedstock availability, e.g. types, quantity available, seasons and locations	•Added value for existing business value chains •Improve the livelihood of local population •Existence of incentives for production of renewable energy •Development of new enterprise for collecting and selling digestate to farmers as fertilizer substitute •Building capacities •Increased access to energy for local populations •Socio-economic development •Development of new enterprise for collecting, transporting and selling agro-industrial waste as feedstock. (Creation of consortium) •Technicians for optimizing plant performance considering the locally available feedstock •Skilled employees for checking plant performance •Development of new training activities: teachers and educational experts	• Lack and/or inadequacy of means of transport for feedstock and by-product • Availability and affordability of feedstock in the long term • High cost of capital • Low acceptance from local population • Small scale agriculture is not adapted to large scale technology • Competition with alternative uses of feedstock (e.g. fuel building material etc.) • Possibility of accidental emissions of methane in the atmosphere • Lack of understanding of technology among financial institutions • Policy and administrative barriers • Artificially low energy prices due to fossil fuel subsidies (e.g. coal)

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Small-scale biogas - results

Rank	Strengths	Weaknesses	Opportunities	Threats
1	Access to modern, clean cooking energy.	High initial capital requirements (high cost of construction)	Commercial by-products	Lack of knowledge on return on investment by investors and providers of capital (leading to lack of financial resources)
2	Improve sanitation/health (through better waste management and reduced indoor air pollution).	Cultural unacceptability	Technology transfer and availability	Uncertainty of feedstock availability in the long term
3	Availability of feedstock and improved waste disposal.	Lack of skills and knowledge in the construction of the biogas system (technical know-how)	Availability of pre-finance	Comparative cost of other energy sources (e.g. LPG)
4	By-products (digestate) increase agricultural yields through use as fertilizer, increasing income.	Lack of ability to identify financial resources (loans)	Incentives for climate change mitigation	Low water availability
5	Ease of transfer of technology know-how	Lack of technical knowledge and skills for operation and maintenance	Incentives for forest stewardship	Lack of knowledge and social non-acceptance (due to culture/beliefs)
6	Save family time (e.g. in wood collection).	Requirement for constant monitoring and evaluation	No cost for dislodging	Trade barriers on imports of biodigesters

Conclusions

- Large-scale
  - **Factors of success** are very broad – social, economic and environmental
  - **Negative factors** focus on financial barriers, the problems of identifying sustainable feedstock sources, and the lack of knowledge of the potential for biogas that impedes investment
- Small-scale
  - **Factors of success** - access to modern, clean energy, waste disposal, and financial opportunities from sale of by-products
  - **Negative factors** - financial constraints, sustainability of feedstock and cultural acceptability
- *Ex ante* feasibility assessments are extremely important in order to ensure that there is sustainable feedstock availability, acceptance of the technology by local populations, positive environmental externalities, and viable economic returns.

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Further research

- Initial analysis that can be built on during further research
- AHP analysis could be carried out for large-scale biogas to determine the most important factors for success
- Medium-scale biogas should be considered in the future

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