Research Note

The feasibility of cassava as sustainable source of clean energy production in Ghana- a concept proposal

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Abstract: The aim of this concept proposal is to invite interested development partners to work collaboratively with rural communities and other stakeholders in Ghana in order to determine the feasibility of cassava as a sustainable source for clean energy (ethanol) production. The proposal arose directly out of a paper titled, 'The search for sustainable disposal of dead bodies- the case of Botoku rural Ghana', which the lead of author of the current paper(KT) presented at the International Conference on Sustainable Development, Oxford UK 2018. The currentpaper is a follow-up and attempts to mobilise support for rural communities such as Botoku to explore the feasibility of growing cassava for clean energy production. At the core of the proposal is the challenge of sustainability: how to improve the lives of the world's poorest people in ways that have co-benefits for climate change mitigation and adaptation?After presenting the background and overview of the concept proposal, we highlight ways in which interested development practitioners, researchers and funders might be able to help determine the feasibility of the concept proposal.

Keywords: Rural development, sustainability, cassava, clean energy, Ghana

Introduction

The paper on 'sustainable disposal of dead bodies', described KT'scommunity development involvement in his native Ghanaian rural community and the ways in which he sought to maintain that involvement since migrating to Australia over 20 years ago. The paper told the story of how following a successful 2012 book launch to raise funds for development activities,the chiefs and elders sought hissupport to help resolve disputes over the use of land for cemetery purposes that was tearing the community apart. Of particular relevance to the current paper is the way KT and his co- mediator used the conflict as opportunity to help the community to come to their own realization that central to the dispute is the challenge of sustainability: how to ensure that burial practices meet the land usage needs of the present populations without compromising the ability of future generations to meet their own needs for land? In thesubsequent search for sustainable burial practices as part of the conflict mediation process, a range of ideas were proposed by the community including growing treeson burial grounds to be used for timber and wood fuel,or growing cassava for clean energy production, instead of the current practice of building concrete tombstones. The present concept proposal seeks to mobilise relevant support to collaboratively explore the feasibility of growing cassava for biofuel production in rural Ghanaian communities.

Background

The potential of renewable energy in Ghana is huge. Fueled by population growth, rapid urbanization and economic development, currently Ghana's energy system is not meeting the needs of the population, especially those living in rural areas. Ghana's energy strategy targets 100% access to electricity for its nearly 30 million population and 10% share of sustainable power in national generation mix by 2020. Despite the existence of numerous policies and a "Renewable Energy Act", current contribution of non-conventional renewable energy to electricity generation is less than 1%. Fortunately, there are enormous renewable energy resources which can provide sustainable electrification as backbone to socioeconomic development while curbing global warming. One staple Ghanaian food crop that has attracted significant policy and research attention over the past five years is cassava. With a high starch content, cassava is also a major source for the industrial production of starch and bioethanol.

While research has shown that there is inherent potential for a cassava-based ethanol industry, the fact that cassava is currently a subsistence food crop for a large part of the population has prevented the crop from being classified as a suitable feedstock for biofuel production at this point in time. Policy makers are understandably cautions about the potential risks associated with growing cassava for biofuel, such as the threat of food shortages and land degradation resulting from industrial mono-cropping. It can be noted that traditionally growing cassava often involves mixed cropping whereby legumes, vegetables and other foods are also grown in alternative rows to each row of cassava. Thus, there is a need for a considered assessment of the best way to encourage cassava mixed cropping methods as well as meeting the biofuel requirements under Ghana's Clean Energy policies.

In the meantime, investors have realized the value of the root vegetable and started to acquire land and invest in infrastructure to grow and process cassava. For example, recently, Caltech Ventures Ghana Limited acquired 2500 hectares of land at Hodzo in the Volta Region of Ghana to cultivate the raw materials for the production of 30,000 litres per day of extra neutral alcohol and 22 tons per day of liquefied carbon dioxide. This is the first biofuel company in Ghana and is currently operating at 70 per cent capacity. This is good news as it produces jobs and has ethanol that can be used as a biofuel. However, given that ethanol is not officially listed as biofuel in Ghana, to date the ethanol produced at the Caltech plant is mainly being purchased to consume as alcohol.

The purpose of this concept proposal is to invite interested development partners to work in partnership with the authors of this paper and relevant stakeholders in Ghana to further research the feasibility of cassava being added to the list as a recognised biofuel product to generate power under Ghana's Renewable Energy Policy. If cassava is deemed feasible then an appropriate business model which mitigates food security risks while maximising the participation of farming families in Africa in the industry will be identified and trialed.

Approach

Briefly, the concept proposes three key stages of development over a five year period:

1. Start up and research phase.
2. Consultation and business case scenario phase.
3. Trialing of the preferred business case phase.

A brief description of each phase follows.

Phase One – Start Up and Research:The purpose of the first phase is to scope the feasibility of cassava being added as a biofuel to Ghana's renewable energy policies. This will involve a systematic desktop review of existing research to determine the strengths, challenges, opportunities and threats of listing cassava as a biofuel under Ghana's Renewable Energy Policy.If the product is determined appropriate to be added to list of approved biofuels to be used for renewable energy, potential pathways for doing so will be identified in this phase, involving preliminary consultations with stakeholders including private investors, donor organisations, research institutions, non-government Organisations and farming families to collect data and test the research findings.If Phase 1 shows that it is not feasible to add cassava to the list of biofuel products in Ghana, then the second and third phases will be redundant. In this case, other sustainable sources for clean energy production may be explored.

Phase Two - Business Case Options:This phase will look at the best way to structure a business model to enhance small scale farming families in Ghana's participation in the cassava farming industry in a sustainable way based on the perspectives of cassava farmers, consumers of biofuel and investors in ethanol plants. It will explore different models of biofuel production plants. For example, a centralized production plant may have the advantage of economies of scale but transporting cassava from a large catchment area to the plant and ethanol outputs from the plant to consumers can be problematic due to the poor conditions of Ghana's roads. On the other hand, smaller mobile biofuel production plants might overcome the current transportation problems by processing cassava and possibly selling the product closer to the communities producing the crop.

Phase Three: Piloting and implementation:The final phase will identify and provide the necessary tools to support small scale farming families to increase their production of cassava. Full details of this phase will be determined after the delivery of the previous two stages.

Conclusion

We described the context in which the idea of growing cassava for ethanol biofuel in rural Ghana developed. We then provided an overview of the current Ghanaian energy policy environment to show the need for anevidence-base assessment of the feasibility of growing cassava for clean energy. The paper highlights a need for development

policy makers, practitioners, fundersand researchers to find innovative means to engage with and support rural communities in their quests to improve livelihoodsin ways that mitigate against the challenges of climate change and food security. We would like to hear from readers regarding:a) the general feasibility of this particular concept proposal; b) other ways in which rural communities such as Botoku in Ghana might be better supported to achieve sustainable development; and c) names and contacts of potential development partners the authors could approach for support.

References

[1] Tsey K, "The search for sustainable disposal of dead bodies- the case of Botoku rural Ghana", International Conference on Sustainable Development, Oxford UK 2018 (accepted for presentation)
[2] Caminiti M, Cassal M, OhEigeartaigh M, Zeru Y (2007) "Feasibility study for a biofuel production in Ghana: Assessing Competitiveness and Structure of the Industry's Value Chain", George Washington University for Technoserve
[3] Saka, M, Amankwah, F, Katzenbach, Gyamfi, S (2017) "Towards a sustainable energy policy", Renewable Sustainable Energy Review
[4] Abdoulaye Toule, Kadir Osman Gyasi; (2015) "Dispatch from Ghana: Agricultural benefits more than just farmers"; World Bank https://blogs.worldbank.org/voices/dispatch-ghana-agriculture-benefits-more-just-farmers
[5] Hagan, EB (2015) "Renewable Energy Policy Review, Identification of Gaps and Solutions in Ghana", Energy Commission, ACCRA Institute of Technology.
[6] 2014 "The Common Market Feasibility Study", University of Pennsylvania.
[7] 2012 "Millennium Challenge Compact between the United States of America acting through The Millennium Challenge Corporation and the Republic of Ghana". Republic of Ghana.