

Energy from woodwaste: An analysis of institutions and community attitudes in Zimbabwe's Eastern Highlands

R. Bailis*^a, A. Herzog^a, T. Nhete^b, D. Kammen^a

^aEnergy and Resources Group: Renewable and Appropriate Energy Laboratory, 4152 Etcheverry Hall, Berkeley, CA, 94720

Phone/Fax: 510-642-2243; dkammen@socrates.berkeley.edu

^bIntermediate Technology Development Group, Southern Africa Region, Zimbabwe

Introduction

We examine the socioeconomic and technical questions that emerge in assessing the potential of biomass power generation in the Eastern Highlands of Zimbabwe. Zimbabwe's Eastern Highlands are home to 90% of the nation's timber plantations. The sawmill industry produces nearly 400,000 m³ of sawn timber annually and, in the process, generates massive amounts of woodwaste [1]. Currently, the larger sawmills burn a small fraction of their waste to produce steam, which is used to dry sawn timber. Some of the remaining waste is disposed of through incineration or dumping, while other waste accumulates in immense piles, where it can sit for many years. Waste also accumulates in plantations as a result of silvicultural operations: no use of this waste is reported.

The waste management practices of sawmills and timber plantations carry environmental and economic costs, some of which are placed on local communities. Waste that accumulates in plantations and landfills, as well as waste that is incinerated at sawmills with no useful energy production, constitute raw materials that could be used to provide heat and electric power for local industry, business, and communities. While large sawmills are connected to the national power grid, they suffer economic losses from frequent power outages. Moreover, they will be subject to considerable increases in electricity rates as the national utility is privatized [2]. The majority of rural businesses and communities, on the other hand, have no access to the national grid and rely on traditional biomass combustion to meet their energy needs [3, 4].

Providing energy services to poor communities using woodwaste from an industry whose business interests are the production and sale of timber, not the provision of energy, poses several challenges. Our energy/development research program addresses this with three interactive approaches. First, we are assessing the spatial and temporal dynamics of the woodwaste resource in the Eastern Highlands and the technical options that exist to produce power from that waste across a range of scales. We present the preliminary results of that study in a separate submission [5].

Second, we are exploring the ways in which the power derived from woodwaste can be utilized to meet the broader development needs of communities living in the proximity of the sawmills. We are doing this by analyzing relevant institutions at the local, national, and international level to assess current practices that determine the use (or misuse) of woodwaste. In addition, we are conducting participatory appraisals [6] in communities neighboring the plantations and sawmills to assess their attitudes towards the timber industry and the waste that they generate. Moreover, we will use the participatory appraisals to develop a sense of the communities' development needs and explore the ways in which their needs can be met by a wiser utilization of the woodwaste resource. In this submission, we explore the preliminary results of the national and regional institutional analyses and the community appraisals. In the final stage of our research, we will develop a set of business models to present to potential investors demonstrating the generation of power at sawmills with excess sales to the national grid or directly to rural communities.

Analysis of Local Communities and broader Institutions

Community Attitudes and Development Needs: Poor urban and rural communities in Zimbabwe rely on biomass to meet most of their energy needs. However, they also rely on commercial forms of energy, including kerosene and lead-acid or dry cell batteries. ESMAP reports that over 200,000 rural households use lead-acid batteries, at a cost of 1.4 – 2.1 US\$ kWh⁻¹. Additionally, in urban areas, where grid electricity is available, some households still use woodfuels[4].

We are conducting participatory analyses in communities neighboring sawmills and plantations in order to determine the ways in which waste generated by the timber industry can meet their development needs. The relationship between the industry and the local people is enmeshed in the local political economy and there are competing tensions characterizing community-industry relations. Community priorities for land, jobs, environment, and access to resources, including clean and reliable energy services, are not well defined. By working with communities to assess their priorities, we will ensure that the use of woodwaste for energy can serve their needs.

National Institutions: Like many nations, Zimbabwe is undergoing reform of its power sector. New policies recommended to Zimbabwe's parliament, outlined in the Electricity White Paper [2], will drastically change current practices, opening the sector up to both domestic and international competition. It will also allow for the existence of independent power providers (IPPs), which is critical for the establishment of sawmill waste-based power generation. Another national institution that is currently undergoing intense scrutiny and reform is the system of land distribution. In Zimbabwe, land reform is the issue around which all other policies revolve. The outcome of current struggles over land will play a decisive role in the future of Zimbabwe's timber industry as well as the potential for land-intensive biomass-based power generation.

International Institutions: Other institutions that we are analyzing are international in scope. One example is the role of developing countries in climate change mitigation. Climate change negotiations remain in flux, but current discussions indicate that industrial countries will be allowed to meet some of their emissions reduction obligations with projects designed to offset emissions in developing countries. The provision of power from woodwaste would reduce greenhouse gas emissions by displacing fossil fuel generated electricity. The majority of Zimbabwe's power is produced by coal and woodwaste-based power generation is a good opportunity for an investor to gain credits for avoided carbon emissions. Also of interest at the international level is the applicability of our methodology to similar situations in countries throughout sub-Saharan Africa where there are timber and agricultural processing industries generating large amounts of wastes and residues. A model of decentralized community energy provision through the utilization of locally generated biomass waste products could, when adapted to local conditions, be applied widely throughout the continent. Ultimately, we seek to develop such a model.

References

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